CITY OF ENUMCLAW

KING COUNTY **WASHINGTON**

WATER SYSTEM PLAN

G&O #22501
FINAL
FEBRUARY 2024

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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TABLE OF CONTENTS

CHAPTER 1 –WATER SYSTEM DESCRIPTION

INTRODUCTION 1-1
WATER SYSTEM OWNERSHIP AND MANAGEMENT 1-1
PROJECTS COMPLETED SINCE THE 2013 WATER SYSTEM PLAN 1-1
SYSTEM BACKGROUND 1-2
History 1-2
Overview of Existing System 1-2
RELATED PLANNING DOCUMENTS 1-3
City of Enumclaw 2013 Comprehensive Water System Plan 1-3
City of Enumclaw 2015 Comprehensive Plan 1-3
King County 2020 Countywide Planning Policies and Comprehensive Plan 1-4
South King County 1989 Coordinated Water System Plan 1-4
Watershed Plans 1-5
WRIA 9 (Green River) Watershed Restoration and Enhancement Plan 1-5
WRIA 10 (White River) Watershed Restoration and Enhancement Plan 1-6
WATER SERVICE AREAS 1-6
Retail Service Area 1-7
Duty to Serve 1-7
Future Service Area 1-7
Water Service Area Agreement 1-8
Adjacent Purveyors 1-8
Group A Systems 1-9
Group B Systems 1-9
Service Area Policies and Conditions of Service 1-10
Applications for New Service 1-13
Satellite System Management 1-14
WATER SERVICE AREA CHARACTERISTICS 1-15
Geology 1-15
Hydrogeology 1-15
Geography 1-15
Site Senstive Areas 1-16
Wildlife Habitats 1-16
Wetlands 1-16
Water Bodies 1-16
Flood Hazard Areas 1-16
Seismic Hazard Areas 1-16
Erosion Hazard Areas 1-16
Landslidge Hazard Areas 1-17
Land Use and Zoning 1-17
INVENTORY OF EXISTING FACILITIES 1-19

Sources of Supply 1-19
Boise Spring 1-20
Watercress Spring 1-20
PC Johnson Wellfield 1-21
Golf Course Well 1-22
Water System Interties 1-22
Water Rights 1-22
Treatment 1-29
Corrosion Control 1-29
City of Tacoma Treatment 1-30
Pressure Zones 1-30
Storage 1-31
1.0 MG City Reservoir 1-32
3.0 MG City Reservoir 1-32
Crews Reservoir 1-32
Stanridge Hill Reservoir 1-33
Fairway Hills Reservoir 1-33
Pump Station Facilities 1-34
Weyerhaeuser Booster Pump Station 1-36
New Horizons Booster Pump Station 1-36
Stanridge Hill Booster Pump Station 1-36
1013 Zone Booster Pump Station 1-36
983 Zone Booster Pump Station 1-37
Fairway Hills Booster Pump Station 1-37
Highview Booster Pump Station 1-37
Pressure Reducing Stations 1-37
Distribution and Transmission System 1-38
Telemetry and Supervisory Control System 1-39
Water System Operation and Control 1-40

CHAPTER 2 – BASIC PLANNING DATA

INTRODUCTION 2-1
EXISTING POPULATION, SERVICES, AND WATER DEMAND 2-1
Population 2-1
Service Connections 2-2
Water Use 2-3
Production History: 2013-2021 2-3
Consumption History: 2013-2021 2-5
Equivalent Residential Units 2-7
Large Water Users 2-10
Distribution System Leakage 2-11
Per Capita Water Production 2-13
FUTURE WATER DEMANDS 2-13
Projected Growth 2-14
Population 2-14

Water Use 2-17

CHAPTER 3 – SYSTEM ANALYSIS

INTRODUCTION 3-1
SYSTEM DESIGN STANDARDS 3-1
Basis of Design Standards 3-1
State Standards 3-1
City Standards 3-2
General Facility Design Standards 3-2
WATER QUALITY STANDARDS 3-7
Applicable Drinking Water Quality Regulations 3-7
Water Quality Standards and Analysis 3-8
Arsenic 3-8
Asbestos 3-9
Consumer Confidence Report 3-9
Disinfectants and Disinfection Byproducts Rule 3-9
Inorganic Physical and Chemical Characteristics 3-10
Lead and Copper Rule 3-12
Revised Lead and Copper Rule 3-13
Per- and Polyfluoroalkyl Substances 3-13
Radionuclides and Radon 3-14
Residual Disinfectant 3-15
Groundwater Rule 3-15
Revised Total Coliform Rule 3-16
Unregulated Contaminant Monitoring Rule 3-17
Volatile Organic and Synthetic Organic Compounds 3-18
Surface Water Treatment Rule (Long-Term 1 and 2 Enhanced Rules) 3-19
Wellhead Protection Program 3-19
Water Quality Monitoring Schedule 3-20
FACILITY ANALYSIS 3-20
Sources of Supply Analysis 3-20
Water Rights Analysis 3-21
Source Production Capacity Analysis 3-21
Treatment System Analysis 3-22
Disinfectant Residual Concentration and Chlorine Contact Time (CT) 3-23
pH Monitoring 3-23
Treatment Monitoring 3-24
Individual Zone Supply and Booster Pump Station Analysis 3-24
888 Zone Facilities 3-25
Stanridge Hill Booster Pump Station 3-25
983 Zone Booster Pump Station 3-26
New Horizons Booster Pump Station 3-27
Highview Booster Pump Station 3-28

1013 Zone Booster Pump Station 3-28
Fairway Hills Booster Pump Station 3-29
Weyerhaeuser Booster Pump Station 3-29
Storage Analysis 3-30
Dead Storage 3-30
Operational Storage 3-31
Equalizing Storage 3-31
Standby Storage 3-32
Fire Suppression Storage 3-32
Storage Capacity Summary 3-33
Storage Facility Condition 3-35
Distribution System Analysis 3-35
System Capacity Summary 3-35
SYSTEM DEFICIENCIES 3-37
Water Quality 3-37
Sources of Supply 3-37
Water Rights 3-37
Booster Pump Stations 3-37
Storage 3-37
Distribution System 3-38
ASSET MANAGEMENT 3-38

CHAPTER 4 – HYDRAULIC ANALYSIS

INTRODUCTION 4-1
HYDRAULIC MODELING PROGRAM 4-1
MODEL ASSUMPTIONS 4-2
Sources 4-2
Storage 4-2
Booster Stations 4-4
Pressure Reducing Valves (PRVs) 4-4
SYSTEM DEMANDS 4-4
MODEL CALIBRATION 4-5
Field Test 4-5
MODELED SCENARIOS AND RESULTS 4-8
Peak Hour Analysis 4-8
Available Fire Flow Analysis 4-9

CHAPTER 5 – WATER USE EFFICIENCY PROGRAM

OBJECTIVE 5-1
WATER USE EFFICIENCY PLANNING REQUIREMENTS 5-1
WATER USE EFFICIENCY REQUIREMENTS 5-2
Source and Service Metering 5-2
Data Collection 5-3
Distribution System Leakage 5-3
Water Demand Forecast 5-4

Water Use Efficiency Goals and Program 5-4
Past Water Use Efficiency Goals and Measures 5-4
Past WUE Measures 5-5
New Water Use Efficiency Goals 5-7
Water Use Efficiency Measures 5-9
Performance Reporting 5-12

CHAPTER 6 – SOURCE WATER PROTECTION PROGRAM

INTRODUCTION 6-1
WELLHEAD PROTECTION PROGRAM 6-1
Geology 6-2
Susceptibility Assessment 6-2
Delineation of Wellhead Protection Areas 6-3
Inventory of Potential Contaminants 6-3
Spill Response Plan 6-3
Contingency Plan 6-5

CHAPTER 7 – OPERATION AND MAINTENANCE PROGRAM

INTRODUCTION 7-1
WATER SYSTEM MANAGEMENT 7-1
Operator Certification 7-1
Professional Growth Requirements 7-2
Staffing Requirements 7-2
SYSTEM FACILITIES AND OPERATIONS 7-5
Sources and Treatment Facilities 7-5
Boise Spring 7-5
Watercress Spring 7-6
PC Johnson Wellfield 7-7
Golf Course Well 7-8
City of Tacoma Intertie 7-9
Treatment 7-9
Reservoirs 7-11
1.0 MG City Reservoir 7-11
3.0 MG City Reservoir 7-11
Crews Reservoir 7-12
Stanridge Hill Reservoir 7-13
Fairway Hills Reservoir 7-14
Booster Pump Stations 7-15
Weyerhaeuser Booster Pump Station 7-15
New Horizon Booster Pump Station 7-16
Stanridge Hill Booster Pump Station 7-16
Corrosion Control Facility Booster Pump Station 7-17
983 Zone Booster Pump Station 7-18
Fairway Hills Booster Pump Station 7-18
Highview Booster Pump Station 7-19

Distribution System 7-20
PREVENTIVE MAINTENANCE PROGRAM 7-20
Major System Facilities 7-21
Meters 7-24
Tools and Equipment 7-24
Inventory of Materials 7-25
Operation and Maintenance 7-25
WATER QUALITY 7-26
Water Quality Procedures 7-26
Water Quality Monitoring Schedule 7-26
EMERGENCY RESPONSE PROGRAM 7-26
Water System Personnel Emergency Contact List 7-26
Emergency Response Plan 7-26
Power Failure 7-26
Water Main Break 7-27
Severe Earthquake 7-27
Major Fire 7-28
Cold and Severe Weather Conditions 7-28
Water Shortage Emergency 7-28
NOTIFICATION PROCEDURES 7-29
Public Notifications 7-29
Bacteriological Presence Detection 7-30
VOC and SOC Detection 7-31
Inorganic Chemical Detection 7-31
CONTINGENCY OPERATIONAL PLAN 7-31
SAFETY PROCEDURES 7-31
Safety Program 7-31
Confined Spaces 7-32
Electrical and Mechanical Equipment 7-32
Chemicals 7-32
Chlorine Gas Leak Procedure 7-33
AC and Pressurized Water Main 7-33
Equipment and Supplies 7-33
Environmental Awareness Practices 7-34
CROSS-CONNECTION CONTROL PROGRAM 7-34
WELLHEAD PROTECTION PLAN 7-34
RECORD KEEPING AND REPORTING 7-34
CUSTOMER COMPLIANT PROGRAM 7-36
OPERATION AND MAINTENANCE DEFICIENCIES 7-36

CHAPTER 8 – CAPITAL IMPROVEMENT PLAN

INTRODUCTION 8-1
CAPITAL IMPROVEMENT PLAN 8-1
Storage Improvements 8-2
ST-1: New 2 MG Reservoir (2033/2034+) 8-2

ST-2: Decommission 1 MG Reservoir (2034+) 8-2
ST-3: Storage Integrity Evaluation (2033) 8-2
ST-4: Reduce Dead Storage in Crews Reservoir (2024) 8-3
Source Improvements 8-3
SO-1: New Watercress Well 1 (2034+) 8-3
SO-2: PC Johnson Wellfield Manganese Treatment Predesign and 3rd Well Review (2025) 8-3
SO-3: PC Johnson Well 3 Pump Replacement (2032) 8-4
Booster Pump Station 8-4
BS-1: Replacement Equipment at Lower New Horizons BPS (2023) 8-4
BS-2: Emergency Generator at Lower New Horizons BPS (2034+) 8-4
Distribution System 8-4
D-1: Stevenson Avenue from Marion Street to Railroad Street (2034+) 8-5
D-2: Marion Street from Stevenson Avenue to Edith Avenue (2034+) 8-5
D-3: Stevenson Avenue from Railroad Avenue to Roosevelt Avenue (2028) 8-5
D-4: Roosevelt Avenue from Stevenson Avenue to Watson Street (2028) 8-6
D-5: Roosevelt Avenue Transmission Main (2027) 8-6
D-6: Farman Street Looping (2031) 8-7
D-7: Boise Springs Transmission Main (2024/2025) 8-7
D-8: Porter Street from Battersby Avenue to McHugh Avenue (2034+) 8-7
D-9: Griffin Avenue from Pioneer Street to Florence Street (2034+) 8-7
D-10: Griffin Avenue from Florence Street to Highpoint Street (2034+) 8-8
D-11: Lafromboise Street Alley from Elmont Avenue to Montgomery Avenue (2030) 8-8
D-12: Montgomery Avenue and Pioneer Street (2030) 8-8
D-13: Harding Street from Kibler Avenue to Griffin Avenue (2027) 8-9
D-14: McHugh Avenue from 2512 to 2840 McHugh (2025) 8-9
D-15: Washington Avenue from Porter Street to James Street (2032) 8-9
D-16: Steel Main Replacement (Annual) 8-10
D-17: Y Bar S Main Replacements (2029, 2034+) 8-10
Z-1: New Western Pressure Zone (2026) 8-10
General Improvements 8-11
G-1: Comprehensive Water System Plan Update (2033) 8-11
G-2: Boise Spring Rehabilitation (2034+) 8-11

G-3: PC Johnson Automatic Transmission Main Control Valve (2031) ... 8-11
G-4: PC Johnson Wellfield Chlorine Analyzer (2031) ... 8-11
G-5: PC Johnson Wells 2 and 3 Rehabilitation ... 8-11
G-6: Automatic Flushing Devices (2027) ... 8-11
G-7: Rural Area Isolation Valves (Annual) ... 8-12
G-8: Facility Equipment Replacements (2034+) ... 8-12
G-9: Miscellaneous Water System Improvements (Annual) ... 8-12
Project Prioritization and Scheduling ... 8-12
Summary of Recommended Improvements ... 8-13

CHAPTER 9 – FINANCIAL PROGRAM

INTRODUCTION ... 9-1
WATER RATES ... 9-1
CONNECTION FEES ... 9-2
FINANCIAL STATUS OF EXISTING UTILITY ... 9-3
Existing Revenue and Expenses ... 9-3
WATER UTILITY FINANCIAL ANALYSIS ... 9-6
PROJECTED REVENUES AND EXPENDITURES ... 9-6
Revenues ... 9-6
Expenditures ... 9-6
Projected Water Utility Balance ... 9-7
WATER RATE EVALUATION ... 9-10
AVAILABLE CAPITAL PROJECT FUNDING SOURCES ... 9-12
Public Works Trust Fund ... 9-12
Drinking Water State Revolving Fund ... 9-13
Community Economic Revitalization Board (CERB) ... 9-13
Revenue Bonds ... 9-14

LIST OF TABLES

No.	Table	Page
1-1	Water System Ownership Information	1-1
1-2	CIP Projects Completed Since 2013 Plan	1-2
1-3	Service Area Policies	1-10
1-4	Zoning Classifications for Enumclaw's Water Service Area	1-18
1-5	Enumclaw Sources of Supply Summary	1-20
1-6	Existing Water Rights Summary	1-24
1-7	Enumclaw Storage Facility Summary	1-31
1-8	Enumclaw Booster Pump Station Facility Summary	1-35
1-9	Enumclaw Pressure Reducing Station Facility Summary	1-38
1-10	Water Main Inventory	1-39
2-1	Estimated Water Service Area Population 2013 through 2021	2-1
2-2a	Historical Water Service Connections 2013 through 2021	2-2
2-2b	Water Service Connection – 2021	2-3
2-3	Annual Metered Water Production by Source 2013 through 2021	2-3
2-4	Monthly Metered Water Production by Source for 2021	2-4
2-5	Average Daily and Maximum Day Production by Source 2013 through 2021	2-4
2-6	Metered Consumption by Customer Class 2013 through 2021	2-5
2-7	Metered Consumption by Customer Class and Month for 2021	2-6
2-8	Consumption per Zone for 2021	2-6
2-9	Equivalent Residential Units (ERUs) 2013 through 2021	2-7
2-10	Year 2021 Equivalent Residential Units	2-10
2-11	Year 2021 Large Water Users	2-10
2-12	Distribution System Leakage 2013 through 2021	2-12
2-13	Water Production per Capita 2013 through 2021	2-13
2-14	Projected Population	2-17
2-15	Water Use Projections	2-19
3-1	General Facility Requirements	3-4
3-2	Drinking Water Regulation Summary	3-7
3-3	Stage 2 D/DBP Monitoring Results (µg/L)	3-10
3-4	Primary and Secondary Water Quality Standards for Inorganic Physical and Chemical Parameters	3-11
3-5	Inorganic Chemical and Physical Characteristics Above State Reporting Limits	3-12
3-6	Lead and Copper Testing Results (2019)	3-13
3-7	PFAS SALs	3-14
3-8	Radionuclide MCLs and Results (August 2021)	3-15
3-9	Regulated VOCs and SOCs	3-18
3-10	Water Right Analysis	3-21
3-11	Source Production Capacity Analysis (All Sources)	3-22
3-12	Contact Time Provided	3-23

No.	Table	Page

3-13 888 Zone Supply Analysis 3-25
3-14 Stanridge Booster Pump Station Pumping Capacity 3-26
3-15 983 Zone Booster Pump Station Pumping Capacity 3-26
3-16 New Horizons Booster Pump Station Pumping Capacity 3-27
3-17 Highview Booster Pump Station Pumping Capacity 3-28
3-18 1013 Zone Booster Pump Station Pumping Capacity 3-28
3-19 Fairway Hills Booster Pump Station Pumping Capacity 3-29
3-20 Weyerhaeuser Booster Pump Station Pumping Capacity 3-30
3-21 Storage Analysis (MG) 3-34
3-22 ERU Capacity Analysis Summary 3-36
4-1 Maximum Day Demand (Fire Flow) Model Inputs 4-3
4-2 Peak Hour Demand Model Inputs 4-3
4-3 Hydrant Field Testing Locations 4-6
4-4 Conditions During Hydrant Testing 4-7
4-5 Model Calibration 4-8
4-6 Target Fire Flows 4-9
5-1 Summary of WUE Requirements 5-2
5-2 Summary of Water Use Data Collection 5-3
5-3 Projected Water Use Efficiency Savings 5-8
5-4 2023 Water Rate Schedule 5-10
5-5 City WUE Measures 5-11
7-1 Personnel Certifications 7-2
7-2 Annual Staff Hours by Activity 7-3
7-3 Water System Maintenance Schedule 7-21
7-4 Preventive Mainteance Schedule for Meters 7-24
7-5 Tools and Equipment Maintenance Schedule 7-24
7-6 Equipment List 7-25
7-7 Severe Earthquake Response 7-27
7-8 Water Contamination Response 7-30
8-1 Capital Improvement Plan Project Summary 8-13
9-1 2023 Monthly Water Service Rates 9-1
9-2 2023 Connection Fees 9-2
9-3 2023 Fire Sprinkler System Charge 9-3
9-4 Historical Revenue and Expense Summary 9-4
9-5 Forecast Factors 9-6
9-6 Projected Revenue and Expenditures 9-8
9-7 Projected Revenue and Expenditures with CIP Program, 5 Percent per Year Rate Increase 9-9
9-8 High-Priority CIP Projects 9-10

LIST OF FIGURES

No.	Figure	On or Follows Page
1-1	Regional Vicinity Map	1-2
1-2	Water System Base Map	1-2
1-3	Service Areas	1-6
1-4	Adjacent Purveyors	1-8
1-5	Topography	1-16
1-6	Site Sensitive Areas – Water	1-16
1-7	Site Sensitive Areas – Soil	1-16
1-8	City Zoning	1-18
1-9	King County Zoning	1-18
1-10	Water System Schematic	1-20
1-11	Hydraulic Profile	1-30
2-1	Consumption Trends	2-9
2-2	Service Area TAZs	2-14
2-3	Population Projections	2-16
3-1	pH Measurements	3-24
4-1	PHD Modeling (2043)	4-8
4-2	Fire Flow Modeling w/2043 MDD	4-8
4-3	Fire Flow w/2043 MDD and CIP Projects	4-10
4-4	Change in Fire Flow After CIP	4-10
7-1	Chlorination System	7-6
7-2	Watercress Springs Building	7-7
7-3	PC Johnson Well 3 Building	7-8
7-4	Tacoma Intertie Vault	7-9
7-5	Corrosion Control Facility	7-10
7-6	3 MG Reservoir	7-12
7-7	Crews Reservoir	7-12
7-8	Stanridge Hill Reservoir	7-14
7-9	Fairway Hills Reservoir	7-15
7-10	Weyerhaeuser Booster Pump Station	7-15
7-11	New Horizons Booster Pump Station	7-16
7-12	Stanridge Hill Booster Pump Station	7-17
7-13	Corrosion Control Facility Booster Pump Station	7-17
7-14	983 Zone Booster Pump Station	7-18
7-15	Fairway Hills Booster Pump Station	7-19
7-16	Highview Booster Pump Station	7-20
8-1	Capital Improvement Projects	8-2
8-2	Steel Main Replacements	8-10

APPENDICES

Appendix A – DOH Project Approval Application and Submittal Forms
Appendix B – Water Facilities Inventory Form
Appendix C – Consistency Determinations
Appendix D – Group B Water Systems
Appendix E – Water System Construction Standards
Appendix F – SEPA Checklist
Appendix G – Additional Data on the City's Sources and Facilities
Appendix H – Retail Agreements
Appendix I – Water Right Certificates, Permits, and Self-Assessment Form
Appendix J – 2022 Consumer Confidence Report
Appendix K – Water Quality Monitoring Schedules, Waiver for Asbestos Testing, DBP Plan, Coliform Plan, 2022 Water Quality Monitoring Report
Appendix L – Emergency Response Plan, Boil Water
Appendix M – Wellhead Protection Plan, DOH Determination WHPA
Appendix N – Complete Modeling Results
Appendix O – WUE Documents
Appendix P – Cross-Connection Control Program
Appendix Q – CIP Cost Estimates
Appendix R – Water Use Efficiency Documentation
Appendix S – Agency Review Correspondence

CHAPTER 1

WATER SYSTEM DESCRIPTION

INTRODUCTION

In accordance with Washington Administrative Code (WAC) 246-290-100 and the Washington State Department of Health (DOH), water system plans are required to be updated and submitted to DOH every 10 years, or more frequently if necessary, to reflect the current conditions of the water system. This Water System Plan (Plan) has been prepared to update the City of Enumclaw's 2013 *Comprehensive Water System Plan* (2013 Plan). Copies of the DOH Project Approval Application and Submittal Forms are included in Appendix A.

WATER SYSTEM OWNERSHIP AND MANAGEMENT

The City of Enumclaw (City) owns and operates a municipal water system that serves the City and the surrounding areas within unincorporated King County. Table 1-1 provides the City's water system ownership information.

TABLE 1-1

Water System Ownership Information

Information Type	Description
System Type	Group A – Community – Public Water System
Owner Name	Enumclaw Water Department
County	King
DOH System ID Number	236001
Address	2041 Railroad Street, Enumclaw, WA 98022
Contact	Kyte Ramberg
Contact Phone Number	(360) 825-5541

A copy of the City's Water Facilities Inventory (WFI) Form is included in Appendix B. Figure 1-1 provides a regional vicinity map showing the location of the system.

PROJECTS COMPLETED SINCE THE 2013 WATER SYSTEM PLAN

The City of Enumclaw completed several Capital Improvement Program (CIP) projects identified in the 2013 Plan. Projects were evaluated according to the necessity for maintaining the system, correcting deficiencies, improving capacity, addressing safety

concerns, and the financial feasibility. Table 1-2 identifies the CIP projects that have been completed since the City's 2013 Plan.

TABLE 1-2

CIP Projects Completed Since 2013 Plan

Project Description	2013 Project Number	Date Completed
2 MG Reservoir Replacement (3 MG Reservoir)	F4	2017
Golf Course Well with 983 Zone Booster Pump Station	F1, PZ1	2017
Fairway Hills Upper Booster Pump Station Replacement	F5, PZ4	2017
Automatic Meter Reading System	M1	2018-2021
New Horizons Booster Pump Station Roof Replacement	M3	2020
Corrosion Control Facility Caustic Soda Piping Replacement	M3	2020
Stanridge Hill Booster Pump Station	PZ3	2021
Zone 983 North Expansion	PZ2	2020
Telemetry Upgrades	M3	2013-2019
Minor and Miscellaneous Improvements	M3	2013-2022
Boise Spring Transmission Main Replacement (partial)	WM2	2022
Annual Water Main Replacement	WM1	2013-2021

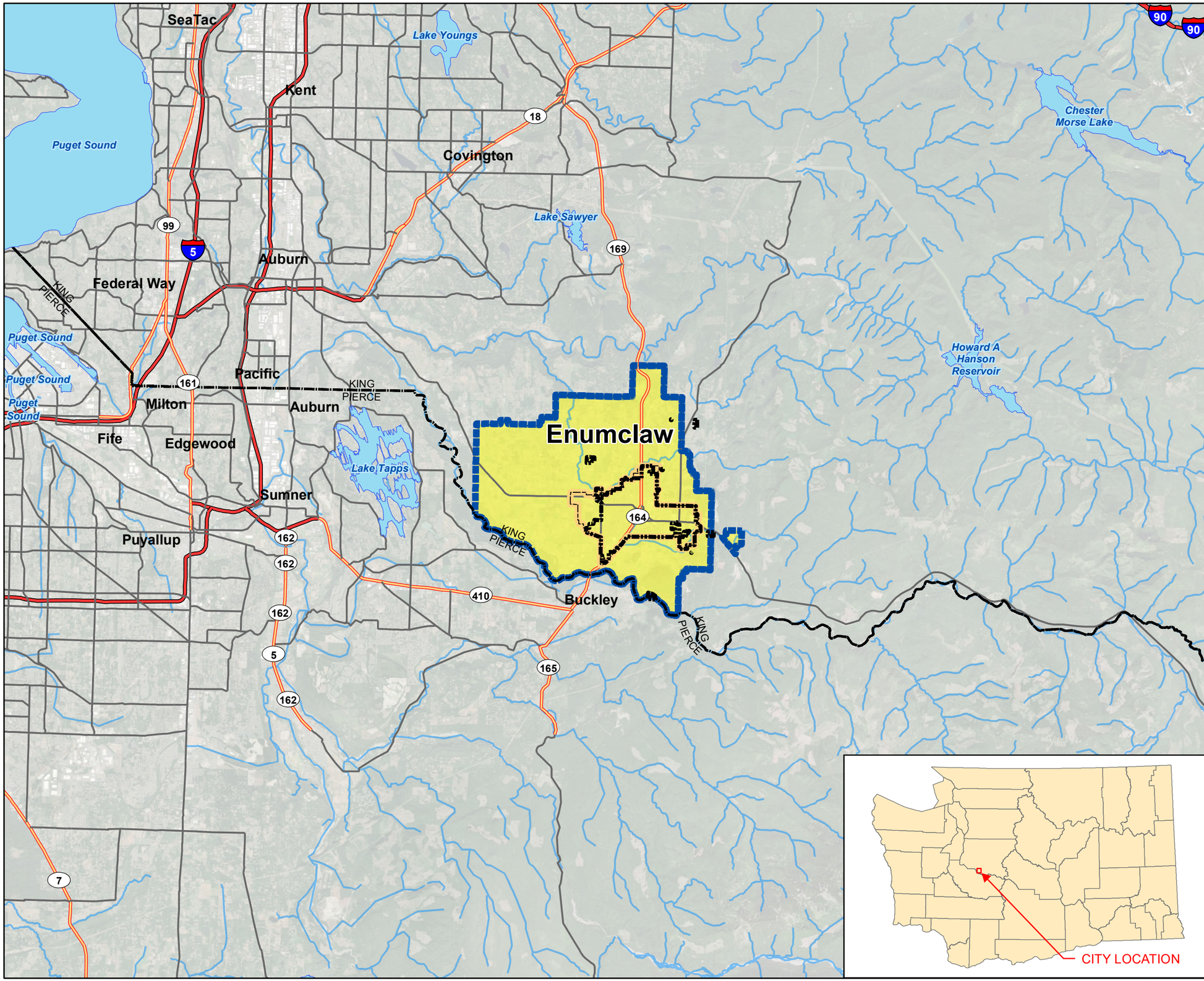
SYSTEM BACKGROUND

HISTORY

In 1879, Frank and Mary Stevenson homesteaded what is now the center of town. Early settlers called this area Stevensonville, but the name later changed to Enumclaw (which means "thundering noise") after Enumclaw Mountain near town. Enumclaw was first platted in 1885, when the railroad came through the area. In 1901, the Town of Enumclaw granted the Weyerhaeuser Company a 25-year franchise to operate a water system within the town. In 1913, the City was incorporated. In 1923, the City acquired the water system from Weyerhaeuser, which included Boise Spring. Since taking over ownership, the City has invested significantly in renovating the system, supplementing storage and supply facilities, and expanding the distribution network including assuming ownership of several small water companies.

OVERVIEW OF EXISTING SYSTEM

As of 2021, the City provides water service to 6,252 customer connections within the City's existing retail service area. The City's corporate limits cover 5.3 square miles of the approximately 28.8 square mile retail service area. The total estimated population within the retail service area is 16,900, with water service provided to an estimated 12,830 people inside the city limits and 4,070 people located outside of the city limits but within the existing retail water service area. The extent of Enumclaw's existing system can be seen in Figure 1-2.



LEGEND

- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- KING - PIERCE COUNTY LINE
- WATER BODY
- RIVER

Sources: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, King County GIS Data, Pierce County GIS Data, City of Enumclaw GIS Data, Washington Geospacial Open Data

N

0 10,000 20,000 40,000 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-1
REGIONAL VICINITY MAP

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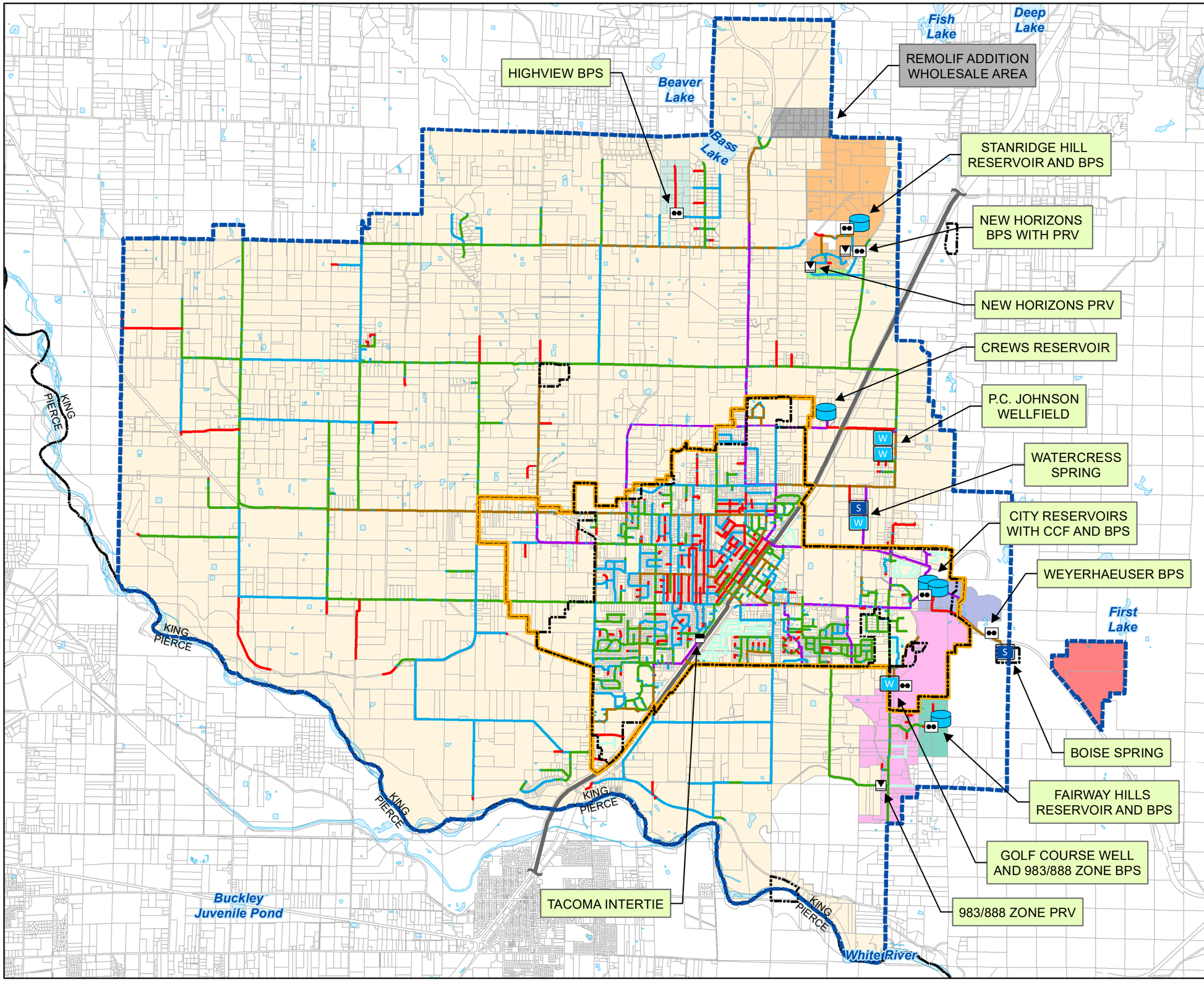
L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-1 REGIONAL VICINITY MAP.mxd



LEGEND

WATER MAIN

- 4-INCH AND SMALLER
- 6
- 8
- 10
- 12-INCH AND LARGER
- PRIVATE WATER MAIN
- TACOMA TRANSMISSION MAIN

PRESSURE ZONE

- 888
- 899
- 983
- 995
- 1013
- 1040
- 1175
- 1245

WATER FACILITIES

- BOOSTER STATION
- INTERTIE
- PRV STATION
- RESERVOIR
- SPRING
- WELL
- WATER SERVICE AREA
- KING - PIERCE COUNTY LINE
- CITY LIMITS
- WATER BODY
- URBAN GROWTH AREA
- PARCELS

Source: City of Enumclaw GIS Data, King Couty GIS Data, Washington Geospacial Open Data

N

0 2,450 4,900 9,800 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-2
WATER SYSTEM BASE MAP

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CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-2 WATER SYSTEM BASE MAP.mxd

The City owns and operates six groundwater supply facilities at four sites to the east of the City: Boise Springs, Watercress Springs, PC Johnson Wellfield, and the Golf Course Well. The City uses Boise and Watercress Springs as primary supply sources while the PC Johnson Wellfield and Golf Course Well are mainly seasonal sources. The City also has an emergency intertie connected to the Tacoma Water pipeline that carries surface water from Tacoma's Green River Filtration Facility through the City. Water produced at all of the City sources are chlorinated and water supplied from the spring sites receive additional treatment for corrosion control. Water from Tacoma is filtered, chlorinated, and fluoridated. Water storage is provided by four reservoirs that have a total capacity of 4.74 million gallons (MG). A fifth City owned reservoir is not currently operating and is scheduled to be decommissioned. In addition, the City's water system has eight pressure zones with three pressure reducing stations, seven booster pump stations, and more than 145 miles of water main. All of these facilities are described in detail later in this chapter.

RELATED PLANNING DOCUMENTS

To ensure this Water System Plan is consistent with service areas, land use, and other related policies, the following planning documents were evaluated during the preparation of this Water System Plan. Consistency determinations from the City of Enumclaw and King County are included in Appendix C.

CITY OF ENUMCLAW 2013 COMPREHENSIVE WATER SYSTEM PLAN

The previous water system planning document was completed by the City staff in 2013. This document was used as the framework for the current Plan. The 2013 Plan presented historical water use, projected water use, and developed a Capital Improvement Plan (CIP) for the City to implement. Since the 2013 Plan was published, the City has completed many of the identified CIP projects, which were detailed earlier in this Chapter and are noted in Table 1-2.

CITY OF ENUMCLAW 2015 COMPREHENSIVE PLAN

The Growth Management Act (GMA) was passed into law in the State of Washington in 1990 with the intention of curbing uncoordinated and uncontrolled development and the resulting environmental impact and urban sprawl. Several goals were adopted by the GMA to guide the development and adoption of comprehensive plans. These goals encourage development in urban areas where adequate public facilities and service can easily be provided, reduce sprawling low-density development, encourage efficient regional based transportation, promote a variety of housing densities and types, and encourage the retention of open space.

The City of Enumclaw completed the most recent update to their Comprehensive Plan in 2015 as an update to their original 1995 Comprehensive Plan. This planning document is required for compliance with Growth Management Act and includes goals, objectives,

and policies that may impact the Water System Plan. The Comprehensive Plan contains population growth projections, defines the City's Urban Growth Area (UGA), and contains a land use plan that is the model for the existing City of Enumclaw zoning.

In preparation for the upcoming 2024 Comprehensive Plan, the City updated the forecasted growth in 2021. The City's population projections are based on a minimum target of 15,864 people within the City Limits in 2044. These projections are used to prepare the water demand forecasts in this Water System Plan for consistency with the Comprehensive Plan.

KING COUNTY 2020 COUNTYWIDE PLANNING POLICIES AND COMPREHENSIVE PLAN

The King County Countywide Planning Policies and Comprehensive Plan was most recently updated in 2016 and amended in 2020. This planning document describes the land use and zoning of urban areas as well as that of rural, unincorporated King County. Similar to the City of Enumclaw's Comprehensive Plan, the County's policy goals and Comprehensive Plan seek to reduce urban sprawl, protect rural areas, provide affordable housing, and coordinate protection of environmentally sensitive areas.

The City serves both incorporated Enumclaw and unincorporated King County within the water service area. The City has determined that this Water System Plan is consistent with the applicable King County plans, policies, and regulations.

SOUTH KING COUNTY 1989 COORDINATED WATER SYSTEM PLAN

The South King County Coordinated Water System Plan (SKCCWSP) was developed by Economic and Engineering Services, Inc. in 1989. The purpose of the SKCCWSP is to assist the area's water utilities in establishing an effective process for the planning and development of public water systems while restricting the proliferation of small public water systems. The SKCCWSP accomplishes this by establishing future service area boundaries, minimum design standards, service review procedures, appeals procedures, long-term regional water supply strategy, water conservation program and goals, and the satellite system management program. As can be seen in the following sections of this Water System Plan, the City has established policies, design criteria, and goals that meet or exceed the requirements and goals of the SKCCWSP.

This Water System Plan proposes no changes to the City's water service area as represented in the SKCCWSP.

WATERSHED PLANS

WRIA 9 (Green River) Watershed Restoration and Enhancement Plan

In January 2018, the Washington State Legislature passed the Streamflow Restoration law (Revised Code of Washington (RCW) 90.94). The law clarifies how local governments issue building permits for homes intending to use a permit-exempt well for their domestic water supply and requires local watershed planning in 15 water resource inventory areas (WRIAs), including the Duwamish-Green watershed (WRIA 9). The law directs the Department of Ecology to lead Watershed Restoration and Enhancement Committees to develop Watershed Restoration and Enhancement Plans (watershed plans). The WRIA 9 Watershed Restoration and Enhancement Plan meets the requirements of the law.

Watershed plans must estimate the potential consumptive impacts of new permit-exempt domestic groundwater withdrawals on instream flows over 20 years (2018-2038), identify projects and actions to offset those impacts, and provide a net ecological benefit to the WRIA. The Department of Ecology (Ecology) established the Duwamish-Green (WRIA 9) Watershed Restoration and Enhancement Committee (Committee) in October 2018 and invited representatives from the following entities in the watershed to participate: tribal governments, county governments, city governments, Department of Fish and Wildlife, the largest non-municipal water purveyor, and interest groups.

The WRIA 9 Committee met for over 2 years to develop a watershed plan. Ecology issued the Final Guidance on Determining Net Ecological Benefit (Final NEB Guidance) (Ecology 2019) to ensure consistency, conformity with state law, and transparency in implementing RCW 90.94. The WRIA 9 Committee projected that a total of 632 new permit-exempt domestic wells (PE wells) will be installed within WRIA 9 during the 20-year planning horizon. The WRIA 9 Committee used this 20-year PE well projection to estimate 247.7 acre-feet per year (AFY), or 0.34 cubic feet per second (cfs), of new consumptive water use in WRIA 9 that this watershed plan must address and offset.

The WRIA 9 Committee sought projects to offset at least 495.4 AFY to account for uncertainties in the PE well projection and consumptive use estimate, including higher rates of water use that could result from climate change and changing development patterns. The WRIA 9 Committee developed the water offset target by doubling the 247.7 AFY consumptive use estimate. The offset target of 495.4 AFY also accounts for uncertainties related to project implementation. The WRIA 9 plan was adopted May 2021 by Ecology and once implemented should achieve a net ecological benefit, as required by RCW 90.94.030 and defined by the Final NEB Guidance (Ecology 2019).

WRIA 10 (White River) Watershed Restoration and Enhancement Plan

In October 2018, the Department of Ecology (Ecology) established the WRIA 10 Watershed Restoration and Enhancement Committee to collaborate with tribes, counties, cities, state agencies, and special interest groups in the Puyallup-White watershed, also known as Water Resource Inventory Area (WRIA) 10. The WRIA 10 Committee met for over 2 years to develop a watershed plan. This watershed plan projected 688 PE well connections over the 20-year planning horizon.

The estimated consumptive water use associated with the new PE well connections is 277.4 acre-feet per year (0.38 cfs); equivalent to 360 gallons per day for each new PE well. The projects and actions in this watershed plan will address and offset the consumptive water use from those PE well connections. The projects in this watershed plan include water right acquisitions, managed aquifer recharges, stormwater infiltration, and PE well decommissioning that provide an estimated offset of 788.3 acre-feet per year to benefit stream flows and enhance the watershed.

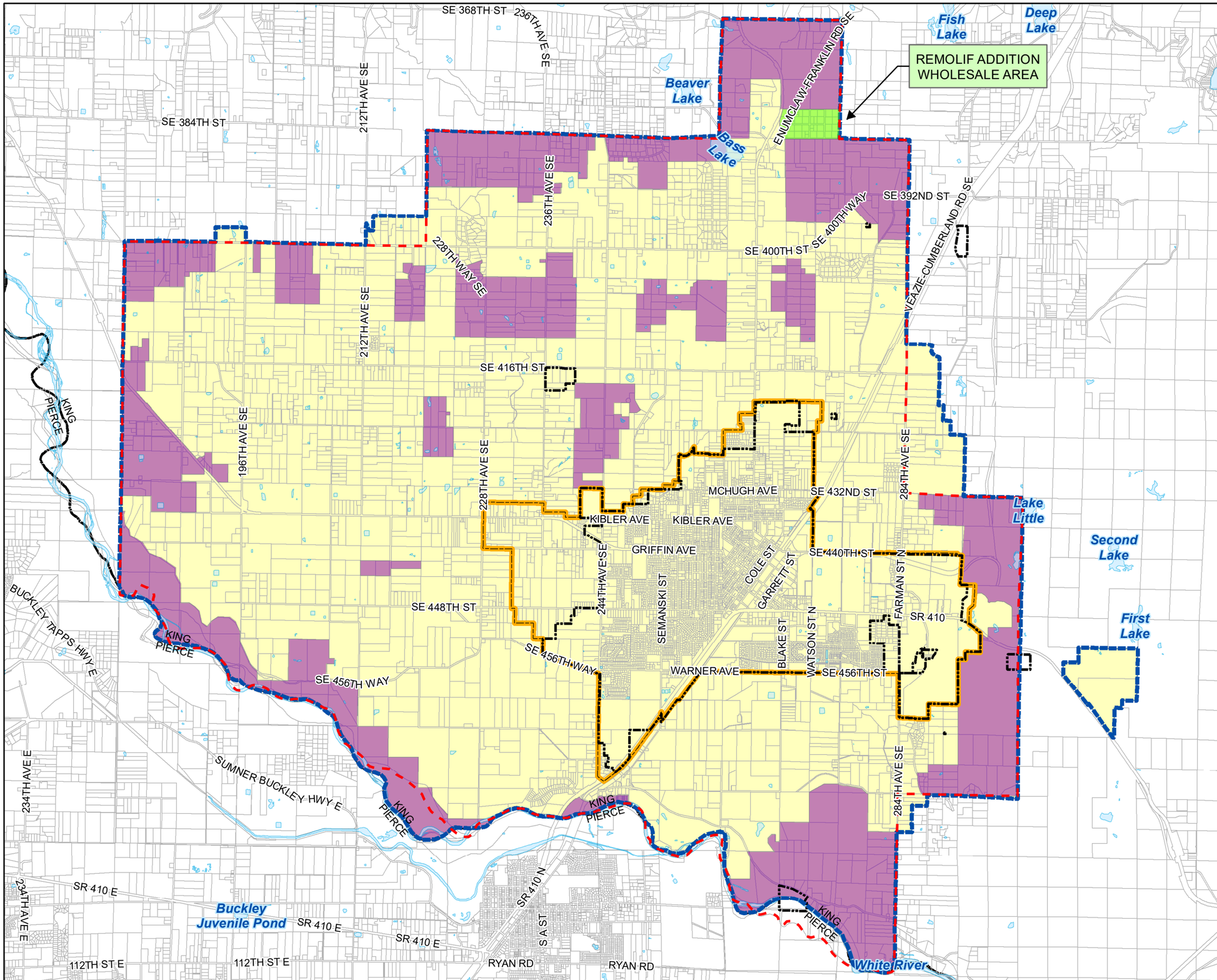
The WRIA 10 plan was adopted May 2021 by Ecology and once implemented should achieve a net ecological benefit, as required by RCW 90.94.030 and defined by the Final NEB Guidance (Ecology 2019).

WATER SERVICE AREAS

The corporate limits of the City of Enumclaw encompass an area of approximately 5.3 square miles, with the existing water service area and distribution system covering approximately 32 additional square miles within unincorporated King County, for a total service area of approximately 37.3 square miles. In accordance with the Washington State Municipal Water Law (MWL) and the South King County Coordinated Water System Plan (SKCCWSP), the City of Enumclaw has designated the existing water service area to include retail and future water service areas.

The City's service area designations are illustrated in Figure 1-3. The City's retail service area (RSA) represents where there is a duty to serve all customers. Generally, the RSA already has utility infrastructure in place and/or could easily expand the infrastructure to meet customer demands on a direct connection basis over both a 10- and 20-year planning horizon. The City's future service area represents the area where the City may provide future retail water service, but not necessarily during the current 10- or 20-year planning horizon.

Within the existing water service area, the City designated a single 0.1 square mile, wholesale service area for the Remolif Addition Group A Water System as shown on Figure 1-3. The Remolif Addition Water System, which is located near the northerly edge of the City service area, previously inquired whether the City could provide wholesale water supply but at a time when the City was not in a position to do so. Remolif subsequently drilled a replacement well, obviating the need to secure wholesale service.



LEGEND

- WATER SERVICE AREA
- RETAIL SERVICE AREA
- FUTURE SERVICE AREA
- WHOLESALE SERVICE AREA
- 1989 SKCCWSP SERVICE AREA BOUNDARY
- CITY LIMITS
- URBAN GROWTH AREA
- KING - PIERCE COUNTY LINE
- PARCELS
- WATER BODY

Source: City of Enumclaw GIS Data, King Couty GIS Data, Washington Geopspacial Open Data

N

0 2,500 5,000 10,000 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-3
SERVICE AREAS

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-3 SERVICE AREAS.mxd

However, the City is now able and willing to provide wholesale supply to Remolif should wholesale service be requested again in the future.

RETAIL SERVICE AREA

The City of Enumclaw's existing RSA reaches as far north as SE 384th Street near Bass Lake, south to the White River and the King County-Pierce County line, west to 180th Avenue SE, and east to approximately one-half mile east of 292nd Avenue SE. The specific boundaries of Enumclaw's retail water service area encompasses an area of approximately 28.8 square miles and can be seen on Figure 1-3.

Duty to Serve

In accordance with the MWL, the City acknowledges that it has a duty to serve all existing and new service connections within its designated RSA, as described above. However, the following four criteria must be met prior to providing service:

1. The City has sufficient water rights to provide service.

2. The City has sufficient capacity to serve water in a safe and reliable manner.

3. The service request is consistent with the adopted local plans, land use plans, and development regulations.

4. Service can be provided in a timely and reasonable manner.

Based on the reliability of existing sources and planned projects, the City has determined that it is capable of meeting its duty to serve customers within its retail service area over a 20-year planning horizon. No major changes or expansions to the City's retail service area are anticipated to occur over the next 10-year planning cycle. Minor changes within the City's service area may be made on a case-by-case basis.

FUTURE SERVICE AREA

As noted above, the duty to serve under state law is limited to the City's existing retail service area and does not extend to the City's defined future water service area. Given that the City is a municipal water supplier, portions of the future water service area may be converted to retail service area. Such action, however, assumes that the four criteria listed in the previous section are met as well as other applicable City service policies described later in this chapter.

At this time, the City's future water service area includes several subareas and/or properties where water mains do not currently exist and may not be easily extended. Other areas within the future water service area may currently conflict with the provision

of retail service and would therefore be inconsistent with the policies discussed later in this chapter. The future service areas are shown in Figure 1-3 and are generally located as follows:

1. Along the corridor of SE 406th Street extended between 216th Avenue SE and 240th Avenue SE

2. Along the corridor of SE 406th Street extended between 248th Avenue SE and 260th Avenue SE

3. Along 268th Avenue SE between SE 401st Street and SE 411th Street

4. In the vicinity of SE 424th Street and 244th Avenue SE

5. Along SE 424th Street between 220th Avenue SE and 224th Avenue SE

6. Along 216th Avenue SE near SE 444th Street.

The boundaries of the subareas/properties within Enumclaw's future water service area encompass approximately 8.5 square miles. No major changes or expansions to the City's future service area are anticipated to occur over the next 10-year planning cycle. Minor changes within the City's service area may be made on a case-by-case basis.

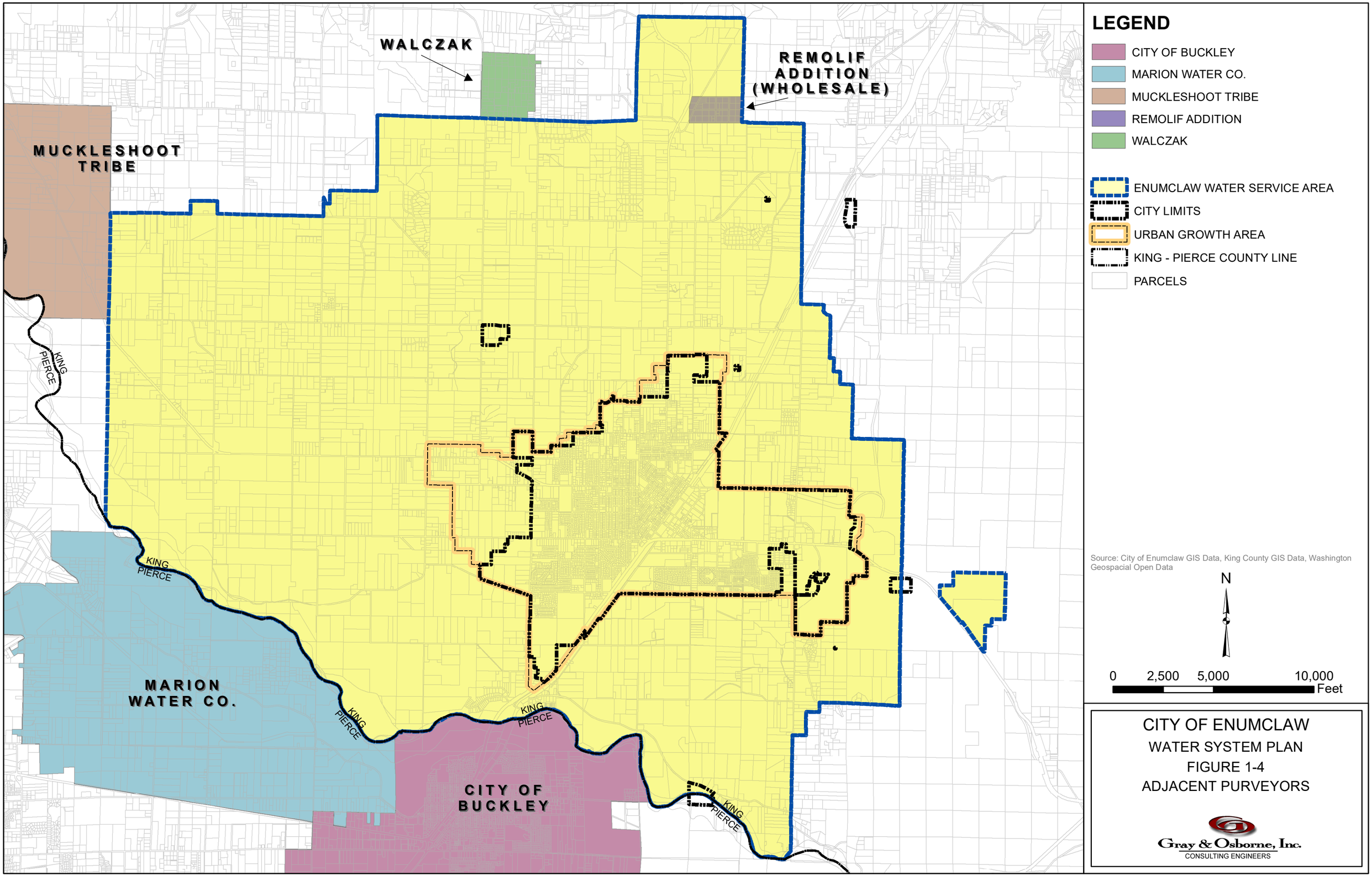
WATER SERVICE AREA AGREEMENT

All public water systems located within a Critical Water Supply Service Area (CWSSA) are required to define the external boundary of their water service area. The City's designated water service area is defined in the 1989 South King County Coordinated Water System Plan (SKCCWSP). This boundary is shown on Figure 1-3 relative to the City's existing service area boundary. All deviations from the SKCCWSP boundary to the existing service area have been reviewed and approved by the King County Utilities Technical Review Committee (UTRC). The Plan is consistent with the SKCCWSP planning efforts and a copy of the Plan will be sent to the King County UTRC for review and comment.

The City has a service area agreement in place with the Remolif Addition Water System, the only Group A water system within the boundaries of the City's water service area.

ADJACENT PURVEYORS

Group A and Group B water systems located in the vicinity of the City's water service area are shown in Figure 1-4 and Appendix D, respectively. There are currently no plans for an intertie between any of these systems and Enumclaw.



L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-4 ADJACENT PURVEYORS.mxd

Group A Systems

Marion Water System

The Marion Water System is located in Pierce County, southwest of the City's service area boundary. The water system serves approximately 370 connections and provides water service to approximately 970 people. Water is supplied to the system by two groundwater wells and an intertie with the City of Buckley.

Muckleshoot Water System

The Muckleshoot Water System is located immediately adjacent to Enumclaw's westerly water service area boundary. The Muckleshoot system has approximately 400 connections and provides water supply from two groundwater wells to approximately 1,600 residents and to commercial customers such as the Muckleshoot Casino and Amphitheater.

Walczak Water System

The Walczak Water System is located north of the City's water service area. The water system has approximately 75 service connections and provides water to approximately 250 people. The Walczak Water System has one groundwater well.

Remolif Addition Water System

The Remolif Addition Water System is located within the northeastern portion of the City's water service area. The water system has approximately 25 service connections and provides water to approximately 75 people. The Remolif Addition Water System has two groundwater wells.

City of Buckley

The City of Buckley's water system is located in Pierce County, south of the City of Enumclaw's water system. The City of Buckley serves a population of approximately 4,700 through approximately 1,825 connections. Five groundwater wells and an intertie with Rainier School are currently providing water supply to Buckley. Buckley has an emergency-only intertie with the City of Tacoma.

Group B Systems

Based on data provided by the Washington State Department of Health (DOH), there are approximately 60 Group B systems located within the City of Enumclaw's service area boundary. Data on each system, including a map illustrating the system locations, is attached in Appendix D.

SERVICE AREA POLICIES AND CONDITIONS OF SERVICE

The City has developed a series of service policies in accordance with the statutes, policies, and rules set forth by the Municipal Water Law (MWL), Department of Health (DOH), and other related legal authorities. The service policies shown in Table 1-3 below ensure the City provides high quality water service at a minimum cost to its customers.

TABLE 1-3

Service Area Policies

Policy Type	City Policy	Source
Water Rates	The City's water rates are established through ordinance by the City Council. Rates shall be adjusted annually for inflation by the Consumer Price Index (CPI).	2023 Water System Plan EMC[(1)] 14.04.190
Wheeling Water	The City of Enumclaw currently does not have a wheeling policy nor do they foresee having a policy in the future until such a time as the Tacoma source is converted to a seasonal supply.	—
Wholesaling Water	Wholesale water service may be extended to water systems identified as falling within the City's wholesale water service area, subject to the agreement of the water system requesting wholesale service to assign its existing water right(s) to the City as a condition of such service. Additionally, the provision of such wholesale supply is not inconsistent with King County's adopted land use plan, zoning, and development regulations. Wholesale service agreements shall be approved by the City Council.	2023 Water System Plan EMC 14.04.170
Water Rights	Areas annexed or water systems requesting service that have existing water right permits, certificates, or claims shall assign such water right(s) to the City for redevelopment as City municipal water supply sources.	2023 Water System Plan
Design and Performance Standards	This policy outlines the application process, effective dates of agreements, requirements for connecting with mains, specifications and maintenance of service pipes, installation fees, and locations and requirements of service pipes.	2023 Water System Plan Water System Construction Standards (Appendix E)
Surcharge for Outside Customers	A monthly surcharge on base and volume usage rates shall be collected on all water customer accounts outside the City limits: see current water rates in Chapter 9.	2023 Water System Plan EMC 14.04.190
Temporary Water Service	No temporary water service is allowed, unless there are plans for permanent water service that meets all City standards.	2023 Water System Plan
Emergency Water Service	Compliance with standards may be temporarily deferred for emergency water service. Policy criteria may be waived for emergency service.	2023 Water System Plan

TABLE 1-3 – (continued)

Service Area Policies

Policy Type	City Policy	Source
Urban Growth Areas	Water service may be extended outside of the City limits to properties located within the UGA and which fall within the City's retail water service area, as long as the proposed project/connection is not inconsistent with the City's adopted land use plan, zoning and development regulations.	2023 Water System Plan 2015 Comprehensive Plan
Remote System Policy	New remote water systems within the City's designated retail and future service area may be allowed subject to the condition that oversight and operation of the new system is contracted to an existing SMA or contract operator (paid by the new water system). The system shall remain part of the City's service area, but the City is under no obligation to own, operate, or extend retail or SMA services. Any such action may occur strictly at the discretion of the City, or if the operator requests water service and agrees to pay all related connection charges and commodity costs. In the event a remote public water system falling within the City's retail service area is placed in receivership by the Washington State Department of Health, King County shall serve as receiver of last resort of such system pursuant to RCW 43.70.195(1).	2023 Water System Plan
Future Service Areas	The provision of retail water service within the City's future service area is a discretionary act by the City subject to a determination that requests for service can be met pursuant to City retail service policies and consistent with WAC 246-290-108. All proposed connections/developments within the City's future water service area shall connect directly to the City's water system unless deemed unfeasible by the City at the time of the request. The City shall specifically evaluate the feasibility of service to applicants in its defined future service area based on the following factors: 1. Date that a written request for retail service is received. 2. Determination that adequate water supply exists beyond that required to meet existing and planned connections within the City's defined retail service area. 3. Compliance with City design, engineering, and operational standards. 4. Determination that costs relating to the extension of existing and/or construction of new mains, distribution lines, and other related facilities can be fully recovered by the City. Consistency with DOH retail service area criteria (WAC 246-290-106)	2023 Water System Plan

TABLE 1-3 – (continued)

Service Area Policies

Policy Type	City Policy	Source
Late-Comer Agreements	The City is required to enter into an agreement, when requested by the owner of the real estate, for reimbursement requiring benefited property owners to reimburse if they did not contribute to the original costs of water system facilities. The city shall deduct 10 percent out of all funds received for costs of administration. The amount received for normal hookup charges shall not be part of the agreement and shall be paid directly to the city. The contract shall be completed and executed within 180 days after completion of construction.	EMC 14.20.010
Cross-Connection Control Program	Cross-connections are prohibited and shall be removed. Failure to comply with the rules and regulations of the City shall result in the disconnection of service. Water service shall be contingent upon providing cross-connection control approved by the City. Backflow devices, if required, shall be approved by the City and tested a minimum of once a year.	EMC 14.16
Connection Fee Policy	The connection charge will be assessed against any property that has not participated in the development of the water system. Meter charges, or hookup fees, are additional in order to recover the cost of meter and service line installation. Credit for existing meters will be given when upgrading to a larger meter size. Connection fees shall be established and amended from time to time by the City Council.	2023 Water System Plan EMC 14.04.040
Permit Exempt Wells	Permit exempt wells are allowed in the City Retail Service Area for non-domestic usage. New permit exempt wells are also allowed temporarily for domestic usage in the Retail Service Area should service from the City be determined not to be timely or reasonable, subject to entering into an agreement with the City to connect and pay all costs of connection once service is available. Except when specifically required by the City as a condition of service, exempt wells will not be required to be decommissioned provided they are not interconnected with the City service or the City service is protected by an approved backflow device.	2023 Water System Plan
Extension Policy	Water system extensions required to provide water service to proposed developments shall be approved by the City and must conform to the adopted design criteria as well as construction standards and specifications. All costs of the extension shall be borne by the developer or applicant.	2023 Water System Plan

TABLE 1-3 – (continued)

Service Area Policies

Policy Type	City Policy	Source
Separate Metering of Existing Multifamily Units	Setting additional meters for existing singly metered multifamily service connections so that each unit has its own meter will not trigger additional capital facility charges since the units already exist and are currently served by City water. All costs shall be borne by the property owner and an agreement executed with the City documenting exercise of this policy.	2023 Water System Plan
Meter Upsizing for Residential Fire Sprinkler System	If a residence requires a fire sprinkler system and will be served by City water, then the meter may be upsized to 1" without incurring additional connection charges.	2023 Water System Plan
Dispute Resolution – Retail Service Area	In the event an individual water service applicant or party seeking a developer extension within the City's retail service area has a grievance regarding the "timely and reasonable" response of the City to his/her application, the applicant is directed to submit in writing to the City Public Works Director, a request for said grievance to be heard before the City Council. Prior to such a hearing, the Public Works Director shall consult with and make a recommendation to the City Council Public Works Committee. The Public Work Committee shall then submit its recommendation to the City Council for its consideration in the course of a Council hearing which the applicant may attend and present his/her position. Once a request for hearing is submitted, a hearing before the City Council shall occur within 60 days. A decision by the Council shall occur no later than 21 business days after the hearing.	2023 Water System Plan
Dispute Resolution – Future Service Area	Applicants for water service in the City's future service area may bring complaints relating to water service to King County. Additionally, applicants for water service may appeal the City's decision to the King County Utilities Technical Review Committee per the South King County CWSP and King County Code.	2023 Water System Plan

(1) Enumclaw Municipal Code (EMC).

Applications for New Service

To apply for new water service, the applicant must submit a request for service to the City's Public Works Department. Once received the request will be evaluated to determine fire flow availability, meter size, and improvements necessary for adequate water pressure, fire flow, looping or extensions. The adequacy of water system capacity to serve the applicant's property will also be evaluated at this time.

The applicant must complete any required improvements and pay the required connection fees to the City's Public Works Department before the new service may be installed. The determination as to whether a new water service will be installed by the City's installation crew or the applicant's contractor is at the sole discretion of the City. City

installations will be completed within three weeks of payment of the connection fees and issuance of any required permits, and within 30 days of installation of the service, the applicant will be billed the actual labor, material, and equipment cost, less any meter deposit amount.

If it has been determined that a property cannot be developed following payment of water service connection charges, the City will process a refund for the connection charges, less the City's costs to abandon the service. To obtain a refund, a written request must be made to the City's Public Works Department that includes documentation from King County or other responsible agency that the property cannot be developed (septic denial, wetlands, etc.), legal proof to whom the refund will be sent to, and a statement of agreement that the amount of the refund will be the total of the connection charges paid at the time the connection was purchased, less the cost to abandon the service.

For water service requests involving projects/properties located outside of the City limits, the City will, within two weeks and upon payment of a fee established by resolution of the City, issue a King County Certificate of Water Availability to the applicant that indicates the conditions that must be fulfilled prior to allowing the new water service connection. In instances that the City does not require connection to its system, King County Code allows a private well only conditioned upon a future connection when water service becomes available to the subject property.

Additional details regarding new water service connections are detailed in Enumclaw Municipal Code (EMC) 14.04.

Satellite System Management

A Satellite System Management Agency (SSMA) is defined as a person or entity that is certified by DOH to own or operate more than one public water system without the necessity for a physical connection between such systems. SSMAs can provide three different levels of service:

1. Ownership of the satellite system.

2. Operations and management of the satellite system.

3. Contract services only.

The service can be provided to new systems, existing systems which are no longer viable, or existing systems placed into receivership status by DOH. Due to staffing constraints, the City of Enumclaw is not in a position to act as an SSMA and has no plans to secure such a role. As discussed in the policies above, newly created remote systems may be allowed to operate within the City's designated service areas subject to the condition that such systems contract with an existing SMA for operational and regulatory compliance.

WATER SERVICE AREA CHARACTERISTICS

GEOLOGY

The City of Enumclaw is situated on the Osceola Mudflow Plain, a broad, relatively level upland above the deep embayment of the Duwamish Valley. The plain consists of lithified volcanic mudflow (lahar) deposits that have been eroded by the Green and White Rivers and their tributaries. The City of Enumclaw lies on the plain near the hydrologic divide between these two rivers. Bedrock consists of tertiary-age volcanic and coarse-grained sedimentary rocks, which comprise a few of the isolated hills on the plain near Enumclaw. Several episodes of Pleistocene to recent glaciation deposited several hundred feet of stratified glacial drift, dense glacial till, and glaciolacustrine silt which were eroded and reworked by succeeding glacial events and during interglacial periods. The complex glacial stratigraphy reflects the historical sequence of glacial ice advance and retreat, and concurrent deposition and erosion of glacial sediment. The most recent Vashon glacial event reached its maximum extent an estimated 13,000 years ago. Enumclaw lies near the terminus of the glacial ice, where extensive piles of unconsolidated sand and gravel accumulated along the ice margins. Post-glacial streams excavated channels and eroded slopes into the Vashon-age glacial sediment. The 5,000-year-old Osceola Mudflow, a massive volcanic debris flow emanating from Mount Rainier and transported along the White River channel, deposited clay, sand and boulders that filled channels and depressions in the Enumclaw area, leveling the surrounding topography to depths up to 80-feet thick.

HYDROGEOLOGY

Groundwater in the Enumclaw area, in sufficient quantities for sustainable withdrawal, resides in porous layers of stratified glacial drift and ice-contact sediments underlying the Osceola Mudflow Plain. Groundwater-bearing zones vary regionally in thickness and extent and typically occur 50 to 150 feet below ground surface. Groundwater in these zones are recharged directly by infiltration of precipitation in the Enumclaw area and through deeper, more extensive groundwater flow paths that transmit infiltrated precipitation falling on the foothills to the east of the City. Supply wells completed in these zones yield from less than 100 to hundreds of gallons per minute.

GEOGRAPHY

The City of Enumclaw is situated in south-central King County, north of the White River. The elevation within the City's water service area varies greatly. The area generally slopes downward to the northwest corner of the service area where the elevation is approximately 520 feet above sea level. The highest area served is located along the eastern extents of the system and has an elevation of approximately 1,100 feet. Figure 1-5 illustrates the topography of the City and surrounding areas.

SITE SENSITIVE AREAS

The vicinity of the City's water service area has many site sensitive areas. Relevant areas of sensitivity include wildlife habitats, wetlands, water bodies, and flood, seismic, erosion, and landslide hazard areas. The site sensitive areas within the City's water system are shown on Figures 1-6 and 1-7. A SEPA Checklist and Determination is included in Appendix F.

Wildlife Habitats

Wildlife habitats may be designated as conservation areas for species whose habitat and/or breeding area is required to be protected by the King County Comprehensive Plan. Several protected species are known to breed and reside with the City's service area, including elk and various species of salmon and trout.

Wetlands

Wetlands are defined by the EPA as areas that are inundated for at least part of the year. Wetlands support valuable and complex ecosystems and consequently, development is severely restricted if not prohibited in most wetlands.

Water Bodies

Lakes and streams are classified as sensitive areas due to the wide variety of plants and animals that they support. It should be noted that a majority of the regulations for water bodies are designed to protect natural water bodies and their associated ecosystems.

Flood Hazard Areas

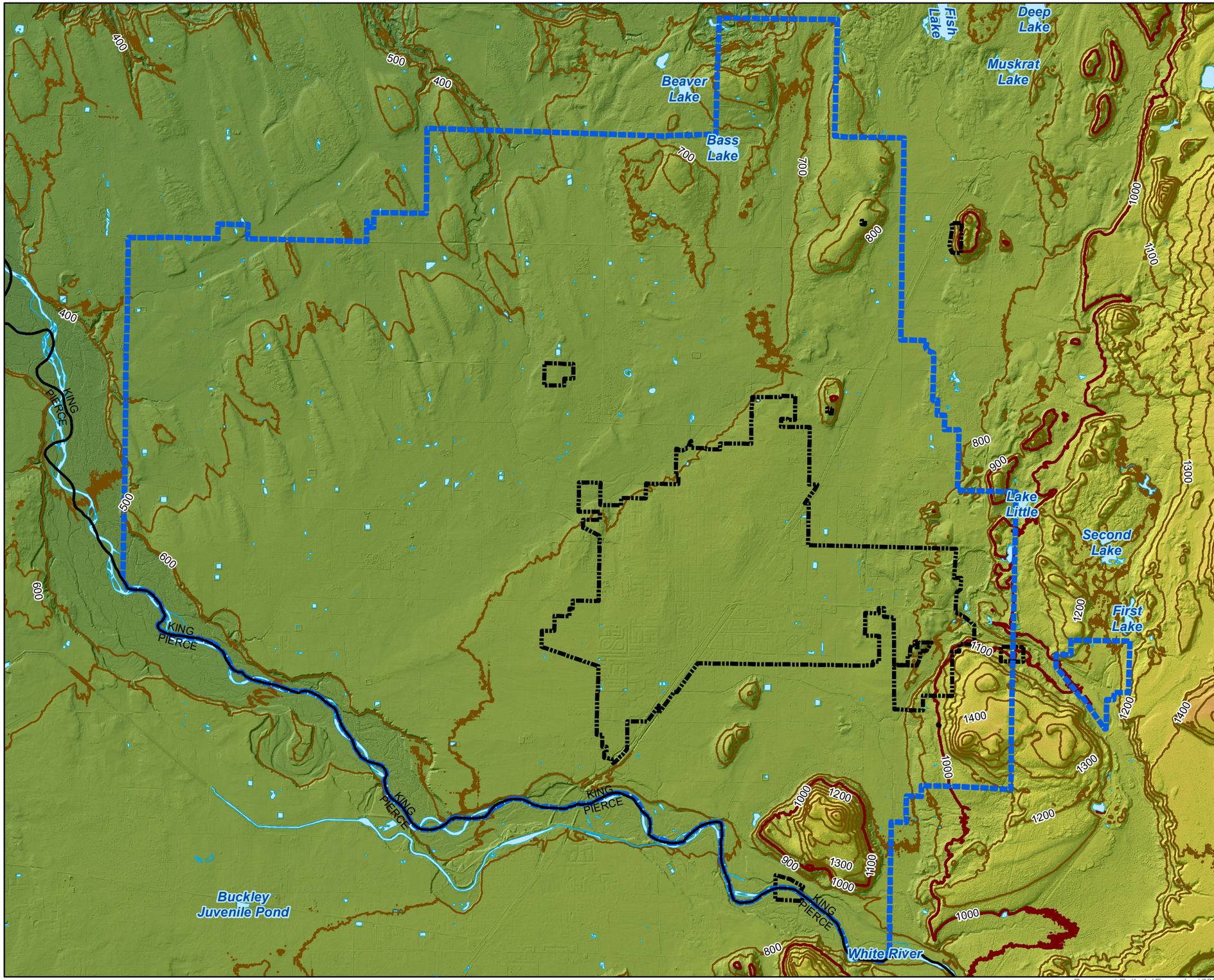
Flood hazard areas are areas adjacent to lakes, rivers, and streams that are prone to flooding during peak runoff periods. Flood hazard areas deserve special attention due to the sensitive nature of their ecosystems as well as the potential for damage to structures located in the floodplain.

Seismic Hazard Areas

Seismic hazard areas are those with low density soils that are more likely to experience greater damage due to seismic-induced subsidence, liquefaction, or landslides.

Erosion Hazard Areas

These areas are especially subject to superficial erosion, if disturbed, and may not be well suited for high-density developments or intensive land uses.



LEGEND

ELEVATION

HIGH: 4,000 FEET

LOW: 0 FEET

1,000 FT CONTOURS

100 FT CONTOURS

WATER SERVICE AREA

CITY LIMITS

KING - PIERCE COUNTY LINE

WATER BODY

Sources: , City of Enumclaw GIS Data, King County GIS Data, Washington Geospacial Open Data

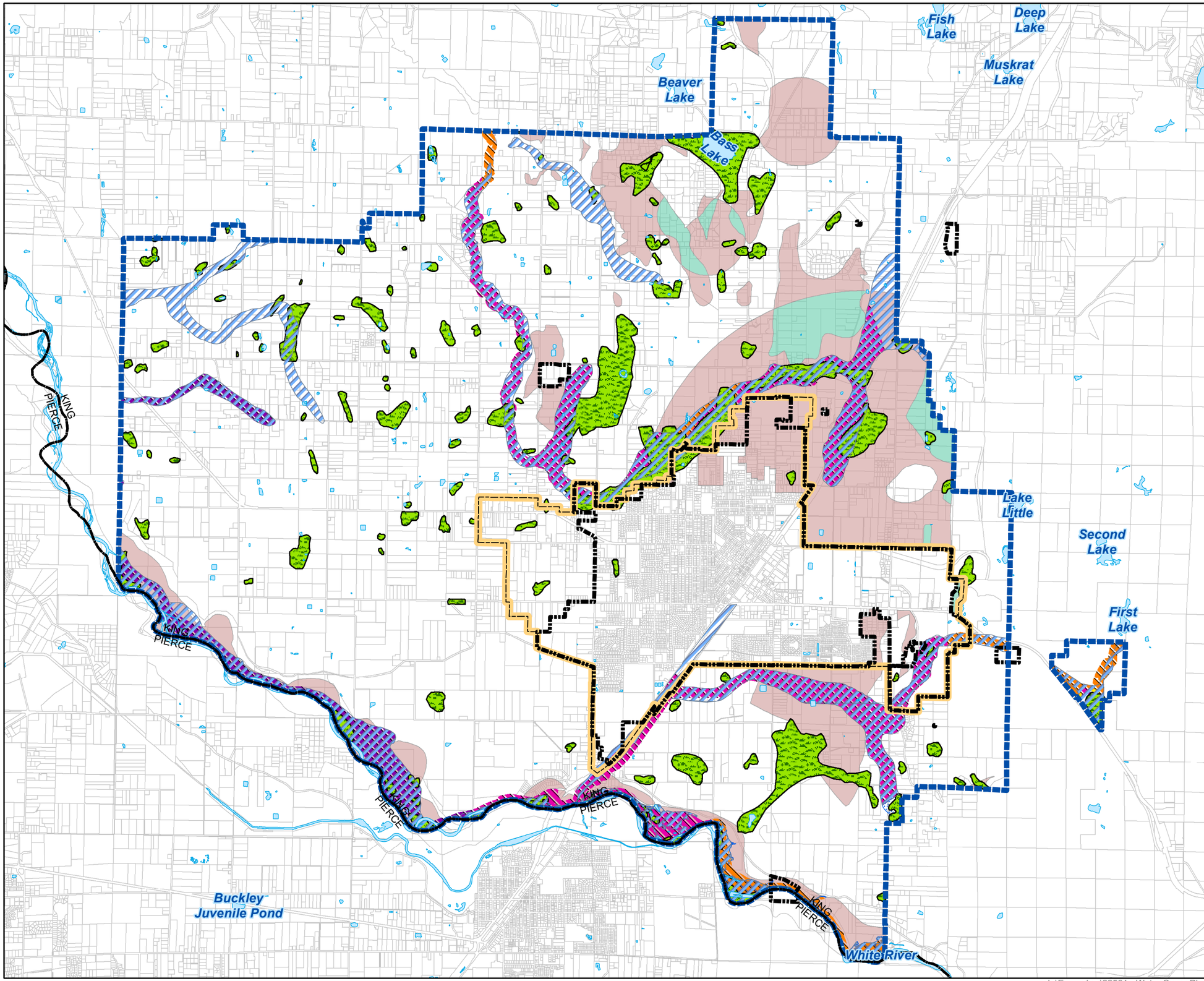
N

0 2,450 4,900 9,800 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-5
TOPOGRAPHY

Gray & Osborne, Inc.
CONSULTING ENGINEERS

Document Path: L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-5 TOPOGRAPHY.mxd



LEGEND

- WETLANDS
- WATER BODY
- REGULATORY FLOODPLAIN
- 100-YEAR FLOODPLAIN
- 500-YEAR FLOODPLAIN

SHORELINE MANAGEMENT DESIGNATION

- CONSERVANCY
- RURAL/CONSERVANCY
- RURAL
- NATURAL

CRITICAL AQUIFER RECHARGE AREAS

- CATEGORY 1
- CATEGORY 2

- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- KING - PIERCE COUNTY LINE
- PARCELS

Source: City of Enumclaw GIS Data, King County GIS Data, Washington Geospacial Open Data

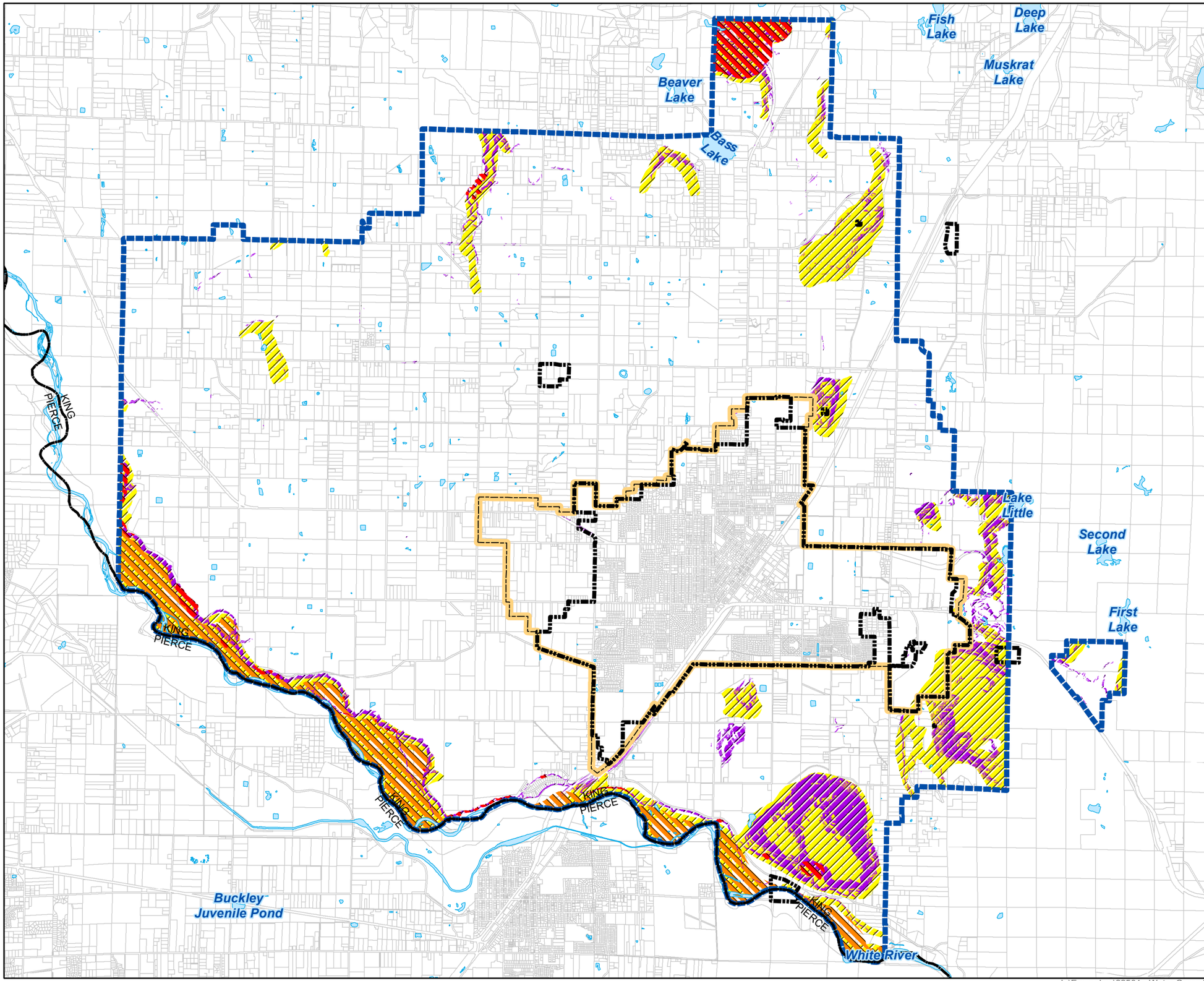
N

0 2,500 5,000 10,000 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-6
SITE SENSITIVE AREAS - WATER

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-6 SITE SENSITIVE AREAS - WATER.mxd



LEGEND

- WATER BODY
- STEEP SLOPE HAZARD AREA
- SEISMIC HAZARD AREA
- EROSION HAZARD AREA
- LANDSLIDE HAZARD AREA
- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- PARCELS

Source: City of Enumclaw GIS Data, King County GIS Data, Washington Geospacial Open Data

N

0 2,500 5,000 10,000 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-7
SITE SENSITIVE AREAS - SOIL

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-7 SITE SENSITIVE AREAS - SOIL.mxd

Landslide Hazard Areas

Landslide hazard areas are those that are prone to unstable behavior due to steep slopes, lack of vegetation, or unconsolidated soils.

LAND USE AND ZONING

Land use and zoning play an important role in predicting population growth patterns which in turn, may influence future water requirements. Increased residential and commercial densities, as well as new large industrial users, can greatly impact water system demands and affect both the system's level of service and its ability to deliver fire flows.

The City designates land use and zoning for the water service areas that lie within the corporate limits. King County defines the land use and zoning for the unincorporated areas of service, including the City's urban growth area. The following are the general types of land uses designated within the City's water service area:

- Residential Land Use: This type of residential land use is assigned based on the number of dwelling units per gross acre. Designations include Single-Family Residential (SFR), Mixed Density Residential (MDR), and Multi-Family Residential (MFR) housing.

- Planned Development Land Use: The Planned Unit Development (PUD) land use designation is used for the City's master planning of large projects. Future land use in these areas have a target density similar to that of Mixed Density Residential (MDR).

- Office Land Use: Lands designated as office areas represent professional offices and small commercial businesses that serve the nearby businesses and neighborhoods.

- Commercial Land Use: The commercial designation includes community retail, services, and office uses.

- Light Industrial Land Use: The light industrial (LI) areas are designated as such due to minimized traffic, noise, air quality, and light pollution impacts.

- Public Land Use: The public land use designations include facilities or areas that provide public services such as parks, schools, hospitals, and other City owned properties.

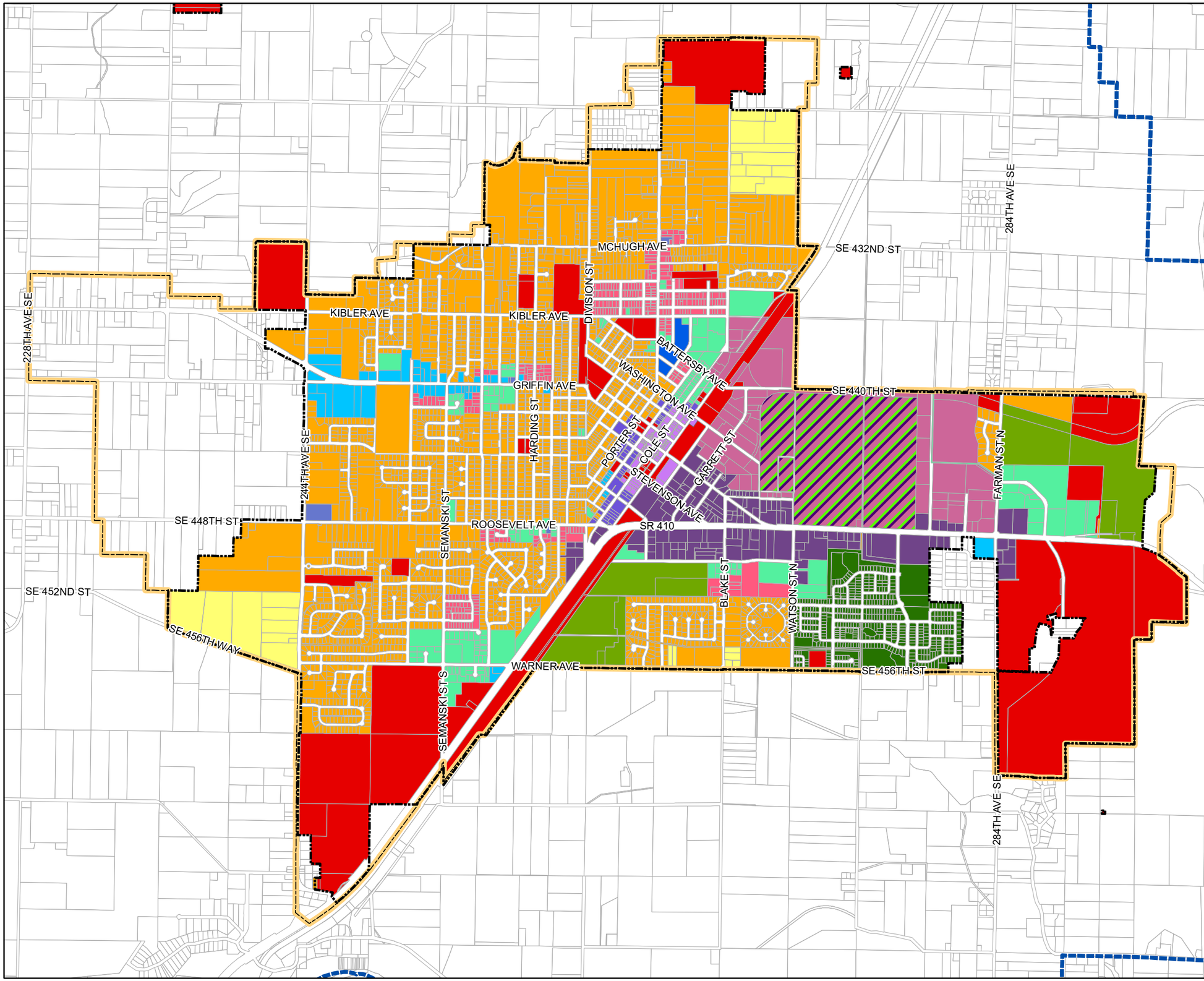
- Agricultural and Forest Land Use: Agricultural and forest designations are intended to preserve and protect farmland and forested areas, respectively. This is primarily accomplished by restricting land use and limiting density. The City is surrounded by and has land within the City limits that is permanently protected agricultural land where development rights have been purchased by King County under the county's Farmland Preservation Program. Approximately 156 acres, or just over half of the City's light industrial zoned land, is in the county Farmland program, as indicated on Figures 1-8 and 1-9.

Table 1-4 provides a breakdown of the land use for the City's water service area. Figure 1-8 illustrates the zoning within the City's limits while Figure 1-9 shows the King County zoning for the service areas outside the City.

TABLE 1-4

Zoning Classifications for Enumclaw's Water Service Area

Location	Land Use Designation	Zoning Classification	Acres	Percent of Total
Within Enumclaw's City Limits(1)	SFR	R-1	111	3.9
	SFR	R-2	1,071	37.3
	MDR	R-3	74	2.6
	MFR	R-4	148	5.2
	PUD	PUD	100	3.5
	MDR	RMHP	137	4.8
	Office	GO	47	1.6
	Office	GO-H	1	0.0
	Hospital	H	5	0.2
	Commercial	NB	5	0.2
	Commercial	CB-1	13	0.5
	Commercial	CB-2	13	0.5
	Commercial	HCB	135	4.7
	Light Industrial	LI	298	10.4
	Public	PUBLIC	711	24.8
Total Within City Limits			**2,869**	**100%**
Outside Enumclaw's City Limits – Within Retail Service Area (King County Zoning)(2)	Residential	RA-2.5	605	3.8
	Residential	RA-5	1,106	7.0
	Residential	RA-10	1,061	6.7
	Commercial(3)	NB	15	0.1
	Industrial	I	1,57	1.0
	Urban Growth Area(3)	UR	596	3.7
	Agricultural	A-10	2,436	15.3
	Agricultural(3)	A-35	9,681	60.9
	Forest(3)	F	236	1.5
Total Outside of City Limits, Retail Service Area			**15,892**	**100%**



LEGEND

EXISTING CLASSIFICATION

- R-1
- R-2
- R-3
- R-4
- PUD
- RMHP
- GO
- GO-H
- H
- NB
- CB-1
- CB-2
- HCB
- LI
- PUBLIC

- KING COUNTY FARMLAND PRESERVATION PROGRAM PARCELS
- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- PARCELS

Source: City of Enumclaw GIS Data

N

0 1,000 2,000 4,000 Feet

CITY OF ENUMCLAW

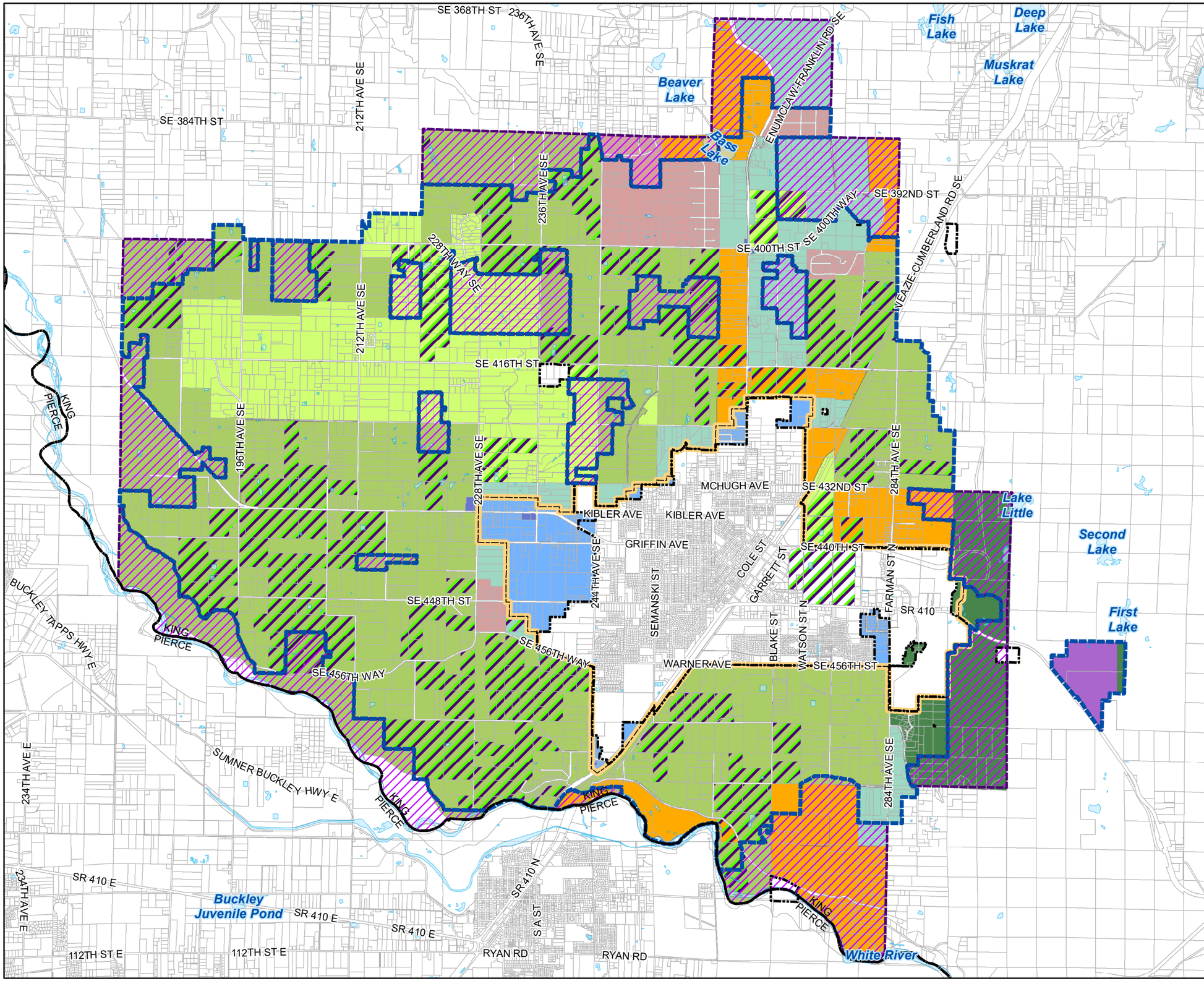
WATER SYSTEM PLAN

FIGURE 1-8

CITY ZONING

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-8 CITY ZONING.mxd



LEGEND

EXISTING CLASSIFICATION

- RA-2.5
- RA-5
- RA-10
- NB
- I
- UR
- A-10
- A-35
- F
- KING - PIERCE COUNTY LINE
- RETAIL WATER SERVICE AREA
- FUTURE SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- WATER BODY
- PARCELS
- KING COUNTY FARMLAND PRESERVATION PROGRAM PARCELS

Source: King County GIS Data

N

0 2,500 5,000 10,000 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-9
KING COUNTY ZONING

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 1-9 KING COUNTY ZONING.mxd

TABLE 1-4 – (continued)

Zoning Classifications for Enumclaw's Water Service Area

Location	Land Use Designation	Zoning Classification	Acres	Percent of Total
Outside Enumclaw's City Limits – Within Future Service Area (King County Zoning)(2)	Residential	RA-2.5	95	1.8
	Residential	RA-5	729	14.2
	Residential	RA-10	1,013	19.7
	Agricultural	A-10	502	9.8
	Agricultural(3)	A-35	2,078	40.4
	Forest(3)	F	723	14.1
Total, Outside of City Limits, Future Service Area			**5,139**	**100%**
Total Outside of City Limits			**21,032**	**-**
Grand Total			**23,901**	**-**

(1) Data sources: City of Enumclaw 2015 Comprehensive Plan and GIS Data.
(2) Data source: King County 2019 Zoning GIS Data.
(3) A portion of the indicated King County Zoning area lies within the City's Urban Growth Area.

INVENTORY OF EXISTING FACILITIES

A description of the facilities currently owned and operated by the City is provided in the following sections. Figure 1-2 shows the major water system facilities while Figures 1-10 and 1-11 provide a schematic and profile of the water system facilities, respectively.

SOURCES OF SUPPLY

Water supply to the Enumclaw water system is provided primarily by the Boise and Watercress spring sources, with the PC Johnson Wellfield and the Golf Course Well providing water seasonally. The City also has an emergency intertie with the City of Tacoma. The City's well and spring sources are located within the eastern portion of the water service area and supply water directly to the City's largest pressure zone, the 888 Zone. The only supply source located within the City of Enumclaw's city limits is the Golf Course Well. A summary of the City's sources of supply is included in Table 1-5. Additional data on the City's sources is contained in Appendix G.

TABLE 1-5

Enumclaw Sources of Supply Summary

DOH Source No.	Name	Year Constructed	Source Capacity (gpm)	Treated	Type	Usage
S01	Boise Spring	Early 1900s	897.6(1)	Yes	Spring	Permanent
S02	Watercress Spring 1	1953	2,000(2)	Yes	Spring	Permanent
S08	Watercress Spring 2	2008	2,285.4(2)	Yes	Well	Permanent
S05(3)	PC Johnson Well 2	1986	900(4)	Yes	Well	Seasonal
S06(3)	PC Johnson Well 3	1997	760(4)	Yes	Well	Seasonal
S09	Golf Course Well	2007/2017	676(5)	Yes	Well	Seasonal
S03	Tacoma Intertie	1977	1,000(6)	Yes	Intertie	Emergency

(1) The source capacity for Boise Spring is limited by the authorized instantaneous withdrawal of 897.6 gpm.

(2) The source capacity for Watercress Spring is limited to a total authorized instantaneous withdrawal of 2,285.4 gpm. Watercress Spring 1 cannot individually produce the full instantaneous water right due to additional friction head following the installation of a transmission main in 2002. Watercress Spring 2 is capable of producing the full instantaneous water right.

(3) PC Johnson Wells 2 and 3 are conjunctively managed as the PC Johnson Wellfield which corresponds to DOH Source Number S07.

(4) The source capacity for the PC Johnson Wells 2 and 3 (Wellfield) is limited to the total authorized instantaneous withdrawal of 1,500 gpm.

(5) The source capacity for the Golf Course Well is limited by the authorized instantaneous withdrawal of 676 gpm.

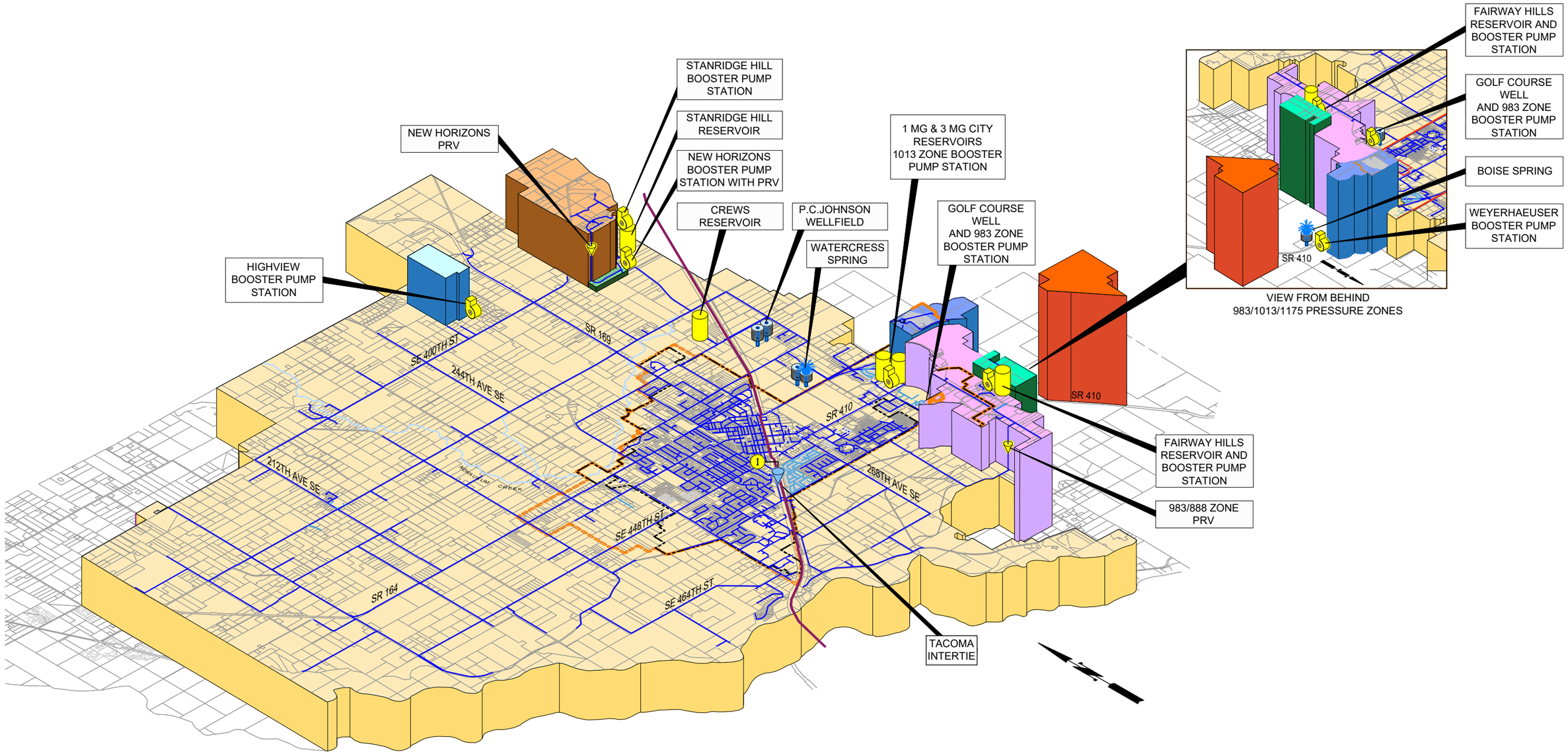
(6) The source capacity for the City of Tacoma Intertie is limited by the pumping capacity of 1,000 gpm assuming only one pump is operating.

Boise Spring

The Boise Spring is one of two primary sources for the City. The spring was originally developed in the early 1900s and is located approximately one-half mile east of the City limits. Water from the spring is collected by horizontal collection pipes that extend from a covered collection vault into the aquifer formation that feeds the spring. Water is conveyed by gravity in a dedicated water main from the spring to the City's reservoirs which directly supply the 888 Zone. Chlorine is injected into the spring pipeline from a station next to the Weyerhaeuser Booster Station and the water is further treated at the Corrosion Control Facility. The spring is metered and is capable of producing the full instantaneous water right flow of 897.6 gpm.

Watercress Spring

The other primary water source is Watercress Spring, which was developed for use by the City in 1953 and is located near the intersection of 280th Avenue SE and SE 436th Street in a rural area. Water at the original facility, Watercress Spring 1, is pumped from a bottomless concrete box that allows spring water to come up from the ground to collect



LEGEND

- 888 PRESSURE ZONE
- 899 PRESSURE ZONE
- 983 PRESSURE ZONE
- 995 PRESSURE ZONE
- 1013 PRESSURE ZONE
- 1040 PRESSURE ZONE
- 1175 PRESSURE ZONE
- 1245 PRESSURE ZONE
- CITY LIMITS
- EXISTING URBAN GROWTH AREA
- CITY OF TACOMA TRANSMISSION MAIN
- WATER MAIN
- PRIVATE WATER MAIN
- WELL
- SPRING
- RESERVOIR
- BOOSTER PUMP STATION
- CONTROL VALVE STATION
- TACOMA INTERTIE

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-10
WATER SYSTEM SCHEMATIC

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\Figures\3D Pressure Schematic\3D Pressure Schematic-PDF version.dwg, 10/5/2022 2:09 PM, PHILIP MARSHALL

within the concrete walls. A 150-horsepower pump with a suction inlet that penetrates into the spring chamber is housed in a building constructed on top of the east end of the collection box. The water is disinfected by the chlorine system located in the nearby Watercress Well 2 Building. Any Watercress Spring 1 flow that is not pumped overflows into an adjacent drainage channel.

In addition to the chlorine disinfection system, the Watercress Well 2 Building houses the Watercress Spring 2 well. The well for Watercress Spring 2 is 20 inches in diameter, approximately 52-feet deep, and is screened from 22 to 42 feet. The well draws water from the aquifer that feeds Watercress Spring approximately 100 feet southeast of the collection point for Watercress Spring 1. After water from both Watercress Springs 1 and 2 is chlorinated, the water is pumped through a dedicated 16-inch water main to an injection vault near the City's reservoirs where caustic soda from the Corrosion Control Facility is injected. The water then fills the City reservoirs and provides supply directly to the 888 Zone. In the peak demand season, control valves downstream of the injection vault can be actuated to direct Watercress transmission main flows back out into the system at an elevated head rather than flowing into the City reservoir. This control system extends the Watercress pump run time and maintains the Crews Reservoir near its maximum level without having to operate the PC Johnson Wellfield.

Production from the springs is fully metered and capable of producing the full instantaneous water right flow of 2,285.4 gpm.

PC Johnson Wellfield

The PC Johnson Wellfield site is located at the intersection of SE 424th Street and 284th Avenue SE in a rural area and includes Wells 2 and 3. PC Johnson Well 2 was drilled in 1986 with a 16-inch diameter and 227-foot depth. PC Johnson Well 3 was drilled in 1997 to replace the failed PC Johnson Well 1 and has a 16-inch diameter to a depth of 229 feet. Wellfield status for PC Johnson Well 2 and PC Johnson Well 3 was granted by DOH in 2004.

The wells are located in separate buildings within the wellfield. Water pumped from both wells is disinfected by the chlorine gas disinfection system located in the Well 3 building before directly supplying the 888 Zone. Both P.C Johnson Wells 2 and 3 are capable of supplying a rate of approximately 750 to 900 gpm each; however, the full instantaneous water right for the wellfield is 1,500 gpm with both pumps running simultaneously. Producing the full instantaneous water right is not necessary based on current demands so only a single well is operated at a time. Well 2 and 3 are separately metered sources.

The PC Johnson Wells are used as seasonal sources due to high manganese levels.

Golf Course Well

The Golf Course Well (GCW) is located in the south parking lot of the Enumclaw Expo Center in a shared facility with the 983 Zone Booster Pump Station. Completed in 2017, the 16-inch diameter, 136-foot deep well can pump into the 888 Zone as well as the 983 Zone to fill the Fairway Hills Reservoir or supply the Golf Course Irrigation system. Normal operation of the Golf Course Well supplies chlorinated water to the 888 Zone via the 676 gpm well pump. 983 Zone operation utilizes the 983 Booster Pump Station to pump chlorinated water to the Fairway Hills Reservoir at 225 gpm during periods of regular demand or 1,700 gpm during a high flow event. When the GCW is in irrigation operation, the 676 gpm well pump directly serves non-chlorinated water to the back nine holes of the City's Golf Course while the front nine is served by the 983 Zone Booster Pump Station. All chlorinated water is treated onsite with a chlorine gas disinfection system.

The well is capable of producing the full instantaneous water right of 676 gpm. The Golf Course Well is a seasonal source.

Water System Interties

The City of Enumclaw has a single intertie with the City of Tacoma which was constructed in 1977 and upgraded in 1999 and 2005. The intertie consists of a booster pump station in a below-grade concrete vault located on the west side of SR 410 north of Warner Avenue. Water is pumped from Tacoma's 52-inch regional transmission main to provide supply directly to the City's 888 Zone. Water from Tacoma is filtered, chlorinated, and fluoridated. The facility has a pumping capacity of approximately 1,000 gpm with one pump operating and is fully metered.

The facility was originally constructed to increase pressures in the City's water system, provide supply during emergencies, and to fill reservoirs as needed. With minor piping additions, the intertie may also be utilized to supply water from Enumclaw to the City of Tacoma, as was done in 1987. At present, the intertie is designated as an emergency-only source until additional capacity is needed. A copy of the 1997 wholesale water supply agreement with Tacoma is provided Appendix H. Both parties have agreed to negotiate an updated agreement, but that effort is still yet to be initiated.

The City does not have plans for additional interties at this time.

Water Rights

The City currently holds 12 water right certificates that authorize a total additive annual quantity (Qa) of 5,218.8 acre-feet per year, and a total additive instantaneous quantity (Qi) of 5,635.8 gpm. Within that total number of rights, the City holds nine additive rights, and three non-additive rights. Because of their senior priority dates, the City's water rights are not subject to the instream flow rules prescribed for the Green and

Puyallup/White River basins. All of the City's water rights qualify as for municipal water supply purposes under RCW 90.03.015 and are in good standing. Water right certificates, permits, and the Self-Assessment form are provided in Appendix I. Table 1-6 summarizes the City's existing water rights.

TABLE 1-6

Existing Water Rights Summary

DOH Source No.	Description	Permit / Certificate No.	Priority Date	Use Type	Source Right Type	Existing Water Rights			
						Instantaneous (Qi)		Annual (Qa, Additive)	Annual (Qa, Non-Additive)
						cfs	gpm	acre-ft	acre-ft
S01	Boise Spring	S1-22798	02/25/1977	Primary	Surface	2.0(1)	897.6	1,270	
S02/08	Watercress Spring	S1-*06308	02/07/1945	Primary	Surface	0.75(1)	336.6	543(2)	
S02/08	Watercress Spring	S1-*10594	08/09/1951	Primary	Surface	1.0(1)	448.8	724(2)	
S02/08	Watercress Spring	G1-*09339	03/27/1968	Primary	Ground		1,500(1)	1,220	
S07	P.C. Johnson Wellfield	G1-23600	04/23/1980	Primary	Ground		550(1,3)	880	
S07	P.C. Johnson Wellfield	G1-24918	10/16/1986	Supplemental	Ground		950(1)		1,680(4)
S09	Golf Course	S1-*05251	09/09/1940	Supplemental	Surface	0.2(1)	89.8	144.8(5,6)	
S09	Golf Course	G1-*02838	11/28/1952	Supplemental	Ground		126(1)	80(5)	
S09	Golf Course	G1-20890	09/06/1973	Primary	Ground		550(1)	291.2	224.8
-	Y Bar S	G1-20398	01/05/1973	Primary	Ground		45(1,7)	18.6(7)	
-	Y Bar S	G1-20529	04/04/1973	Primary	Ground		45(1,7)	18.6(7)	
-	Cemetery Well	G1-*05705	08/17/1960	Primary	Ground		97(1,8)	28(8)	
Total							**5,635.8**	**5,218.2**	

(1) Indicates the actual value provided on the water rights certificate.
(2) No annual quantity is provided on the certificate (pre-1965). Department of Ecology provided the calculated authorized annual withdrawal on the Report of Examination (ROE) for the application of the P.C. Johnson Wellfield water right certificate G1-24918. The ROE is included in Appendix I.
(3) Certificated maximum instantaneous production from P.C. Johnson Wellfield limited to 1,500 gpm for both rights combined.
(4) Annual water right for Certificate No. G1-23600 is supplemental to Certificate No. G1-24918 and thus excluded from the annual total.
(5) Annual total withdrawal of Golf Course rights is recognized to be 516 ac-ft for all three rights combined.
(6) No annual quantity is provided on the certificate (pre-1965). The City of Enumclaw determined an authorized annual withdrawal (Qa) based on a water duty of 2 acre-feet per acre to irrigate the authorized 30 acres. Previously approved Water System Plans for the City have well documented the Qa. In January 2022, the City advised Ecology in the course of submitting a grant application to relocate Boise Creek, that it was prepared to donate S1-*05251 as a permit exempt well offset project to support the WRIA 10 Watershed Restoration and Enhancement Plan.
(7) Y Bar S water rights have been temporary donated to the Washington State Trust Water Right Program.
(8) The Cemetery Well source is isolated from the City's distribution system.

Boise Spring

Boise Spring Surface Water Right (S1-22798)

Boise Spring is a certificated, primary surface water right with an authorized instantaneous quantity (Qa) of 2.0 cfs (1.29 mgd) and an annual quantity (Qa) of 1,270 afy. This source falls within the White River basin and the water right has a priority date of 1977. The right's purpose of use is for "municipal supply", and the designated place of use is "area served by the City of Enumclaw." The source water is captured by an underground collection system of perforated pipes, gravel and a concrete covered vault. The Boise Spring right was issued prior to adoption of the Puyallup River Basin Instream Resources Protection Program (IRPP - WAC 173-510-040) which established both closures and minimum flows on that river system, and its exercise is therefore senior in time to said flow regulations. Continued withdrawals from this source are anticipated to meet existing and projected service area demands.

Watercress Spring System

The Watercress Spring System is the City's largest water source and is comprised of two certificated surface water (springs) rights and one certificated groundwater right. These rights are conjunctively managed. The source of this system is Watercress Spring, a tributary to Newaukum Creek within the Green River basin. Pursuant to the water right issued for the last permitted source for this system (i.e., G1-*09339), the total primary authorized instantaneous quantity for the rights in this system are 3.29 mgd (2,285.4 gpm), and the total primary annual quantity (Qa) is 2,487 afy. Continued withdrawals from this source and system are anticipated to meet existing and projected service area demands.

*Watercress Surface Water Right (S1-*06308/5576C)*

This surface water right has an authorized instantaneous quantity (Qi) of 0.75 cfs (0.48 mgd), and a priority date of 1945. This right authorized the first source developed for the Watercress system. No annual quantity (Qa) is stated on the certificate (pre-1965 certificate). However, the Department of Ecology has calculated an authorized Qa of 543 afy (ROE for PC Johnson 2/G1-24918 – 1986). The water right's purpose of use is stated as "domestic supply", now recognized as "municipal supply purposes" under RCW 90.03.015, and the designated place of use is the area served by the "City of Enumclaw." The source water is collected by either an underground, bottomless vault with pipe penetrations through the walls of the vault and/or a 20-inch well that is approximately 52 feet deep with screens set from 22 feet to 42 feet.

*Watercress Surface Water Right (S1-*10594/5579)*

This surface water right has an authorized instantaneous quantity (Qi) of 1.0 cfs (.65 mgd), and a priority date of 1951. No annual quantity (Qa) is stated on the certificate (pre-1965 certificate). However, the Department of Ecology has calculated an authorized Qa of 724 (ROE for PC Johnson 2/G1-24918 - 1986). The water right's purpose of use is for "municipal purposes", and the designated place of use is the area served by the "City of Enumclaw." The source water is collected as referenced above for S1-*06308.

*Watercress Groundwater Right (G1-*09339/6894-A)*

This groundwater right has an authorized instantaneous quantity (Qi) of 1,500 gpm (2.17 mgd), and an annual quantity (Qa) of 1,220 afy. The priority date for this right is 1968. This right was the last source developed for the Watercress system. The water right's purpose of use is for "municipal supply," and the designated place of use is the "area served by the City of Enumclaw." The source water is collected as referenced above for S1-*06308.

<u>PC Johnson Wellfield</u>

The PC Johnson Wellfield is comprised of two certificated groundwater rights; one primary and one supplemental right which are conjunctively managed as a wellfield. This source falls within the Green River basin. Pursuant to the water right issued for the last permitted source for this system (i.e., G1-24918), the total authorized instantaneous quantity for the rights in this system is 1,500 gpm (2.17 mgd), and the total annual quantity (Qa) is 1,680 afy. Continued withdrawals from this source and system are anticipated to meet existing and projected service area demands.

PC Johnson Groundwater Right (G1-23600)

This primary groundwater right has an authorized instantaneous quantity (Qi) of 550 gpm (0.79 mgd), and an annual quantity (Qa) of 880 afy. The priority date for this right is 1980. The water right's purpose of use is for "municipal supply", and the designated place of use is the "area served by the City of Enumclaw." This right was the first source developed as part of the PC Johnson wellfield. The source groundwater is withdrawn by a 16-inch well that is approximately 230 feet deep with screens set from 195 feet to 225 feet. A replacement well was drilled in 1997 and is designated as PC Johnson Well 3 by Washington State Department of Health to distinguish it from the well it replaced.

PC Johnson Groundwater Right (G1-24918)

This groundwater right has an authorized instantaneous quantity (Qi) of 1,500 gpm (2.16 mgd) and an annual quantity (Qa) of 1,680 afy; the Qa being fully supplemental to the City of Enumclaw's existing primary rights. The priority date for this right is 1986.

The water right's purpose of use is for "municipal supply," and the designated place of use is the "area served by the City of Enumclaw." This right was the second source developed as part of the PC Johnson wellfield. The source groundwater is withdrawn by a 16-inch well that is approximately 227 feet deep, with screens set from 203 feet to 224 feet.

Golf Course Well

In 2004, King County conveyed three certificated primary water rights to the City of Enumclaw (City), involving two groundwater rights (three wells), and one surface water right/intake as part of its legal transfer of the Enumclaw Golf Course. The Enumclaw Golf Course was developed in the 1940s by King County Parks and Recreation for golf course operations. The water rights conveyed by King County to the City, which are in close proximity to Boise Creek, were originally issued to and/or secured by the King County Division of Property and Purchasing for golf course domestic and irrigation purposes.

Pursuant to: (1) King County's status as a municipal water supply system under RCW 90.03.15 (Municipal Water Law); and (2) the status of municipal golf course irrigation as a recognized proprietary and commercial purpose of municipal supply water rights, the water rights developed/acquired by King County are considered "municipal purpose" water rights.

In its 2007 water system plan update, the City documented its intention to treat the former King County water rights as municipal purpose, and to conform their respective place(s) of use to the City's existing retail service area. This conformance occurred by operation of law, in accordance with the Municipal Water Law, and specifically RCW 90.03.386(2), with the approval by Department of Health (DOH) of the 2007 water system plan update.

*Golf Course Surface Water Right (S1-*05251)*

Surface Water Right Certificate S1-*05251 has an authorized instantaneous quantity (Qi) of 0.2 cfs (89.8 gpm) for the purpose of irrigating 30 acres of golf course property and providing domestic supply to related facilities. The period of use for Golf Course irrigation is seasonal (April 15-October 1). Although no annual quantity (Qa) was designated (pre-1965 certificate), the City determined an annual quantity (Qa) authorization of 60 afy based on a water duty of 2 acre foot per acre to irrigate 30 acres. Said Qa has been repeatedly documented in prior water system plans. The priority date of the water right is 1940.

The water right's original purpose of use was for "domestic supply and irrigation", and the original designated place of use reflected the Golf Course property (i.e., 1st nine holes constructed). The water right has been used to irrigate the front nine of the Golf Course on a continuous basis since the Golf Course went into operation in the late 1940s.

The original point of diversion for S1-*05251 was designated as Chappel Springs, a tributary to Boise Creek and the White River. The point of diversion was changed in 1951 to allow the golf course lessee to withdraw the water from a small (gravel mining) lake in close proximity to the golf course property. The point of diversion was subsequently moved downstream in 1985 to a constructed pond on the golf course property hydraulically connected to Chappel Spring. Since that time, the source water has been pumped from the pond into the golf course irrigation system.

In July 2020, the City transferred the source of irrigation for the front nine of the Golf Course from the pond associated with S1-*05251 to the larger municipal supply system that serves the City. As a subsequent action approved by DOH on September 14, 2020, the City amended its 2013 water system plan to update the beneficial use and plan status of S1-*05251, a municipal purpose water right. The amendment documented the City's intent to maintain S1-*05251 to serve the City's future growth demands and backup supply needs consistent with the Safe Harbor provision of Ecology Policy 2030.

In January 2022, the City advised Ecology in the course of submitting a grant application to relocate Boise Creek, that it was prepared to donate S1-*05251 as a permit exempt well offset project to support the WRIA 10 Watershed Restoration and Enhancement Plan. The purpose of the Boise Creek relocation project is to alleviate chronic flooding of the golf course and adjacent properties and the improve habitat conditions of the creek.

*Golf Course Groundwater Right (G1-*02838)*

This certificated groundwater right has an authorized instantaneous quantity (Qi) of 126 gpm, and an annual quantity (Qa) of 80 afy. The priority date for this right is 1952 and the point of withdrawal is a well 70 feet deep. The original purpose of use of the water right, which was granted to Mr. Paul W. Moore, was for irrigation and stock watering activities within 40 acres. The season of use was continuous for stockwatering, and seasonal for irrigation. Records indicate that shortly after Mr. Moore secured the water right (1954), it was assigned in 1956/57 to King County, along with property cited in the proposed place of use, to serve and expand golf course operations.

Golf Course Groundwater Right (G1-20890)

This certificated groundwater right has an authorized instantaneous quantity (Qi) of 550 gpm and an annual quantity (Qa) of 516 afy. The annual quantity is partially additive to the annual quantities (Qa) cited for the two golf course rights above, but limits the total Qa withdrawal to 516 afy, less the Qa amounts certificated in the golf course rights cited above. The priority date for this right, which was secured by King County Division of Property and Purchasing, is 1973. The right authorizes two wells/points of withdrawal (109 feet/60 feet deep), located in the vicinity of Boise Creek. The purpose of use of the water right is for irrigation of the golf course property. The authorized period of use is during the irrigation season. The development of this right allowed King

County to complete expansion of the golf course to a full 18 holes. A 16-inch replacement well approximately 136 feet deep with screens set from 80 feet to 131 feet replaced the 109-foot well and the 60-foot well was decommissioned.

Y Bar S Groundwater Rights (G1-20398 and G1-20529)

Each of these certificated groundwater rights have an authorized instantaneous quantity (Qi) of 45 gpm and an annual quantity (Qa) of 18.6 afy for water supply to the former service area of the Y Bar S Water Company. The priority date of each right is 1973 and the purpose of use is year round domestic supply. The wells used to supply water under these rights have either been decommissioned or transferred to underlying property owners as except wells.

The two water rights were temporarily donated by the City to the Washington State Trust Water Right Program in 2009 for a ten year term that was set to expire on December 16, 2019, or upon written notice of termination by the City. On February 5, 2019, the City secured approval for a further 10 year temporary trust donation which shall run to December 16, 2029 unless further extended by the City.

Cemetery Well Groundwater Right (G1-*05705)

This certificated groundwater right has an authorized instantaneous quantity (Qi) of 97 gpm and an annual quantity (Qa) of 28 afy for the irrigation of 14 acres. The priority date for this right is 1960 and the purpose of use is municipal (irrigation of municipal cemetery). The well depth is approximately 20 feet deep. The season of use is limited to the irrigation season (April – October). This water right is currently being held for standby/emergency use purposes consistent with the Safe Harbor provision of POL--2030.

TREATMENT

All water that is produced by the City's sources is chlorinated for disinfection. Chlorination is achieved through chlorine gas systems that use 150-pound cylinders and are located at Weyerhaeuser Booster Pump Station, Watercress Spring, PC Johnson Wellfield, and the Golf Course Well. The target residual is 0.5 mg/L. The City of Enumclaw does not add fluoride to its water.

Corrosion Control

Water from the two spring sources is treated for corrosion control at the Corrosion Control Facility (CCF) prior to entering the City reservoirs. The CCF is located on the City reservoir site.

Water from each spring transmission line is directed to the CCF where sodium hydroxide solution (caustic soda) is injected to adjust pH. Two 300-gallon day tanks and two

3,000-gallon solution storage tanks are housed within the facility to store the 13 and 25 percent caustic soda solution, respectively.

A small portion of the water from Boise Spring is treated for corrosion control upstream of the CCF at the Weyerhaeuser Booster Pump Station (BPS). Caustic soda is injected into the water proportional to flow as it is pumped through the booster station to the former Weyerhaeuser Mill site. A 50-gallon solution storage tank is located onsite and refilled as needed.

City of Tacoma Treatment

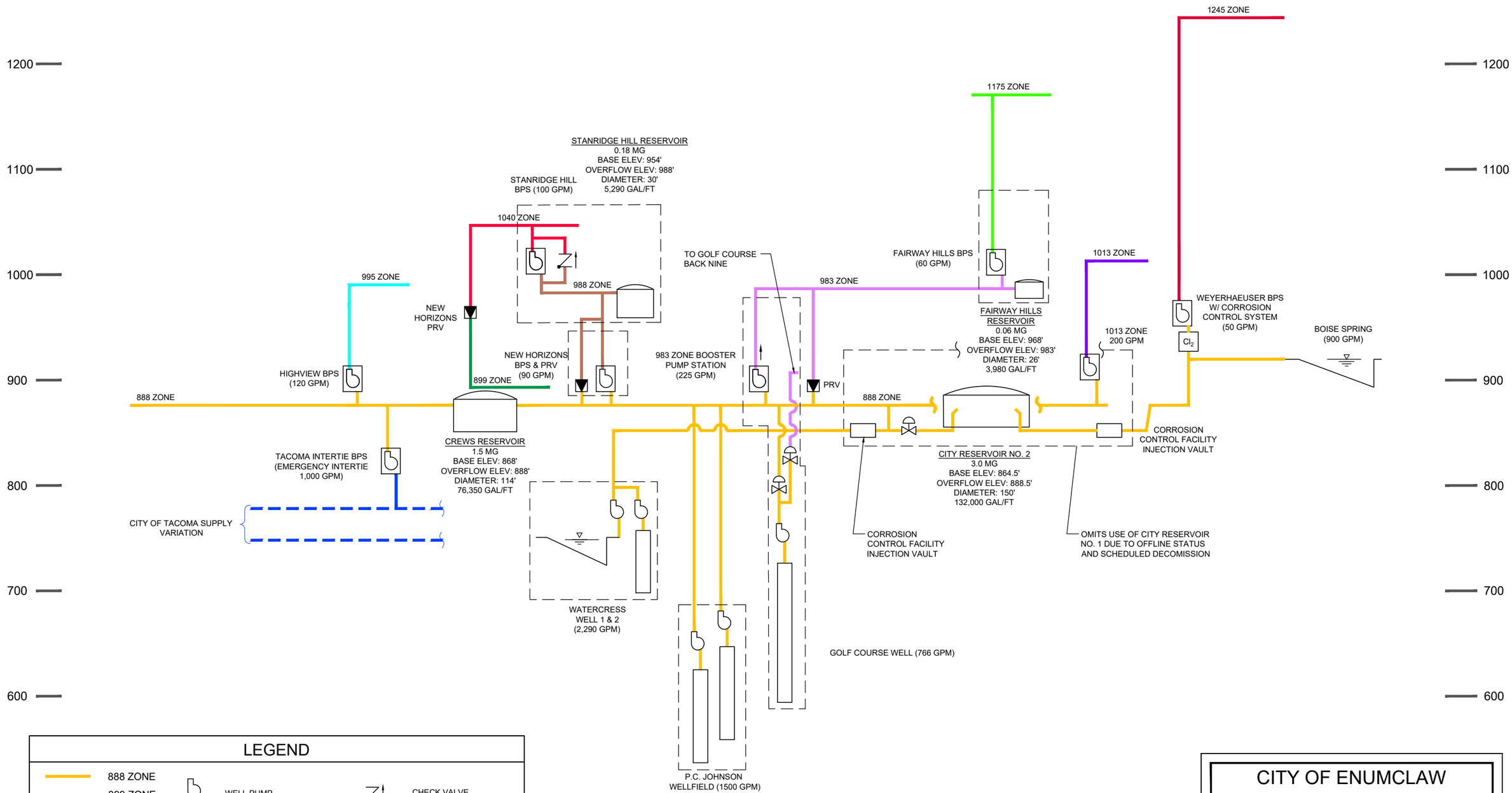
The City of Tacoma draws its water from the Green River and/or a series of wells near the water storage reservoir impounded by Howard Hanson Dam. Filtration process upgrades were completed in 2014 to comply with the Long-Term 2 Enhanced Surface Water Treatment Rule. As a surface water source, Tacoma must disinfect its water to a higher level than the City of Enumclaw. Chlorine levels of over 1.5 mg/L at the City of Tacoma intertie are typical, whereas the chlorine levels maintained at City sources typically average near 0.5 mg/L. Tacoma also adjusts the pH of its water and adds fluoride. For water systems that choose to fluoridate, fluoride levels of 0.5 to 0.9 mg/L are required in the distribution system.

PRESSURE ZONES

The City of Enumclaw currently serves customers within an elevation range of approximately 520 feet near the northwestern corner of the water service area to an elevation of approximately 1,100 feet at the former Weyerhaeuser Mill site on SR 410. The wide range of elevations requires that the water pressure be increased or reduced to maintain pressures that are safe and sufficient to meet the flow requirements of the system. This is achieved in the Enumclaw system by dividing the water system into eight pressure zones, as shown in Figure 1-10. The pressure in each zone is regulated by reservoir levels, pressure reducing station settings, pump station settings, or a combination of these. Figure 1-11 provides a hydraulic profile illustrating the City's system and the interactions between pressure zones.

The 888 Zone and the 983 Zone are open zones meaning that the pressure is set by reservoir levels. Pressures in the 888 Zone, which has a maximum hydraulic elevation of 888 feet (NAVD29 Datum), are established by the surface water level in the City and Crews Reservoirs. As the City's largest pressure zone, the 888 Zone encompasses most of the City's water service area and serves customers within an elevation range of approximately 520 feet to 810 feet.

The surface water level in the Fairway Hills Reservoir establishes pressures in the 983 Zone. With a maximum hydraulic elevation of 983 feet (NAVD29 Datum), the 983 Zone serves customers within an elevation range of approximately 785 feet to 900 feet. The zone serves the southeastern area of the water system.



LEGEND

- 888 ZONE
- 899 ZONE
- 983 ZONE
- 988 ZONE
- 995 ZONE
- 1013 ZONE
- 1040 ZONE
- 1175 ZONE
- 1245 ZONE

- WELL PUMP
- BOOSTER PUMP STATION
- PRESSURE REDUCING STATION
- DISINFECTION SITE
- CHECK VALVE
- CONTROL VALVE
- FACILITIES AT SAME SITE

HYDRAULIC PROFILE

NOT TO SCALE

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1-11
HYDRAULIC PROFILE

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\Figures\2D Hydraulic Profile\Figure 1-10_Hydraulic Profile.dwg, 8/12/2022 9:13 AM, MARK NAGEL

The 995 Zone, 1013 Zone, 1040 Zone, 1175 Zone and the 1245 Zone are zones without storage, known as closed zones, which are supplied by booster pump stations. The 995 Zone is supplied by the Highview Booster Pump station and currently serves 23 customers with an elevation range of approximately 750 to 850 feet. The 1013 Zone is supplied by a booster pump station located at the same site as the City reservoirs and serves only surrounding properties. The elevation range within the 1013 Zone is approximately 820 feet to 860 feet. The 1040 Zone is supplied by the Stanridge Hill Booster Pump Station and serves customers in the northeastern area of the water system, including the New Horizons subdivision, within an elevation range of approximately 830 feet to 950 feet. Supplied by the Fairway Hills Booster Pump Station, the 1175 Zone serves customers in the vicinity of 290th Avenue SE and SE 464th Street within an elevation range of approximately 935 feet to 1,000 feet. The 1245 Zone is supplied by the Weyerhaeuser Booster Pump Station which serves the former Weyerhaeuser Mill site located on SR 410. The elevation range within the zone is approximately 1,000 feet to 1,100 feet.

The 899 Zone serves customers along SE 403rd Street in the New Horizons area through a pressure reducing station that decreases the pressure of water from the 1040 Zone. This zone serves customers within an elevation range of approximately 740 feet to 830 feet.

STORAGE

The City has four operational reservoirs in three different zones with a total of 4.74 million gallons (MG) of storage. A fifth reservoir, the 1 MG City Reservoir is not currently operating and is scheduled to be decommissioned. A summary of the City's storage facilities is included in Table 1-7. Descriptions of the facilities are provided below and additional data is contained in Appendix G.

TABLE 1-7

Enumclaw Storage Facility Summary

Name	Pressure Zone/ HGL(5)	Year	Material	Overall Height (feet)	Diameter (feet)	Capacity (MG)
1 MG City Reservoir(1)	888	1926(2)	Concrete	15.3	(3)	1.0
3 MG City Reservoir	888	2017	Concrete	25	150	3.0
Crews Reservoir	888	1989	Concrete	22	114	1.5
Stanridge Hill Reservoir	899/1040	1993	Concrete	36	30	0.18
Fairway Hills Reservoir	983/1175	1991	Concrete	16	26	0.06
Total(4)						**4.74**

(1) The reservoir is currently not in use and is scheduled to be decommissioned.
(2) Concrete roof was installed in 1977.
(3) Reservoir is a trapezoidal prism structure with a 130-foot square top.
(4) Does not include the 1 MG City Reservoir, which is currently not in use.
(5) NAVD29 Datum.

1.0 MG City Reservoir

The 1.0 MG City Reservoir is located near SR 410, north of the Enumclaw Golf Course on a site that is shared with the Corrosion Control Facility and the 3.0 MG City Reservoir. The reservoir is operated at the same water surface elevation as the 3.0 MG City Reservoir, and together they provide water storage directly to the 888 Zone. A 12-inch water main connects the 1.0 MG City Reservoir directly to the 3.0 MG City Reservoir from the southeast corner of the reservoir. A separate 12-inch water main with a 12-inch control valve serves as an inlet and outlet for the reservoir and enters at the base of the facility near its northwesterly corner.

The 15-foot tall concrete reservoir is a partially buried rectangular structure with a roof dimension of approximately 130-feet square. The storage volume varies from approximately 6,330 gallons per foot of height at the reservoir's base elevation of 875.7 feet to approximately 12,640 gallons per foot at the reservoir's overflow elevation of 887.7 feet (NAVD29 Datum). The cast-in place reservoir floor and sloping walls were constructed in 1926 and a precast, prestressed hollow core plank (Span Deck) roof with precast, prestressed girders installed in 1977. The interior of the 1.0 MG City Reservoir was lined to reduce leakage from the reservoir in 2002.

The 1.0 MG City Reservoir was taken offline in September of 2018 due to security concerns regarding accessibility to the at-grade structure. The City does not plan to return the 1.0 MG City Reservoir to operation, and the schedule to decommission the reservoir is detailed in Chapter 8 of the Plan.

3.0 MG City Reservoir

The 3.0 MG City Reservoir is located on the same site as the 1.0 MG City Reservoir and the Corrosion Control Facility (CCF). Similar to the 1.0 MG City Reservoir, the 3.0 MG City Reservoir provides water storage directly to the 888 Zone. The 25-foot tall, 114-foot diameter cast-in-place, prestressed concrete reservoir was constructed in 2017 and provides approximately 132,000 gallons of storage per foot height. The structure has a base elevation of 864.5 feet and an overflow elevation of 888.5 feet (NAVD29 Datum).

The reservoir has a 12-inch water main on the southeast side of the reservoir to accept flow from the Boise and Watercress Spring transmission mains after it passes through either of the CCF injection vaults. An 18-inch water main inlet/outlet connects to the 1.0 MG City Reservoir in the northwest.

Crews Reservoir

The Crews Reservoir is located north of the intersection of SE 424th Street and 274th Avenue SE and provides water storage directly to the 888 Zone. The 114-foot diameter, 22-foot tall cast-in-place, prestressed concrete reservoir was constructed in 1989, has a

total capacity of 1.5 MG and provides approximately 76,350 gallons of storage per foot height. The reservoir's base elevation is approximately 868 feet and the overflow elevation is 888 feet (NAVD29 Datum). The reservoir is equipped with an exterior level gauge. A 12-inch hydraulic altitude valve and a booster pump used for tank cleaning is housed onsite.

The reservoir has three inlets and several valves within a control building that allow for different inflow and outlet configurations. Under normal operation, flow enters and leaves the reservoir through a line with an altitude valve to allow operation without overfilling the reservoir. When the PC Johnson Wellfield is being used, flows can be forced through two inlets at elevations of 886 and 872 feet (NAVD29 Datum), with water exiting the reservoir through the main with the altitude valve.

Stanridge Hill Reservoir

The Stanridge Hill Reservoir is located approximately one-quarter mile north of the intersection of 278th Way SE and SE 400th Place. The reservoir is supplied by the New Horizons Booster Pump Station and provides water to the 1040 and 899 Zones through the Stanridge Hill Booster Pump Station. The 30-foot diameter, 36-foot tall, cast-in-place concrete Mt. Baker Silo reservoir was constructed in 1993, has a total capacity of 0.18 MG, and provides approximately 5,290 gallons of storage per foot height. The reservoir's base elevation is at 954 feet and the overflow elevation is at 988 feet (NAVD29 Datum). The reservoir is fed by an 8-inch water main at an elevation of 976.5 feet, has a 10-inch outlet pipe, and is equipped with an exterior level gauge.

Fairway Hills Reservoir

The Fairway Hills Reservoir is located on a site that is shared with the Fairway Hills Booster Pump Station at the intersection of 290th Avenue SE and SE 464th Street. The reservoir is supplied by the 983 Zone Booster Pump Station and provides water storage directly to the 983 Zone and indirectly to the 1175 Zone. The partially buried 26-foot diameter, 16-foot tall, cast-in-place, concrete Mt. Baker Silo reservoir was constructed in 1991, has a total capacity of 0.06 MG, and provides approximately 4,000 gallons of storage per foot height. The reservoir's base elevation is at 968 feet and the overflow elevation is at 983 feet (NAVD29 Datum). The reservoir is equipped with an exterior level gauge and has a single 8-inch main that serves as the inlet and outlet pipe. A control valve was added to this pipe to direct 983 Zone Booster Pump Station flows back out into the system at an elevated head rather than flowing into the reservoir. This allows extended run time to exercise the pump and flushes the lengthy dead-end lines created when the 983 Zone was expanded in 2017.

PUMP STATION FACILITIES

The City has a total of seven booster pump stations (BPS) to serve higher elevation areas in the north and east portions of the City water service area. A summary of the City's BPS facilities is included in Table 1-8. Descriptions of the facilities are provided below and additional data is contained in Appendix G.

TABLE 1-8

Enumclaw Booster Pump Station Facility Summary

Name	Pump Name	Design Capacity (gpm)	Facility Capacity (gpm)	Design Head (feet)	Motor Size (hp)	Suction Zone	Discharge Zone	Standby Power
Weyerhaeuser BPS	1	42	50(1,2)	354	7.5 (3,450 rpm)	Boise Spring Main	1245	No
	2	42		354	7.5 (3,450 rpm)			
New Horizons BPS	1	60	90(1)	110	3 (3,450 rpm)	888	988(3)	No
	2	45		112	3 (3,500 rpm)			
Stanridge Hill BPS	1	100	100(4)	125	3 (VFD)	988(3)	1040	Yes
	2	100		125	3 (VFD)			
	3	100		125	3 (VFD)			
1013 Zone BPS	1	200	200(5)	130	10 (VFD)	888	1013	Yes
	2	200		130	10 (VFD)			
983 Zone BPS	1	208	225(5)	162	15 (VFD)	888	983	Yes
	2	208		162	15 (VFD)			
	High Flow	1,700		201	100 (VFD)			
Fairway Hills BPS	1	30	60(1)	220	3 (VFD)	983	1175	Yes
	2	30		220	3 (VFD)			
	3	30		220	3 (VFD)			
Highview BPS	1	120	120(4)	110	3 (VFD)	888	995	Yes
	2	120		110	3 (VFD)			
	3	120		110	3 (VFD)			

(1) Facility capacity is based on two pumps operating.
(2) A pressure sustaining valve is set slightly above the pump-off pressure to keep pumped flows at a steady rate for more consistent dosing of caustic soda.
(3) The 988 pressure zone is set by the Stanridge Hill Reservoir overflow elevation. There is only one service connection in this pressure zone and, therefore, it is not considered one of the eight pressure zones designated by the City.
(4) Facility capacity listed is based on two of three pumps operating at a reduced pumping rate.
(5) Facility capacity is based on one pump operating.

Weyerhaeuser Booster Pump Station

The Weyerhaeuser Booster Pump Station is located on a site that is shared with the Boise Spring chlorination building, just north of SR 410 and Boise Creek. The station is used to pump water from the discharge side of the Boise Spring chlorination system to the former Weyerhaeuser Mill site in the 1245 Zone. The station has a capacity of 50 gpm with two pumps that are equipped with 7.5-horsepower motors. Pump cycling is controlled by bladder tanks located at the truck shop on the former Weyerhaeuser Mill site, currently owned by Lisa, Inc. The site owner owns and is responsible for maintaining the bladder tanks. Also housed in the booster pump station is a small corrosion control diaphragm pump and tank used to inject caustic soda into the water supplied from the Boise Spring.

New Horizons Booster Pump Station

The New Horizons Booster Pump Station is located near the intersection of 278th Way SE and SE 400th Place within an easement. The station pumps water from the 888 Zone to fill the Stanridge Hill Reservoir through a dedicated transmission main. The station has a capacity of 90 gpm with two end-suction centrifugal pumps that are equipped with 3-hp motors.

A 3-inch pressure reducing valve installed between the pump station suction and discharge headers is set to open on low pressure in 888 zone (i.e., fire event) to allow flow from the Stanridge Hill Reservoir to flow into 888 Zone. The valve will also allow for back-feeding the long dead end line that supplies the booster station, should the water supply from the 888 main zone be interrupted for repairs.

Stanridge Hill Booster Pump Station

The Stanridge Hill Booster Pump Station is located on the site of the Stanridge Hill Reservoir and pumps water from the reservoir into the closed 1040 Zone. The station has three centrifugal pumps equipped with 3-hp motors and variable frequency drives that provide a total station capacity of 100 gpm. The lead pump runs continuously with additional pumps started as needed to meet demand. A 10-inch check valve installed in a vault next to the booster pump station supplies water to the 1040 Zone from the Stanridge Hill Reservoir in the event that pressures are excessively suppressed in the 1040 zone (i.e., fire flow situation).

1013 Zone Booster Pump Station

The 1013 Zone Booster Pump Station is located on the same site as the Corrosion Control Facility, which is located near SR 410 north of the Enumclaw Golf Course, and pumps water from the 888 Zone into the closed 1013 Zone. The station increases service pressures and supplies treated water to surrounding properties and customers who were transferred off of the 10-inch dedicated Boise Spring transmission main.

The 1013 Zone Booster Pump Station has two 10-horsepower pumps capable of a maximum of 200 gpm each and one 60-horsepower pump capable of 1,600 gpm in the event that pressures are excessively suppressed in the 1013 Zone (i.e., fire flow situation).

983 Zone Booster Pump Station

The 983 Zone Booster Pump Station is located in the south parking lot of the Enumclaw Expo Center in a shared facility with the Golf Course Well. The station pumps water from the City's 888 Zone into the 983 Zone to fill the Fairway Hills Reservoir. The 983 Zone Booster Pump Station has two 15-horsepower pumps capable of a maximum of 225 gpm each and one 100-horsepower pump capable of 1,700 gpm in the event that pressures are excessively suppressed in the 983 Zone (i.e., fire flow situation).

Fairway Hills Booster Pump Station

The Fairway Hills Booster Pump Station was reconstructed in 2017 and is located on a shared site with the Fairway Hills Reservoir, at the intersection of 290th Avenue SE and SE 464th Street. The booster pump station pumps water from the Fairway Hills Reservoir in the 983 Zone to the closed 1175 Zone. The station has a capacity of 60 gpm with three 3-hp pumps powered by variable frequency drives. The lead pump runs continuously with additional pumps started as needed to meet demand.

Highview Booster Pump Station

The Highview Booster Pump Station is located within an easement on the east side of 254th Avenue SE near SE 396th Street and supplies water from the 888 Zone to the closed 995 Zone. The station has a capacity of 120 gpm with three multi-stage centrifugal pumps equipped with 3-hp motors powered by variable frequency drives. The lead pump runs continuously with additional pumps started as needed to meet demand.

PRESSURE REDUCING STATIONS

Pressure reducing stations are connections between adjacent pressure zones that allow water to flow from the higher pressure zone to the lower pressure zone by reducing the pressure of the water as it flows through the station, thereby maintaining a safe range of pressures in the lower zone. The pressure reducing valve (PRV) hydraulically varies the flow rate through the valve (up to the flow capacity of the valve) to maintain a constant pressure on the downstream side of the valve for water flowing into the lower pressure zone. The City's water system has three pressure reducing stations. A summary of the City's facilities is included in Table 1-9. Descriptions of the stations are provided below and additional data is contained in Appendix G.

TABLE 1-9

Enumclaw Pressure Reducing Station Facility Summary

PRV Station Name	Upper Zone	Lower Zone	Size (in)	Valve Elevation (ft)(1)	Valve Set Point (ft)
New Horizons	1040	899	2	830	30
	1040	899	6	830	25
New Horizons BPS	988	888	3	765	30
983/888 Zone	983	888	6	778	30

(1) NAVD29 Datum.

The New Horizons pressure reducing station actively supplies water from the 1040 Zone to the lower 899 Zone through 2-inch and 6-inch valves. The station's below-grade concrete vault was constructed in 1996 and is located south of the intersection of 273rd Avenue SE and SE 402nd Street. In the event that the pressure reducing station fails, a pressure relief valve near the intersection of SE 403rd Street and 278th Avenue SE opens to relieve excess pressure in the zone.

A 3-inch pressure reducing valve is located within the New Horizons Booster Pump Station and is set to function as a standby supply from the Stanridge Hill Reservoir to the 888 Zone as noted in the prior New Horizons Booster Pump Station description.

A 6-inch pressure reducing valve is located approximately 300 feet west of the 284th Avenue SE and SE 472nd Street intersection and is set to function as pressure relief for the 983 Zone and as a source of supply in case of low pressure in the 888 Zone.

DISTRIBUTION AND TRANSMISSION SYSTEM

The City owns and maintains approximately 145.9 miles of water main ranging in size from less than 1-inch to 24-inches. A total of approximately 8.7 miles of private water main are connected to the City system. The private mains primarily include fire sprinkler system lines and mobile home park communities that the City provides water to through master meters. City and private mains can be seen on Figure 1-2 and are inventoried in Table 1-10.

TABLE 1-10

Water Main Inventory

Diameter (in)	City-Owned Length (ft)	City-Owned Percent Total	Privately-Owned Length (ft)	Privately-Owned Percent Total	Total
2 or smaller	63,993	8.3%	11,717	25.6%	75,710
3	66	0.0%	7,517	16.4%	7,583
4	34,487	4.5%	5,961	13.0%	40,448
5	380	0.0%	-	-	380
6	220,250	28.6%	14,406	31.5%	234,656
8	280,862	36.4%	3,336	7.3%	284,198
10	101,545	13.2%	2,767	6.1%	104,312
12	59,856	7.8%	-	-	59,856
14	1,481	0.2%	-	-	1,481
16	6,363	0.8%	-	-	6,363
18	856	0.1%	-	-	856
24	471	0.1%	-	-	471
Total	770,609	100%	45,704	100%	816,313

Water main in the City's system is constructed of asbestos concrete, PVC, HDPE, ductile iron, cast iron and steel. New water main installations are mostly required to be ductile iron water main in accordance with the City's development and construction standards.

The life expectancy of water main is assumed by the City to be approximately 80 years. Some water main constructed in the 1920s and 1930s is still in service and is primarily located in the downtown Enumclaw area. The majority of this older water main, which has exceeded its general life expectancy, is cast iron.

TELEMETRY AND SUPERVISORY CONTROL SYSTEM

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

The City's telemetry and supervisory control system is updated and maintained by the consultant firm S&B, Inc. The system consists of a master telemetry unit (MTU) at the public works building and remote telemetry units (RTU) at remote facilities.

WATER SYSTEM OPERATION AND CONTROL

All of the City's water sources provide supply directly into the City's main pressure zone, the 888 Zone. Watercress Spring and the Boise Spring feed the City Reservoir site through dedicated transmission mains. Boise Spring is a continuous supply source while the operation of Watercress Spring is controlled by water levels in the Crews and City Reservoirs. The water level in the Crews and City Reservoirs can also be used to control the operation of the PC Johnson Wellfield and Golf Course Well. Additionally, the Golf Course Well may be run from the Fairway Hills Reservoir to pump directly to the 983 Zone. The City of Tacoma Intertie can provide water directly into the 888 Zone in an emergency to supplement water production from the City's wells and springs.

The settings of the supply and storage facilities, pumping stations, and pressure reducing valves dictate the amount of water either flowing into or out of the systems pressure zones as described earlier in this chapter. Further detail regarding operation of the water system is included in Chapter 7.

CHAPTER 2

BASIC PLANNING DATA

INTRODUCTION

This chapter presents basic planning data that is essential for projecting the City of Enumclaw's future water demands. Recent population growth rates, and water consumption and production quantities are presented and used to project future population, customer growth, and associated water demands over the planning period. These projections are then used in Chapter 3 to assess the ability of the water system to serve the future water supply needs over the next 20 years.

EXISTING POPULATION, SERVICES, AND WATER DEMAND

POPULATION

The City's water service area population as of August 2021 is estimated to be 16,900 per the City's latest Water Facilities Inventory (Appendix B). Table 2-1 presents the estimated water service area population based on the number of water service connections.

TABLE 2-1

Estimated Water Service Area Population 2013 through 2021

Year	Estimated Service Population Within City(1)	Estimated Service Population Outside City Limits (King County)(2)	Total Service Area Population	Total Annual Growth
2012	11,015	4,268	15,283(3)	0.3%
2013	11,090	4,246	15,336	-0.1%
2014	11,095	4,223	15,318	0.2%
2015	11,141	4,201	15,342	1.6%
2016	11,413	4,179	15,592	0.0%
2017	11,440	4,157	15,597	1.4%
2018	11,680	4,135	15,815	3.0%
2019	12,184	4,113	16,297	2.1%
2020	12,543	4,092	16,635	1.6%
2021	12,830	4,070	16,900(3)	0.3%

(1) From Census (2020) and WA OFM population estimates.
(2) Based on 2012 and 2021 total service area population minus population within City.
(3) Per the City's 2012 and 2021 Water Facilities Inventories.

The City's population has grown since 2012 at a rate of just under 0.1 percent per year (2013 to 2014) to 4.3 percent per year (2018 to 2019). Population data for the City was obtained from the Washington State Office of Financial Management (OFM) data, as well as census data from 2020. Over the past 5 years, the population within the City has increased annually by 2.9 percent per year. It is generally assumed that a similar trend will continue for the near-term. This chapter includes population projections in a later section.

The estimated population served outside of the City's limits has declined over the past 10 years at a rate of approximately -0.5 percent per year. However, the decline is primarily due to the City's last annexation in 2012, and active connections outside the City limits dropped from 1,842 in 2012 to 1,809 in 2013. From 2013 to 2021 active services outside the City increased slightly to 1,814. The population projections used in this Plan will assume a slight increase in population in the areas beyond City limits in order to not underestimate potential water demands, based on Puget Sound Regional Council (PSRC) data, and the City's historic data trends for connections outside of the city limits.

SERVICE CONNECTIONS

Table 2-2a lists the number of water service connections by customer classification and the average annual percentage growth rate for 2013 to 2021, and Table 2-2b includes the proportion of customers in each class located both within and outside of the City limits in 2021.

TABLE 2-2a

Historical Water Service Connections 2013 through 2021

Customer Classification	Number of Service Connections								
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Single-Family	4,798	4,800	4,797	4,822	4,870	4,982	5,206	5,384	5,471
Multi-family	225	227	231	230	230	232	237	235	235
Commercial	372	372	380	381	385	386	381	384	383
School	20	20	20	20	20	21	22	22	22
City	38	37	30	30	30	31	31	30	35
Agricultural	109	112	115	113	112	110	109	105	106
Total	**5,562**	**5,568**	**5,573**	**5,596**	**5,647**	**5,762**	**5,986**	**6,160**	**6,252**
Growth Rate	--	0.1%	0.1%	0.4%	0.9%	2.0%	3.9%	2.9%	1.5%

Approximately 88 percent of the City's water service connections are single-family residential customers.

TABLE 2-2b

Water Service Connection – 2021

Customer Classification	Connections Inside vs Outside in 2021				
	In	**Out**	**Total**	**%In**	**%Out**
Single-Family	3,801	1,670	5,471	69.5%	30.5%
Multi-Family	232	3	235	98.7%	1.3%
Commercial	356	27	383	93.0%	7.0%
School	21	1	22	95.5%	4.5%
City	35	0	35	100.0%	0.0%
Agricultural	2	104	106	1.9%	98.1%
Total	**4,447**	**1,805**	**6,252**	**71.1%**	**28.9%**

Approximately 71 percent of the City's connections are located within city limits.

WATER USE

Production data is collected from the City's sources on a daily basis. Customer service meters have historically been read on a monthly schedule until 2018 when the City started to convert to an automated read system. The conversion was completed in 2021.

Production History: 2013-2021

The total annual production for each of the City's sources for 2013 through 2021 is shown in Table 2-3. The production by month for 2021 for each of the City's sources is shown in Table 2-4.

TABLE 2-3

Annual Metered Water Production by Source 2013 through 2021

Source Name	Metered Production (MG)								
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Boise Spring	442.3	433.5	404.6	414.5	431.2	409.4	403.8	426.7	416.1
Watercress Spring 1	0.0	0.0	45.6	0.0	0.0	0.0	0.0	0.0	0.0
Watercress Spring 2	160.0	165.5	166.4	196.4	149.2	198.9	192.6	180.3	225.8
Tacoma Intertie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P.C. Johnson Well 2	0.0	0.0	3.8	0.0	5.6	0.0	0.1	0.0(2)	9.8
P.C. Johnson Well 3	0.0(1)	0.0	18.3	0.0	0.6	0.3	0.0	0.0	1.2
Golf Course Well	0.0	0.0	0.0	0.0	64.6	10.2	3.0	12.6	33.5
Total	**602.3**	**599.0**	**638.7**	**610.9**	**651.3**	**618.8**	**599.5**	**619.6**	**686.3**

(1) Actual production was 5,000 gallons.
(2) Actual production was 17,000 gallons.

TABLE 2-4

Monthly Metered Water Production by Source for 2021

Source	Monthly Metered Production (MG)											
	J	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Boise Spring	39.5	35.6	39.4	37.5	36.0	33.9	32.2	29.8	27.1	27.6	35.7	41.8
Watercress Spring 1	0	0	0	0	0	0	0	0	0	0	0	0
Tacoma Intertie	0	0	0	0	0	0	0	0	0	0	0	0
P.C. Johnson Well 2	0	0	0	0	0	2.3	3.1	4.2	0	0	0.3	0
P.C. Johnson Well 3	0	0	0	0	0	1.2	0	0[1]	0	0	0	0
Watercress Spring 2	3.2	4.7	4.1	8.6	14.4	26.5	53.3	43.9	35.8	17.9	8.3	5.0
Golf Course Well	0	0	0	0	0	9.8	8.0	15.6	00	0.1	0	0
Total	**42.8**	**40.3**	**43.5**	**46.1**	**50.4**	**73.6**	**96.7**	**93.4**	**62.9**	**45.6**	**44.4**	**46.7**

(1) Actual production was 3,000 gallons.

Highest production during 2021 occurred during the summer months, peaking in July. Average day and maximum day production for the City's sources were taken from source production records. Table 2-5 shows the average and maximum daily production and the ratio of maximum daily to average daily production for 2013 through 2021. Based on recent production ratios, a ratio of 2.3 will be used to predict future maximum day demands on the City's water system for analysis later in this chapter. This is conservative compared with the overall average since 2013, and is higher than the peaking factor of 2.1 used in the 2013 Plan.

Annual water use has remained fairly consistent since the adoption of the 2013 Plan. Average Day and Maximum Day water production in 2015 and in 2021 were somewhat higher than in other years, likely due to hotter and drier than average weather. The highest maximum day production in Table 2-5 occurred in 2021 during a record heatwave in June, when temperatures reached 108°F at SeaTac Airport.

TABLE 2-5

Average Daily and Maximum Day Production for 2013 through 2021

Year	Total Annual Production (MG)	Average Daily Production (gpd)	Maximum Day Production (gpd)	Ratio
2013	602	1,650,162	2,872,357	1.74
2014	599	1,641,044	3,155,800	1.92
2015	639	1,749,802	4,021,500	2.30
2016	611	1,670,679	3,110,667	1.86
2017	651	1,784,365	3,760,917	2.11

TABLE 2-5 – (continued)

Average Daily and Maximum Day Production for 2013 through 2021

Year	Total Annual Production (MG)	Average Daily Production (gpd)	Maximum Day Production (gpd)	Ratio
2018	619	1,695,373	3,762,000	2.22
2019	599	1,642,416	3,106,000	1.89
2020	620	1,694,236	3,408,000	2.01
2021	686	1,880,375	4,277,000	2.27
Average	**625**	**1,712,050**	**3,497,138**	**2.04**

Consumption History: 2013-2021

The City's water consumption recorded by customer class for 2013 through 2021 is presented in Table 2-6. The non-residential customer class includes City properties, schools, commercial, industrial, and agricultural customers. Because the City serves customers located both within and outside of City limits, Table 2-6 indicates the consumption for these two categories of customers separately. Customers within the City limits account for approximately two-thirds of the overall water consumption each year.

TABLE 2-6

Metered Consumption by Customer Class 2013 through 2021

Location	Customer Class	Metered Consumption (MG)								
		2013	2014	2015	2016	2017	2018	2019	2020	2021
In-City	Single-Family	185.1	183.6	195.2	182.3	192.6	195.6	195.4	219.6	236.9
	Multi-Family	79.6	76.3	78.1	74.9	79.7	78.9	78.6	78.0	82.3
	Non-Residential	71.2	76.1	86.5	88.8	84.7	87.2	79.1	69.2	89.1
	Total	**335.8**	**336.0**	**359.8**	**346.0**	**357.0**	**361.8**	**353.2**	**366.8**	**408.3**
Outside of City	Single-Family	139.8	141.5	154.1	139.2	152.1	149.0	143.0	150.0	162.7
	Multi-Family	10.2	10.5	11.4	11.2	13.5	14.0	13.3	15.9	19.0
	Non-Residential	47.1	49.2	47.6	45.4	47.7	44.8	42.6	37.6	40.7
	Total	**197.1**	**201.2**	**213.1**	**195.8**	**213.2**	**207.8**	**198.9**	**203.5**	**222.5**
Grand Total		**532.9**	**537.2**	**572.9**	**541.9**	**570.2**	**569.6**	**552.0**	**570.3**	**630.8**

Table 2-6 presents 2021 consumption by month and customer class. As shown in Table 2-7, the seasonal variation in consumption is more pronounced for the single-family and commercial customer classes than the multi-family customer class.

TABLE 2-7

Metered Consumption by Customer Class and Month for 2021

Month	Metered Consumption (MG)			
	Single-Family	**Multi-Family**	**Non-Residential**	**Total**
January	23.3	6.8	6.5	36.6
February	22.4	7.1	7.6	37.1
March	25.2	8.3	8.2	41.8
April	25.6	7.4	7.3	40.3
May	26.9	7.7	8.0	42.6
June	44.9	10.6	12.7	68.2
July	58.4	9.6	17.4	85.4
August	59.9	9.8	22.2	91.9
September	39.3	9.0	15.9	64.1
October	23.5	7.3	8.6	39.4
November	26.3	9.6	8.2	44.1
December	23.9	8.2	7.1	39.2
Total	**399.7**	**101.3**	**129.8**	**630.8**

Table 2-8 provides a breakdown of the estimated water use per zone, based on 2021 consumption data. The 888 Zone is the largest zone in the City, both in area and in consumption, and each of the smaller zones represents less than 1 percent of the total consumption within the system.

TABLE 2-8

Consumption per Zone for 2021

Zone	Water Meters	2021 Water Consumption (ccf)	2021 Daily Consumption (gpd)	Percent of Total Consumption
888	6,060	825,185(3)	1,691,291	97.85%
899	14	1,421(1)	2,912	0.17%
983	87	6,818(4)	13,974	0.81%
988	1	108	221	0.01%
995	24	3,448	7,068	0.41%
1013	2	81	166	0.01%
1040	52	5,074(1)	10,400	0.60%
1175	11	1,073(1)	2,200	0.13%
1245	1	111	228	0.01%
Total	6,252	843,320(2)	1,728,459	100.00%

(1) Consumption estimated based on number of meters multiplied by 200 gpd/ERU. All services in these zones are residential.
(2) Total consumption per City's records for 2021.
(3) 888 Zone consumption based on total consumption minus metered or estimated consumption in each smaller zone.
(4) Excludes the demand of the City golf course that the zone supplies in combination with direct feed from the Golf Course Well.

EQUIVALENT RESIDENTIAL UNITS

Use of Equivalent Residential Units (ERUs) is a way to express water use by non-residential customers as an equivalent number of residential customers. The water consumption ERU value is calculated by dividing the total volume of water used in the single-family residential customer class by the total number of active single-family residential connections. The volume of water used by other customer classes can then be divided by the average single-family residential water use to determine the number of equivalent residential units consumed by other customer classes.

Table 2-9 presents the equivalent residential unit calculations for years 2013 to 2021.

TABLE 2-9

Equivalent Residential Units (ERUs) 2013 through 2021

Year	SF Residential Consumption (gpd)	SF Residential Service Connections	ERU value
2013	890,171	4,798	186
2014	890,479	4,800	186
2015	957,023	4,797	200
2016	878,437	4,822	182
2017	944,162	4,870	194
2018	944,231	4,982	190
2019	927,078	5,206	178
2020	1,009,694	5,384	188
2021	1,094,989	5,471	200
Average	**948,474**	**5,014**	**189**

As shown in Table 2-9, the average daily single-family residential water use for the water system from 2013 to 2021 (which is equivalent to one ERU) ranged from 178 gpd/ERU to 200 gpd/ERU with an average of 189 gpd/ERU. A value of 190 gpd/ERU will be used to predict future demands on the City's water system.

The planning value of 190 gpd/ERU is a reduction as compared to the planning values established by the previous WSP, which used a planning consumption value of 223 gpd/ERU. The per-ERU consumption has fallen steadily over the past two decades, as shown below in Figure 2-1. This is likely due to conservation resulting from the City's three-tiered water rate structure for residential customers and to the elevated sewer rates charged to customers inside the City. The calculated consumption since 2004 has fallen from 263 gpd/ERU to 188 gpd/ERU in 2020. The consumption recorded in 2021 of 200 gpd/ERU was a slight increase from 2020.

Also shown in Figure 2-1 are the City's past WUE consumption goals. The 2004 WSP established a goal to reduce per-ERU consumption by 5 percent gpd per year between 2004 and 2012. The 2013 WSP established a goal to maintain a 3-year rolling average per-ERU water usage of 200 gpd/ERU or less. These goals were accomplished, as shown on the figure.

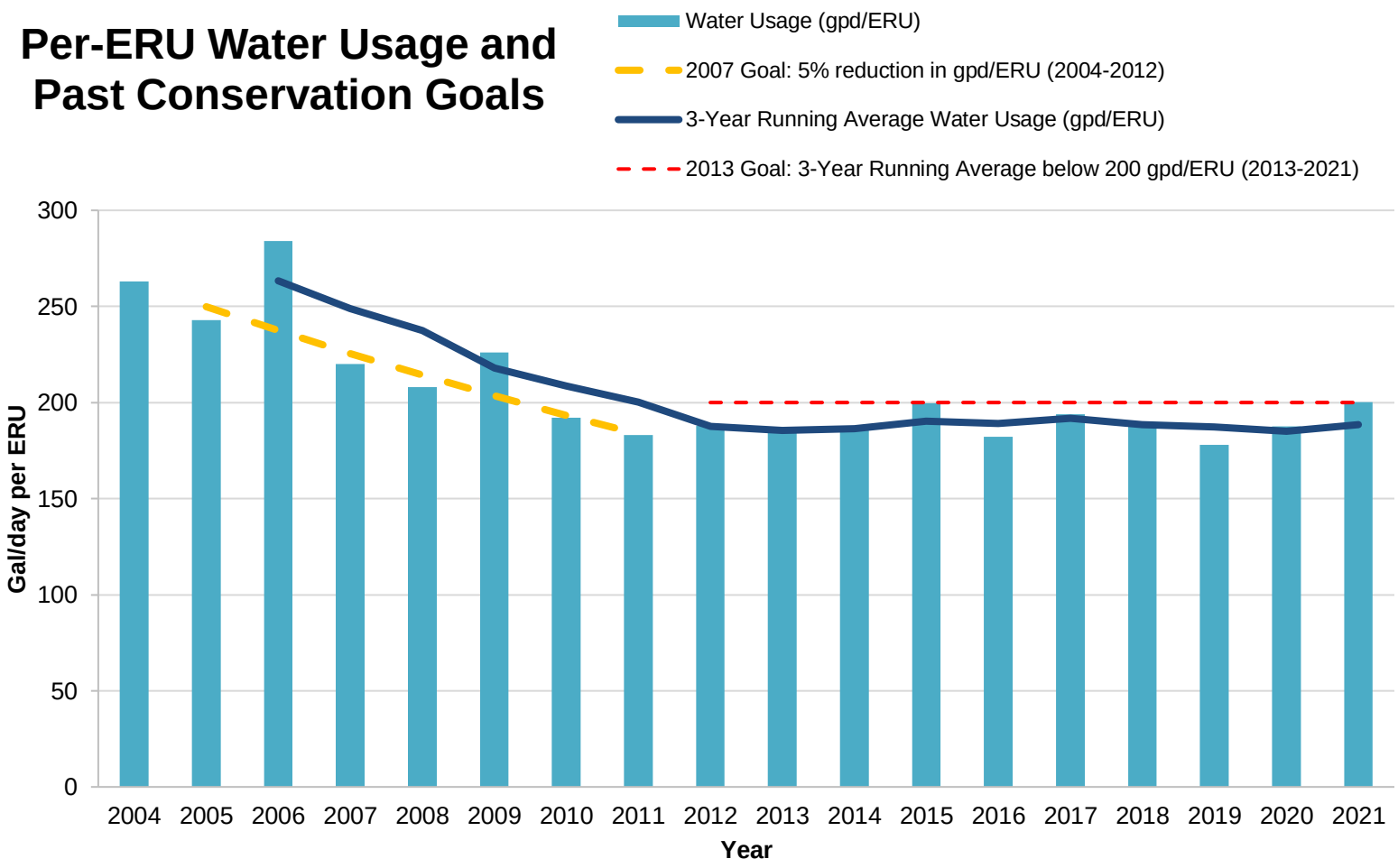


FIGURE 2-1

Consumption Trends

Table 2-10 presents the numbers of ERUs for all customer classes in year 2021, based on the ERU value for 2021.

TABLE 2-10

Year 2021 Equivalent Residential Units

Customer Class	Number of Connections	Average Daily Consumption (gpd)	ERUs(1)	Average ERUs Per Connection
Single-Family	5,471	1,094,989	5,471	1.0
Multi-Family	1,252(2)	277,553	1,387	1.1
Commercial	383	200,794	1,003	2.6
School	22	36,270	181	8.2
City	35	21,375	107	3.1
Agricultural	106	97,247	486	4.6
Total	**6,252**	**1,728,228**	**8,635**	**1.2**

(1) Based on the value of 200 gpd/ERU for 2021. A value of 190 gpd/ERU is used throughout the Plan to project future water system demands.

(2) Number of multi-family housing units per City's 2021 WFI. There are 235 multi-family connections, per Table 2-2.

LARGE WATER USERS

The 20 largest water users in the City's water system in 2021 are listed in Table 2-11 below, along with their total metered consumption for that year. These customers accounted for approximately 13 percent of the total metered consumption in 2021.

TABLE 2-11

Year 2021 Large Water Users

Customer	CCF	Gal	MG	gpd	mgd	% of Total	ERUs(1)
Mountain Meadows LLC	19,271	14,414,708	14.4	39,492	0.04	2.3%	197.3
Cal-Am Properties	13,465	10,071,820	10.1	27,594	0.03	1.6%	137.9
CrystalAire Mobile Park	8,792	6,576,416	6.6	18,018	0.02	1.0%	90.0
Dairy	6,551	4,900,148	4.9	13,425	0.01	0.8%	67.1
Lightning Clean Car Wash	6,329	4,734,092	4.7	12,970	0.01	0.8%	64.8
Aspen Glade Apts	4,826	3,609,848	3.6	9,890	0.01	0.6%	49.4
CC-Misty Mountain MHC LLC	4,679	3,499,892	3.5	9,589	0.01	0.6%	47.9
School District #216	4,490	3,358,520	3.4	9,201	0.01	0.5%	46.0
Dairy	4,168	3,117,664	3.1	8,542	0.01	0.5%	42.7
VIP Property Management LLC	3,896	2,914,208	2.9	7,984	0.01	0.5%	39.9
High Point Village	3,705	2,771,340	2.8	7,593	0.01	0.4%	37.9
School District #216	3,639	2,721,972	2.7	7,457	0.01	0.4%	37.3

TABLE 2-11 – (continued)

Year 2021 Large Water Users

Customer	CCF	Gal	MG	gpd	mgd	% of Total	ERUs[1]
Golden Elms Apartments	3,564	2,665,872	2.7	7,304	0.01	0.4%	36.5
St. Elizabeth Hospital	3,536	2,644,928	2.6	7,246	0.01	0.4%	36.2
Car Wash Enterprises Inc	3,194	2,389,112	2.4	6,546	0.01	0.4%	32.7
Safeway Store #494	2,606	1,949,288	1.9	5,341	0.01	0.3%	26.7
Lee Restaurant	2,531	1,893,188	1.9	5,187	0.01	0.3%	25.9
Expressions at Enumclaw	2,505	1,873,740	1.9	5,134	0.01	0.3%	25.6
Dairy	2,280	1,705,440	1.7	4,672	0.00	0.3%	23.3
SF Resident (major leak)	2,229	1,667,292	1.7	4,568	0.00	0.3%	22.8
Total	**106,256**	**79,479,488**	**79.5**	**217,752**	**0.22**	**12.6%**	**1,088**

(1) Based on the value of 200 gpd/ERU for 2021. A value of 190 gpd/ERU is used throughout the Plan to project future water system demands.

DISTRIBUTION SYSTEM LEAKAGE

Distribution system leakage (DSL) is defined as the difference between total water produced or purchased and all authorized water consumed. Authorized consumption (AC) includes both metered customer consumption and unmetered authorized consumption for activities such as construction, firefighting, and flushing.

Distribution system leakage for the City equals the difference between the supply measured at each source, including interties, and the volume measured at the customers' meters and all credibly estimated unmetered use. Since 2013, distribution system leakage has ranged from approximately 42 to 70 million gallons (MG), or approximately 7 percent to 11 percent of total treated supply. Table 2-12 provides annual data of distribution system leakage from 2013 to 2021.

TABLE 2-12

Distribution System Leakage 2013 through 2021

Year	Metered Production (MG)	Metered Consumption (MG)	Unmetered Accounted for Water(1)	Total Accounted for Water (MG)	Distribution System Leakage (MG)	Distribution System Leakage (%)	3-Year Rolling Average	DSL as ERUs(2)
2013	602	533	2	535	68	11.2%	10.4%	1,000
2014	599	537	2	539	60	10.0%	10.6%	883
2015	639	573	10	583	55	8.7%	10.0%	760
2016	611	542	4	546	65	10.6%	9.7%	973
2017	651	570	11	581	70	10.7%	10.0%	989
2018	619	570	6	576	43	7.0%	9.4%	623
2019	599	552	4	556	44	7.3%	8.3%	670
2020	620	570	8	578	42	6.7%	7.0%	607
2021	686	631	6	637	49	7.1%	7.0%	671
Average DSL						**8.8%**		**797**

(1) Includes flushing, firefighting and training, process use, construction and water trucks.
(2) Based on the ERU value for each year in Table 2-9.

As noted in Table 2-12, the City's DSL has generally decreased since 2013, and as of 2021 the City is below the 10 percent 3-year rolling average threshold that would require an action plan for DSL reduction. The City will continue to employ water conservation methods and leak detection measures to maintain this level of DSL. An average of 8.8 percent DSL is used in the water production projections in this Plan.

PER CAPITA WATER PRODUCTION

The City's per capita water production is shown in Table 2-13. The per capita production is calculated based on total metered production, which includes all residential, commercial, and industrial consumption, as well as distribution system leakage.

TABLE 2-13

Water Production per Capita 2013 through 2021

Year	Estimated Service Area Population	Average Daily Production (gpd)	Estimated Per Capita Production (gpcd)
2013	15,336	1,650,162	108
2014	15,318	1,641,044	107
2015	15,342	1,749,802	114
2016	15,592	1,669,209	107
2017	15,597	1,784,365	114
2018	15,815	1,695,373	107
2019	16,297	1,642,416	101
2020	16,635	1,692,792	102
2021	16,900	1,880,375	111

As shown in Table 2-12, the City's production per capita has been relatively consistent over the past several years, averaging 108 gallons per capita per day (gpcd). This is a reduction from the per-capita production noted in the 2013 WSP, which ranged from 111 to 134 gpcd between 2004 and 2012. Per capita water usage is not used for the projections in this Plan, as water use is determined on a per-ERU basis. Growth rates within the service area are applied to the number of ERUs to estimate future ERUs for the 10- and 20-year planning periods.

FUTURE WATER DEMANDS

An essential component of the Plan is projecting water demands on the system during the 20-year planning period. Three types of demands are considered in this plan: average day demand (ADD), maximum day demand (MDD), and peak hourly demand (PHD). Average day demand is projected using the number of ERUs and the average day consumption per ERU. For the purposes of water demand projections, an ERU value of 190 gpd/ERU is used.

Table 2-5 indicates that the average maximum day production to average day production ratio is 2.04; for the purposes of water demand projections, maximum day demand is calculated by multiplying the average day demand by a peak day factor of 2.3.

Precise records of peak hour demand are not available. Peak hour demand can be expressed in terms of a peak hour factor, defined as the ratio of peak hour to the maximum day demand. Peak hour factors generally range from 1.5 to 2.5. The DOH Water System Design Manual provides a methodology for calculating peak hour demand (PHD). The generalized equation is as follows:

$$PHD = (MDD/1440)[(C)(N) + F] + 18$$

Where:

PHD = *Peak Hourly Demand, (gallons per minute, gpm)*
C= *Coefficient Associated with Ranges of the number of ERUs*
N= *Number of Service Connections, ERUs*
F= *Factor Associated with Ranges of the number of ERUs*
MDD= *Maximum Day Demand, (gpd/ERU)*

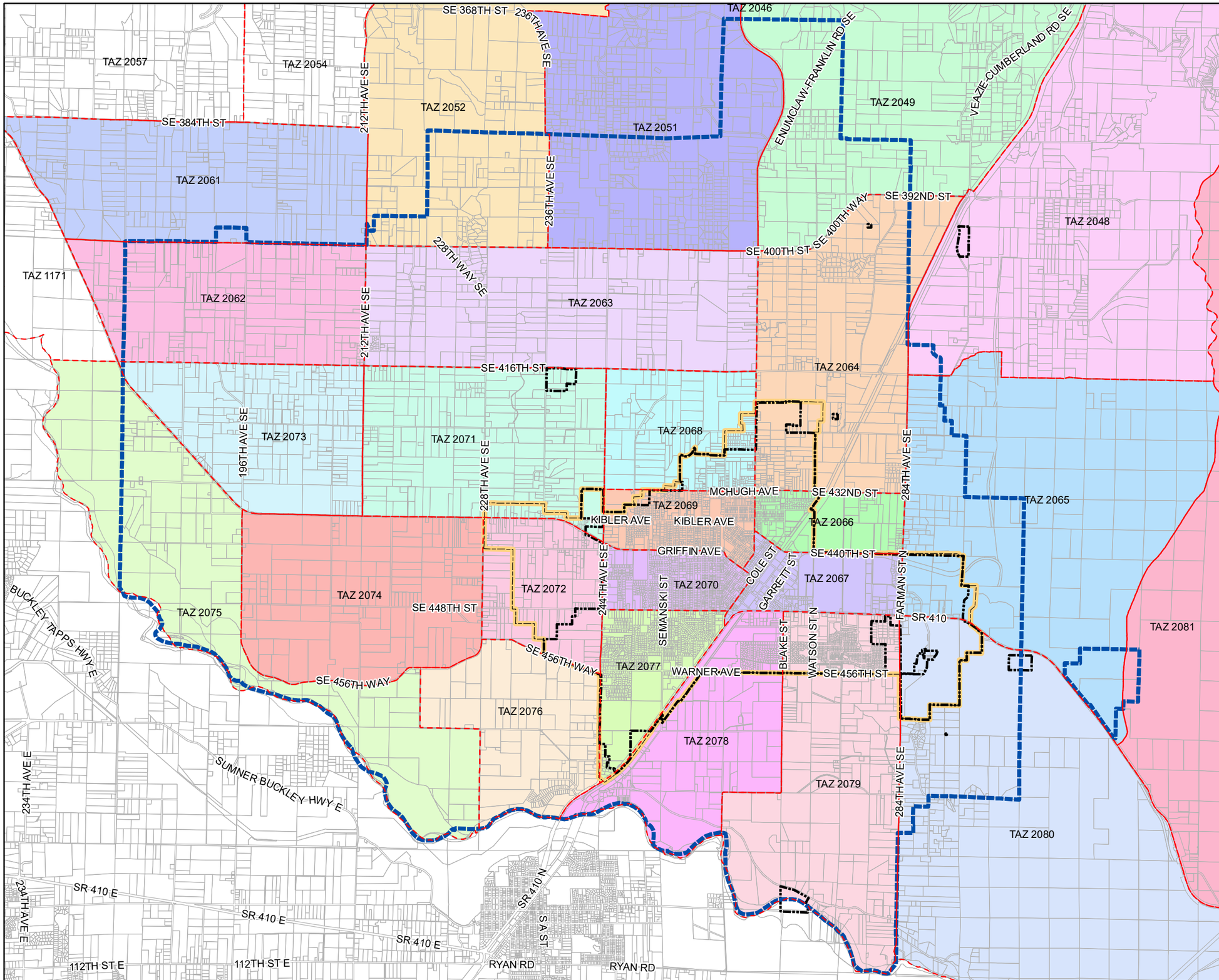
The values for C and F of the peak hour demand formula are taken from the DOH Water System Design Manual: C is equal to 1.6 and F is equal to 225. In 2021, the MDD for the Enumclaw water system was 495 gpd/ERU (4.28 mgd/8,635 ERUs). Using the above equation, the City's estimated peak hour demand was 4,848 gpm. Therefore, the City's peak hour factor for 2021 is equal to 1.63 times the MDD. A rounded factor of 1.7 is used for the peak hour peaking factor in the projections. This is slightly less than the 1.8 factor used in the 2013 Plan.

PROJECTED GROWTH

Population

The population projections for this Plan were determined using the King County Countywide Planning Policies (CPPs) Table DP-1 housing targets, which were converted back to a population, resulting in an estimated population of 15,864 by 2044. According to the CPPs, the housing target is 1,057 additional housing units and 989 additional jobs with an average of 2.39 persons per household.

As noted in Table 2-1, population within the City limits has increased at a faster rate over the past 5 years, following completion of the last Comprehensive Plan. The City is currently in the process of updating the Comprehensive Plan alongside other regional entities' and King County's updated planning efforts. At this time, finalized planning numbers and housing targets are not established, but draft information is available.



LEGEND

- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- TAZ BOUNDARY
- PARCELS

Source: King County GIS Data

N

0 2,500 5,000 10,000 Feet

CITY OF ENUMCLAW

WATER SYSTEM PLAN

FIGURE 2-2

SERVICE AREA TAZs

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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One of the interim planning efforts, the County's 2021 County-wide Planning Policies document, identified a growth target of 1,057 additional housing units within the City between 2019 and 2044. The City has estimated a population based on this housing target in 2044 of 15,864 people within the City limits. The number of housing units within the City as of 2019 was 5,228 according to the OFM postcensal estimates of housing data. The additional units over a 25-year period would require a consistent annual growth rate of 0.74 percent per year. However, in recent years, the City's growth rate has outpaced this rate. Because this projected population represents a minimum target, the growth projections in this Plan are higher.

Additionally, the Puget Sound Regional Council (PSRC) population projection data was used to assist in developing the population projections in this chapter. PSRC provided the City with data from the Vision 2050 update in June 2022 for this analysis. The PSRC projections are provided for small areas called Traffic Analysis Zones (TAZs). The TAZs contained in the City's water service area are shown on Figure 2-2.

As noted previously, the population growth outside of the City's limits has been very limited over the past 10 years, after accounting for a past annexation. This trend is supported in the negative growth rates projected for several TAZs within the Water Service Area (WSA) outside of the City limits. The negative growth is assumed to be related to the County's continued acquisition of properties for development transfer credits and environmental restoration projects. However, the PSRC data indicates positive overall growth for the WSA outside of City limits from 2020 through 2045. As the historic local data is considered a better predictor of future trends than the high level PSRC data, a modified yet conservative growth factor for outside the City limits will be applied. Therefore, an annual growth rate for areas outside of the City is assumed to be 0.3 percent per year through the next 20 years, applied to the number of out-of-City ERUs.

Within the City, a growth rate exceeding the rate required to achieve the County's housing target is applied in order to ensure conservatism in system planning. For the next 5 years, a growth rate of 2.9 percent per year is applied to the number of in-City ERUs, based on the average annual population growth between 2017 and 2021. Between 2027 and 2037, it is assumed that growth will slow, and the PSRC TAZ growth rate of 0.3 percent per year is used. The growth rate between year 15 (2038) and year 20 (2043) is assumed to be 0.4 percent per year, in order to reach the City's current target population of 15,864 in 2044.

Figure 2-3 includes the projected population within the City, within the service area but outside of the City, and the total population. It is assumed that all ERUs within the service area will be subject to the same growth rate, and that non-residential water use will generally increase at a similar pace as residential development and water use.

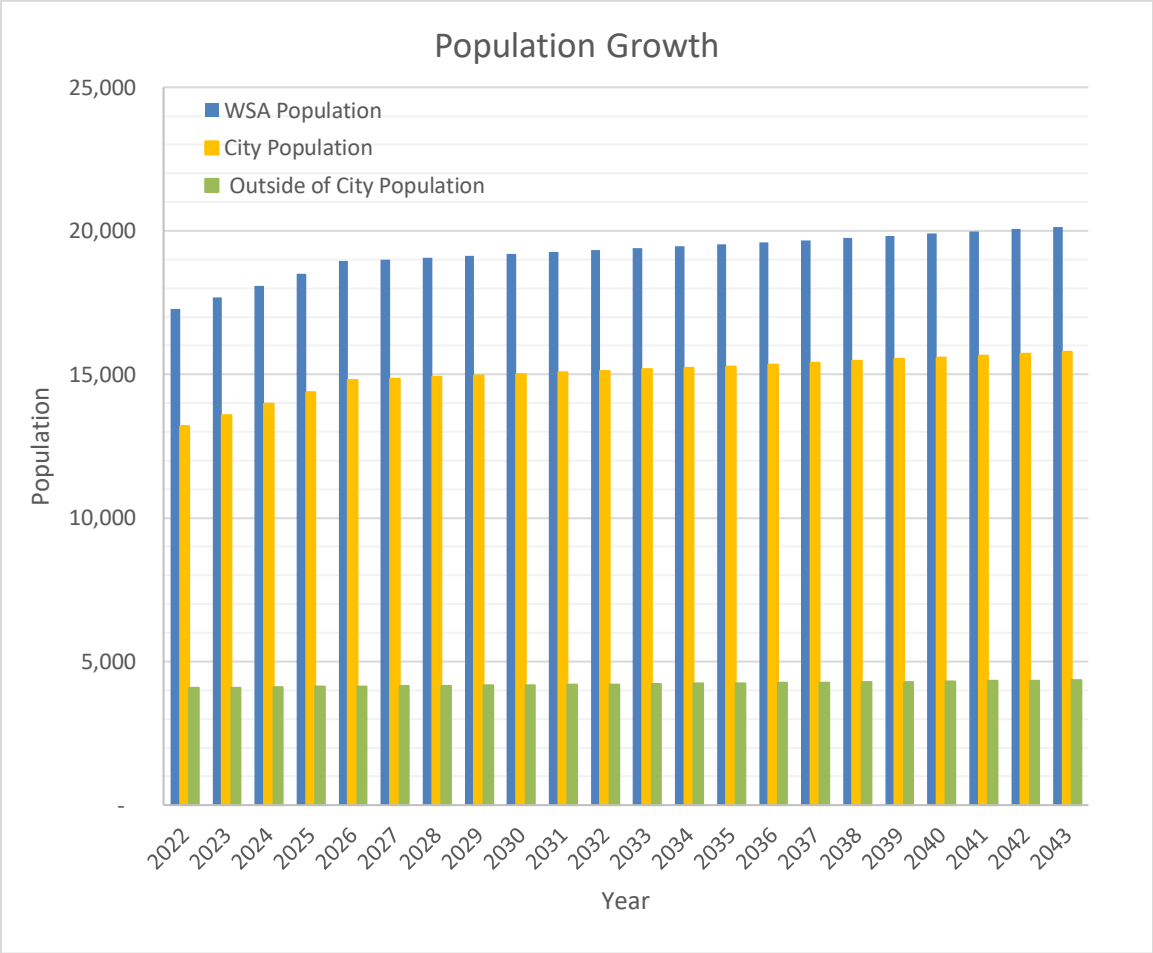


FIGURE 2-3

Population Projections

Table 2-14 includes the projected population by year for both in-City and outside of City customers. The 10-year planning period covers 2023 through 2032, while the 20-year planning period ends in 2043.

TABLE 2-14

Projected Population

Year	In-City Annual Growth	In-City Population	Out of City Annual Growth	Out of City Population	WSA Annual Growth	WSA Population
2022	2.9%	13,200	0.3%	4,080	2.3%	17,280
2023	2.9%	13,590	0.3%	4,090	2.3%	17,680
2024	2.9%	13,980	0.3%	4,110	2.3%	18,090
2025	2.9%	14,390	0.3%	4,120	2.3%	18,510
2026	2.9%	14,810	0.3%	4,130	2.3%	18,940
2027	0.3%	14,860	0.3%	4,140	0.3%	19,000
2028	0.3%	14,910	0.3%	4,160	0.3%	19,070
2029	0.3%	14,970	0.3%	4,170	0.3%	19,140
2030	0.3%	15,020	0.3%	4,180	0.3%	19,200
2031	0.3%	15,070	0.3%	4,190	0.3%	19,260
2032	0.3%	15,120	0.3%	4,210	0.3%	19,330
2038	0.4%	15,470	0.3%	4,280	0.4%	19,750
2043	0.4%	15,800	0.3%	4,350	0.4%	20,150

Water Use

Table 2-15 shows the projected water demand during the 20-year planning period. Projected consumption is calculated based on 190 gpd/ERU. Distribution system leakage is calculated based on a rate of 8.8 percent of average daily production. Peak day demands and peak hour demands are calculated using peaking factors of 2.3 and 1.7, respectively.

The City is aware that water demand and supply may be impacted by climate change in the future, due to either changes in rainfall amounts, or hotter temperatures. The average annual temperature at SeaTac Airport has increased by approximately 4 degrees F since 1945 according to the Western Regional Climate Center (WRCC), with more extreme heatwaves in recent years, most notably in June 2021 when temperatures reached 108 degrees. The City's maximum recorded water usage occurred in response to this heatwave. In order to plan for the high water usage that may occur in the future in response to similar heat events, the maximum daily water demand assumed in this Plan is of a similar magnitude to the actual peak day demand during June 2021. The City may implement water conservation measures in the future, as well as source and storage improvements noted in this Plan in order to respond to demand changes as a result of climate change.

Average annual rainfall at SeaTac Airport has stayed fairly consistent over the past 80 years according to the WRCC. However, average rainfall during the summer months has decreased slightly, which may indicate extended dry periods in the future. Surface

water sources may be particularly impacted by decreased rainfall and longer dry periods. The City's sources are all groundwater-based, though the City's largest sources, its Boise and Watercress Springs sources, are likely fed by shallower aquifers that may be replenished by rainfall more directly. The City will continue to monitor its sources to identify any trends or changes in production from these sources.

TABLE 2-15

Water Use Projections

Year	Total ERUs(1)	Population	Consumption ADD(2) (gpd)	DSL(3) (gpd)	Production ADD (gpd)	MDD(4) (gpd)	PHD(5) (gpm)
2022	8,834	17,280	1,678,600	162,200	1,840,800	4,233,800	5,000
2023	9,033	17,680	1,716,200	165,800	1,882,000	4,328,600	5,110
2024	9,237	18,090	1,755,000	169,500	1,924,500	4,426,400	5,230
2025	9,446	18,510	1,794,800	173,400	1,968,200	4,526,900	5,340
2026	9,662	18,940	1,835,800	177,400	2,013,200	4,630,400	5,470
2027	9,695	19,000	1,842,000	178,000	2,020,000	4,646,000	5,480
2028	9,727	19,070	1,848,200	178,600	2,026,800	4,661,600	5,500
2029	9,760	19,140	1,854,400	179,200	2,033,600	4,677,300	5,520
2030	9,793	19,200	1,860,600	179,800	2,040,400	4,692,900	5,540
2031	9,826	19,260	1,866,900	180,400	2,047,300	4,708,800	5,560
2032	9,859	19,330	1,873,200	181,000	2,054,200	4,724,700	5,580
2038	10,072	19,750	1,913,700	184,900	2,098,600	4,826,800	5,700
2043	10,273	20,150	1,951,800	188,600	2,140,400	4,922,900	5,810

(1) Based on the in-City and out of City growth rates presented in Table 2-14.
(2) Average Day Demand is calculated using 190 gpd/ERU.
(3) DSL is calculated using 8.8 percent of average day production.
(4) Maximum Day Demand is calculated using an MDD:ADD peaking factor of 2.3.
(5) Peak Hour Demand is calculated using a PHD:MDD peaking factor of 1.7.

CHAPTER 3

SYSTEM ANALYSIS

INTRODUCTION

Water system planning is based on a careful analysis of a water utility's ability to meet level of service standards for existing and future customers. The City of Enumclaw (City) has adopted design standards, which identify criteria and standards for the water system. These standards can be used to evaluate and analyze the existing water system facilities and water quality within the City's water service area. Based on these analyses, a summary of deficiencies and options to resolve these deficiencies in order to comply with the required standards are identified. This chapter summarizes the City's water system design standards and Washington State and EPA water quality standards and provides an analysis of part of the water system to identify system deficiencies.

SYSTEM DESIGN STANDARDS

Performance and design criteria typically address the sizing and reliability requirements for source, storage, distribution, and fire flow. Construction standards set forth the materials and construction methods that contractors, developers, and the City must follow when constructing water system facility improvements.

BASIS OF DESIGN STANDARDS

State Standards

The Washington State Department of Health (DOH) relies on various publications of standards, agencies, and the utility itself to establish design criteria. The following is a brief description of three of the most widely recognized performance and design standards.

- ***WAC 246-290, Group A Public Water Systems*, Washington State Board of Health (November 2021)**

  This is the primary drinking water regulation used by the Washington State Department of Health (DOH) to assess capacity, water quality, and overall compliance with drinking water standards.

- ***Water System Design Manual, Washington State Department of Health (June 2020)***

  These standards serve as guidance for the preparation of plans and specifications for Group A public water systems in compliance with WAC 246-290.

- ***Water System Planning Guidebook*, Washington State Department of Health (August 2020)**

  The Water System Planning Guidebook outlines planning requirements as well as a process framework for water systems to create a WSP that best fits their size and needs. Significant revisions to the former Water System Guidebook were adopted in August 2020.

City Standards

DOH relies on the City itself to establish design criteria. The following gives a brief description of the referenced City design standards:

- All proposed developments within the City's existing and future service areas shall conform to the City's adopted design criteria, construction standards and specifications.

- All projects within unincorporated King County right-of-way must be designed and constructed in accordance with the King County Road Standards and franchise requirements and must be inspected and approved by King County Utility Inspection.

Additional criteria are contained in the *City of Enumclaw Water System Construction Standards*, a copy of which is included in Appendix E of this Plan.

GENERAL FACILITY DESIGN STANDARDS

Table 3-1 lists the suggested DOH *Water System Design Manual* guidance and the City of Enumclaw policies with regard to each standard for general facility requirements. General facility design standards cover the following categories:

- Average and Peak Day Demand
- Peak Hour Demand
- Storage Requirements
- Fire Flow Rate and Duration
- Minimum System Pressure
- Minimum pipe Sizes

- Reliability Recommendations
- Valve and Hydrant Spacing

TABLE 3-1

General Facility Requirements

Standard	DOH Water System Design Manual (June 2020)	City of Enumclaw Standard
Average Day and Maximum Day Demand	Average day demand should be determined from previous actual water use data. Maximum day demand is estimated at 1.35 to 1.65 times the maximum month's average day demand if daily metered data is not available.	Average day demand is determined using consumption and production data from 2013 to 2021. A maximum day demand (MDD) of 2.3 times the average day demand (ADD) is based on the peak ratio of MDD/ADD in the 2013 to 2021 data. (See Future Water Demands in Chapter 2)
Peak Hour Demand	Peak hour demand is determined using the following equation: PHD = (ERU_{MDD}/1440) [(C)(N) + F] + 18 ERU_{MDD} = Daily demand per ERU, calculated using peak day single-family housing unit demand (gpd) C = Coefficient from DOH Design Manual Table 3-1. N = Number of connections, ERUs using max day demand and ERU_{MDD} F = Factor of range from DOH Design Manual Table 3-1.	Peak hour demand is determined by applying a peaking factor of 1.7 to the MDD, based upon the DOH Water System Design Manual equation outlined in the adjacent cell. (See Future Water Demands in Chapter 2)
Storage Requirements	Water systems must account for and provide storage equal to the sum of: * Operational Storage * Equalizing Storage * Standby Storage* * Fire Suppression Storage* * Dead Storage *Standby storage and fire suppression storage may be nested if permitted by the local fire authority.	The sum of: • Operational Storage (OS) • Equalizing Storage (ES) • Standby Storage (SB) • Fire Suppression Storage (FSS), if applicable • Dead Storage (DS) Standby storage and fire suppression storage are nested. Refer to storage analysis in Chapter 3 for further details.

TABLE 3-1 – (continued)

General Facility Requirements

Standard	DOH Water System Design Manual (June 2020)	City of Enumclaw Standard
Fire Flow Standard (Rate & Duration)	The minimum fire flow shall be determined by the local fire authority or WAC 246-293 for systems within a critical water supply service area (CWSSA).	The following fire flow requirements are used for planning purposes Rural Residential (>35,000 sq. ft.): 500 gpm for 0.5 hours Single Family Residential and Rural Residential (<35,000 sq. ft.): 1,000 gpm for 2 hours High-Density Residential: 1,750 gpm for 2 hours Multi-Family Residential: 2,500 gpm for 2 hours Commercial/Industrial/Schools: 3,000 gpm for 3 hours
Minimum System Pressure	The system should be designed to maintain a minimum of 30 psi in the distribution system under peak hour demand when all operational and equalizing storage is depleted and 20 psi under fire flow plus maximum day demand conditions when all fire suppression storage is depleted.	• The City will maintain a minimum pressure of 40 psi at customer meters during normal demand conditions, excluding a fire or emergency. • The City will endeavor to maintain a minimum pressure of 30 psi at customer meters during all demand conditions, excluding a fire or emergency. • During fire conditions, the minimum pressure at customer meters and throughout the remainder of the system will be 20 psi.
Minimum Pipe Sizes	The diameter of a transmission line shall be determined by hydraulic analysis. The minimum size distribution system line shall not be less than 6 inches in diameter unless a hydraulic analysis justifies another size.	The minimum diameter of distribution mains shall be 6-inches in diameter if looped, or 8-inches in diameter for dead-end lines. All new distribution mains will be sized by a hydraulic analysis. All new mains providing fire flow will be sized to provide the required fire flow at a minimum residual pressure of 20 psi and maximum pipeline velocity of eight feet per second during maximum day demand conditions.
Reliability Recommendations	1. Sources should be capable of replenishing fire suppression storage within a 72-hour period while concurrently supplying MDD. 2. Sources capable of supplying MDD within a 20-hour period. 3. Sources must meet ADD with the largest source out of service. 4. Source reliability sufficient to limit system-imposed water use restrictions to once every 50 years, on average. 5. In-place, auto-transfer auxiliary power equipment for pump stations and/or two independent primary public power sources and/or adequate gravity standby storage.	1. Sources should be capable of replenishing fire suppression storage within a 72-hour period while concurrently supplying MDD. 2. Sources capable of supplying MDD within a 20-hour period. 3. Sources must meet ADD with the largest source out of service. 4. Source reliability sufficient to limit system-imposed water use restrictions to once every 50 years, on average. 5. Back-up power equipment for pump stations 6. Standby storage equivalent to MDD, unless lack of source redundancy justifies higher SB volume or good source redundancy justifies lower SB volume. 7. Unless deemed impractical, transmission and distribution mains will be looped to improve water quality and increase reliability, fire flow capacity and to decrease head losses. 8. During normal demand conditions, the velocity of water in a water main should be less than 5 fps. Unless otherwise allowed by the City during emergency conditions such as a fire, the velocity of water in a water main may exceed 5 fps,

TABLE 3-1 – (continued)

General Facility Requirements

Standard	DOH Water System Design Manual (June 2020)	City of Enumclaw Standard
	6. Standby storage equivalent to MDD, unless lack of source redundancy justifies higher SB volume or good source redundancy justifies lower SB volume. 7. Looping of distribution mains when feasible. 8. Pipeline velocities <8 ft/s at PHD. 9. Flushing velocities of a minimum of 3 fps for all pipelines.	9. but should not exceed 10 fps unless hydraulic transient (water hammer) analysis is conducted. 10. Flushing must be 3 fps minimum for all pipelines.
Valve and Hydrant Spacing	Sufficient valves should be spaced to keep the minimum number of customers out of service when water is turned off for maintenance or repair. Fire hydrants on lateral should be provided with their own auxiliary gate valve.	Hydrants are required every 600 feet in residential areas and at every 450 feet in commercial areas. The maximum valve spacing is 300 feet on center or such that no more than twenty services will be isolated within a shutdown area. A minimum of three valves will be provided per cross, and two per tee.

WATER QUALITY STANDARDS

APPLICABLE DRINKING WATER QUALITY REGULATIONS

Water quality monitoring is an important part of both regulatory compliance and water system oversight. Table 3-2 lists the existing and future drinking water regulations and action taken by the City. Some regulations are not included, as they do not apply to the City's water system.

Existing state law regulates bacteriological contaminants, inorganic chemicals and inorganic physical parameters (IOCs); volatile organic chemicals (VOCs); synthetic organic chemicals (SOCs); radionuclides; disinfection byproducts (DBPs) including total trihalomethanes (TTHMs), haloacetic acids (HAA5s), bromate, and chlorite; and disinfectant residuals. Future water quality regulations include the Revised Lead and Copper Rule as well as Per- and Polyfluoroalkyl Substances (PFAS) monitoring and radon. These regulations define treated water quality standards and establish treated and/or source water quality monitoring schedules. The implementation schedules for the proposed new regulations are subject to revision and the City should continue to stay informed regarding regulatory deadlines.

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

TABLE 3-2

Drinking Water Regulation Summary

Drinking Water Regulation(1)	Affected Contaminants(2)	City Action
Arsenic Rule	Arsenic	Monitoring
Asbestos	Asbestos	Waived thru 2028
Consumer Confidence Report	Reporting only	Reporting
Disinfectants/Disinfection By-Products Rule (DBPR) (Stage 1 and 2)	THMs, HAA5, Chlorite, Bromate	Monitoring and Planning
Inorganic Chemical and Physical parameters	IOCs	Monitoring
Lead and Copper Rule	Lead, Copper	Monitoring
Revised Lead and Copper Rule	Lead, Copper	Future Monitoring: Monitoring requirements change 2024
Per- and Polyfluoroalkyl Substances	PFAS	Future Monitoring: Report Initial Sample by December 31, 2025
Radionuclide Rule	Radionuclides	Monitoring

TABLE 3-2 – (continued)

Drinking Water Regulation Summary

Drinking Water Regulation(1)	Affected Contaminants(2)	City Action
Residual Disinfectant	Total Free Chlorine	Monitoring
Revised Total Coliform Rule	Coliform	Monitoring
Surface Water Treatment Rule (SWTR) (Long Term 1 & 2 Enhanced Monitoring	Microbial	Not required until Tacoma intertie is converted to seasonal source
Unregulated Contaminant Monitoring Rule	IOCs, VOCs, SOCs	Monitoring
Volatile and Synthetic Organic Compounds	VOCs, SOCs	Monitoring
Wellhead and Watershed Protection Program	N/A	Monitoring and Updating as Necessary
Groundwater Rule	Bacteriological	Monitoring
Filter Backwash Recycling Rule	Recycling contaminants	Not required until manganese removal system is installed for the PC Johnson Well

(1) Drinking water regulations as of March 2022.
(2) TTHM = Total Trihalomethanes; HAA5 = Five Haloacetic Acids; IOCs = Inorganic Chemical and Physical Characteristics; VOCs = Volatile Organic Chemicals; SOCs = Synthetic Organic Compounds.

WATER QUALITY STANDARDS AND ANALYSIS

Minimum standards for water quality are specified in terms of Maximum Contaminant Levels (MCLs). Primary MCLs are based on chronic and/or acute human health effects. Secondary MCLs are based on factors other than health effects, including aesthetics. MCLs are specified in WAC 246-290 and described in the following pages and tables in this chapter. Water quality monitoring schedules for the City of Enumclaw are provided in Appendix K.

Arsenic

Arsenic is an inorganic chemical to which long-term exposure even at low concentrations of arsenic in drinking water can lead to skin, bladder, lung, or prostate cancer. Non-cancer effects of ingesting arsenic at low levels include cardiovascular disease, diabetes, and anemia, as well as reproductive, developmental, immunological, and neurological effects. The EPA's Arsenic MCL is 0.01 mg/L.

The Arsenic Rule makes monitoring requirements consistent with monitoring for other IOCs. Any system that has a sampling point monitoring result exceeding the MCL must increase the frequency of monitoring at that sampling point to quarterly sampling. Compliance with the MCL is based on the running annual average of the samples. Systems triggered into increased monitoring are not considered in violation of the MCL

until they have completed 1 year of quarterly sampling. However, if any sample result will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.

The last reported arsenic sample results from 2020 indicate arsenic levels that were below both the MCL of 0.01 mg/L and the detection level.

Asbestos

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

There is concern with the health risks associated with the use of asbestos. 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, although studies of asbestos workers have shown increased rates of gastrointestinal cancer.

Asbestos monitoring is required if the sources are vulnerable to asbestos contamination or if the distribution system contains more than 10 percent of asbestos cement pipe. The City is not required to monitor for asbestos because the spring and well sources are not vulnerable to asbestos contamination and less than ten percent of the City's distribution pipe is constructed of asbestos cement pipe. The City has obtained a waiver for asbestos testing from DOH, as is noted in Appendix K.

Consumer Confidence Report

The Consumer Confidence Report (CCR) Rule requires community water system purveyors to prepare and distribute an annual report of water quality analyses to their customers. The City provides a CCR to its customers annually. A copy of the City's 2022 CCR is included in Appendix J.

Disinfectants and Disinfection Byproducts Rule

WAC 246-290-300(6) requires purveyors of public systems that provide water treated with chemical disinfectants to monitor for disinfectants and disinfection byproducts. The Disinfectants and Disinfection Byproducts (D/DBP) Rule establishes residual disinfectant concentrations and MCLs for disinfection byproducts. Trihalomethanes and haloacetic acids (HAA5) are a group of organic compounds that can be formed as a result of drinking water disinfection by chlorine and are often referred to as disinfection

byproducts. Total Trihalomethanes (TTHMs) include the sum of the concentrations of four disinfection byproducts: chloroform, bromoform, bromodichloromethane, and dibromochloromethane.

The Stage 1 D/DBP rule became effective in February 1999 and established the MCLs for TTHM and HAA5 at 80 µg/L and 60 µg/L, respectively, based on the running annual average of four quarterly samples. The Stage 1 D/DBP Rule remained in effect for compliance until October 1, 2013.

Stage 2 of the D/DBP Rule was published in January 2006 and compliance with the new regulations began on October 1, 2013. Under Stage 2 of the D/DBP Rule, the MCLs for TTHM and HAA5 remain 80 µg/L and 60 µg/L, respectively; however, compliance with the MCL is based on the running annual average of each individual sample site instead of the running annual average of all samples combined. The Enumclaw system falls into the category of systems serving between 10,000 and 99,999 people, which would require the collection of four samples each for TTHMs and HAA5s per year. The City qualified for a reduction in this sampling frequency in 2014, and is currently approved to collect two samples for each species per year.

A copy of the Disinfection Byproducts Monitoring Plan is included in Appendix K.

Results of the D/DBP monitoring for 2017 through 2021 are presented in Table 3-3. In all cases the test results were well below the MCLs for TTHM and HAA5

TABLE 3-3

Stage 2 D/DBP Monitoring Results (µg/L)

Location	Parameter	MCL (µg/L)	2017	2018	2019	2020	2021
19104 SE 440th Street	TTHM	80	6.9	4.71	9.05	7.67	6.13
	HAA5	60	ND(1)	ND(1)	ND(1)	1.28	3.25
39626 224th Avenue SE	TTHM	80	4.6	4.48	4.9	3.95	4.33
	HAA5	60	1.0	ND(1)	ND(1)	ND(1)	1.13

(1) Indicates a non-detectable.

Inorganic Physical and Chemical Characteristics

WAC 246-290-310 specifies primary and secondary MCLs for inorganic physical and chemical characteristics. Primary MCLs are based on health effects, and secondary MCLs are based on factors other than health effects, such as aesthetics. Three chemicals, lead, copper, and sodium do not have primary or secondary MCLs, but are required to be monitored along with other IOCs. Lead and copper are regulated under the Lead and Copper Rule, described in detail later in this chapter. Primary and secondary MCLs for inorganic chemical and physical characteristics are summarized in Tables 3-4.

TABLE 3-4

Primary and Secondary Water Quality Standards for Inorganic Physical and Chemical Parameters

Chemical	Primary MCL (mg/L)
Antimony (Sb)	0.006
Arsenic (As)	0.01
Asbestos	7 million fibers/liter (Length > 10 micron)
Barium (Ba)	2.0
Beryllium (Be)	0.004
Cadmium (Cd)	0.005
Chromium (Cr)	0.1
Copper (Cu)	1.3 (Action Level, EPA)
Cyanide (HCN)	0.2
Fluoride (F)	4.0
Lead (Pb)	0.015 (Action Level, EPA)
Mercury (Hg)	0.002
Nickel (Ni)	0.1
Nitrate (as N)	10.0
Nitrite (as N)	1.0
Selenium (Se)	0.05
Sodium (Na)	None(1)
Thallium (Tl)	0.002
Turbidity	5 NTU
Chemical/Characteristic	**Secondary MCL (mg/L)**
Chloride (Cl)	250.0
Color	15 Color Units
Fluoride (F)	2.0
Iron (Fe)	0.3
Manganese (Mn)	0.05
Silver (Ag)	0.1
Specific Conductivity	700 µmhos/cm
Sulfate (SO4)	250
Total Dissolved Solids (TDS)	500
Zinc (Zn)	5

Source: WAC 246-290-310.

(1) Although an MCL has not been established for sodium, there is enough public health significance connected with sodium levels to require inclusion in inorganic chemical and physical monitoring.

Nitrate samples are required annually and nitrite samples are required once every 3 years. Because nitrates and nitrites are included in Inorganic Chemical (IOC) sampling, additional individual samples are not required in years when an IOC sample is taken from the source.

The City has a monitoring waiver for IOCs allowing for less frequent testing of inorganics, with the exceptions of lead, copper, and nitrates. Table 3-5 provides the results for IOC sampling from July 2019 which were above the state reporting limit. No samples exceeded the primary or secondary EPA Standards. All other parameters were below detection limits.

TABLE 3-5

Inorganic Chemical and Physical Characteristics Above State Reporting Limits

Parameter	MCL	Source Sample(1)	Units
EPA Regulated Primary Standards			
Nitrate -N	10	0.8	mg/L
Turbidity	5	0.68	NTU
EPA Regulated Secondary Standards			
Conductivity	700	139.8	µmhos/cm
Hardness (as $CaCO_3$)	N/A	68	mg/L

(1) Results from July 2019 IOC sampling for the Golf Course Well.

Lead and Copper Rule

In 1991, the EPA promulgated the Federal Lead and Copper Rule. The State of Washington adopted this rule in 1995, with minimal changes. The Lead and Copper Rule is intended to reduce the tap water concentrations of lead and copper that can occur when corrosive source water causes lead and copper to leach from water meters and other plumbing fixtures.

Ninety percent of the distribution system lead samples collected according to the procedures outlined in WAC 246-290 must have concentrations below the "Action Level" of 0.015 mg/L. Similarly, 90 percent of the copper samples must have concentrations less than 1.3 mg/L. If the 90th percentile concentration of either lead or copper from the group of samples exceeds these action levels, a corrosion control study must be undertaken to evaluate strategies and make recommendations for reducing the lead or copper concentration below the action levels. The rule requires systems that exceed the lead level to educate the affected public about reducing its lead intake. Systems that continue to exceed the lead action level after implementing corrosion control and source water treatment may be required to replace piping in the system that contains the source of lead. Corrosion control is typically accomplished by increasing the pH of the water to make it less corrosive, reducing its ability to break down water pipes and absorb lead or copper.

Table 3-6 provides the results of the City's lead and copper testing completed in May 2019. Lead and copper levels dropped significantly after the Corrosion Control Facility was brought on-line in 2002 to adjust pH in the water supplied by Boise and Watercress Springs. Because 90th percentile concentrations have been less than the federal action level, the City qualifies for reduced monitoring frequency of 30 sample sites every 3 years rather than 60 sites every year. The City is in compliance with the Lead and Copper Rule.

TABLE 3-6

Lead and Copper Testing Results (2019)

	Action level (mg/L)	**Minimum Concentration (mg/L)**	**Maximum Concentration (mg/L)**	**90th percentile concentration (mg/L)**	**Samples Taken**
Lead	0.015	<0.001	0.0019	0.0012	33
Copper	1.3	0.026	0.152	0.135	32

Sample sites were selected based on the known existence of lead pipes, copper pipes, and copper pipes with lead solder. All samples are "first draw tap samples" taken at a cold water tap in which water has not been drawn from the tap for at least 6 hours. The locations of future sample sites shall be chosen from the same as set of past sample sites, unless unavoidable conditions prevent sampling at the same locations.

Revised Lead and Copper Rule

The Revised Lead and Copper Rule (RLCR) will focus on replacing 100 percent of lead service lines and establishing a "trigger level" and "action level" for each contaminant. The EPA has also signaled its intent to test for lead and copper in schools and child care facilities. Water systems will be required to identify and make public the locations of lead service pipes. These revised regulations will take effect in October of 2024. The City is not aware of any lead service lines within the system.

Per- and Polyfluoroalkyl Substances

Per- and polyfluoroalkyl substances (PFAS) have become an increased concern for groundwater contamination in recent years. The substances are resistant to heat and chemical degradation and are used to manufacture heat-, grease-, oil-, stain-, and water-resistant materials. PFAS are commonly found in consumer goods such as clothing, nonstick cookware, and food packaging as well as fire retardants and surfactants. PFAS are typically found in groundwater near military bases, airports, and local fire departments.

The EPA established non-regulatory lifetime health advisory levels for two specific PFAS, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) at 70 parts per trillion combined. As of 2022, the EPA is still in the process of establishing federal drinking water standards for PFAS.

In Washington State, DOH's PFAS rule took effect in January 2022 and establishes State Action Levels (SAL) for five PFAS commonly found in drinking water. The rule will require water systems to monitor all active, permanent, and seasonal sources beginning in 2023 and no later than 2025. Monitoring requirements are set by WAC 246-290-300(10), and sampling will be required a minimum of once every 3 years. In the event PFAS is detected, follow up measures and monitoring will be required. The SALs for the five PFAS are summarized in Table 3-7. Enumclaw will sample for PFAs in 2025.

TABLE 3-7

PFAS SALs

Chemical	State Action Level(1)
PFOA	10 µg/L
PFOS	15 µg/L
PFHxS	65 µg/L
PFNA	9 µg/L
PFBS	345 µg/L

(1) All action levels set by WAC 246-290-315(4).

Radionuclides and Radon

Radionuclides are elements that undergo a process of natural decay and emit radiation in the form of alpha or beta particles and gamma photons. The radiation can cause various kinds of cancers, depending on the type of radionuclide exposure from drinking water. The regulations address both man-made and naturally occurring radionuclides in drinking water. Radionuclides include radioactive substances occurring naturally in surface and subsurface waters. Regulated substances include radium-226, radium-228, uranium, and gross alpha and beta particles. Radon is currently not regulated.

Table 3-8 summarizes radionuclide MCLs as defined by EPA's Radionuclide Rule and Washington State Department of Health's WAC 246-290-310(7), and 40 CFR 141.66. The City's most recent radionuclide sampling occurred in August 2021.

TABLE 3-8

Radionuclide MCLs and Results (August 2021)

Parameter	MCL	Watercress 1	P.C. Johnson	Watercress 2
Combined Radium-226 and -228	5 pCi/L	0.466 pCi/L	0.319 pCi/L	0.466 pCi/L
Gross Alpha (excluding Radon and Uranium)	15 pCi/L	<3.0 pCi/L	<3.0 pCi/L	<3.0 pCi/L

WAC 246-290 requires radionuclide samples once every 6 years. All samples from the most recent test have radionuclide levels below the MCL.

Final federal requirements for addressing radon were expected to be implemented in 2003; however, they have not been published to date. The rule proposes a 300 pCi/L MCL for community water systems that use groundwater, or an alternative, less-stringent MCL of 4,000 pCi/L for water systems where their state implements an EPA-approved program to reduce radon risks in household indoor-air, as well as tap water. The final Radon Rule publication date is unknown at this time.

Residual Disinfectant

The City's chlorination target is to maintain a residual disinfectant concentration of at least 0.2 mg/L throughout the distribution system. Weekly samples collected and submitted for coliform testing are also tested for disinfectant residual concentration to ensure the disinfectant residual meets the regulatory requirements and achieves the minimum target level. Additionally, a random location in the distribution system is also tested on a daily basis. The results of the residual disinfectant concentration are submitted monthly to DOH in compliance with the regulations. The City has been in compliance with its residual disinfectant standards. A discussion of chlorination and disinfection contact time is provided later in this chapter.

Groundwater Rule

The Groundwater Rule (GWR) is one of the requirements of the 1994 Amendments to the SDWA. The final rule was published on November 8, 2006, and applies to all water systems that use groundwater as a source of supply. The GWR initially requires two actions: the state must conduct a sanitary survey to assess contamination risks and the purveyor must conduct a source water assessment. The source water assessment is required for systems that do not provide 99.99 percent (4-log) inactivation or virus removal and has a positive total coliform sample under the Total Coliform Rule. The assessment must identify the presence of E. coli, enterococci, and coliphage at each source. The state can also require systems to conduct a source water assessment at any time.

Depending on the results of the source water assessment, corrective action may be required and may include disinfection. The rule requires all public water systems using groundwater to disinfect at each source unless the system qualifies for a variance or satisfies "natural disinfection" criteria. Natural disinfection criteria consider historical source water contamination, distances to the nearest potential source of fecal contamination, groundwater and pathogen travel time, hydrogeologic features, and well construction standards. The City is currently disinfecting at all sources, and the highly susceptible spring sources have sufficient contact time to provide 4-log treatment of viruses prior to entering distribution. The less susceptible PC Johnson Wellfield source also has sufficient contact time in the transmission main prior to provide 4-log treatment of viruses if at least a 0.6 mg/l chlorine residual is maintained.

The GWR requires triggered source water monitoring within 24 hours of receiving a positive total coliform distribution system sample unless there is DOH approved 4-log treatment and continuous disinfectant residual monitoring at the point of entry to distribution (compliance monitoring). The City currently monitors disinfectant residual at the spring sources only and therefore must use triggered source monitoring to comply with the rule. Under triggered source monitoring at least one sample must be taken from each source that was operating at the time of the positive distribution sample. Source samples are analyzed for fecal coliform and the results are reported to DOH. An additional five samples from the same source must be taken within 24 hours if the initial source sample is fecal positive unless DOH requires immediate corrective action, such as providing an alternative source of water until the source of the contamination is identified and eliminated or treatment instituted. If any of the additional samples are fecal coliform positive corrective action is required. Unless the fecal positive source sample is invalidated by DOH, persons served by the water system must be notified of the contamination as soon as practical but no later than 24 hours after the system learns of the violation.

The GWR also requires sanitary surveys of water systems every 3 to 5 years to identify conditions that may present a sanitary or public health risk.

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 and they represent an indicator organism. 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, so these tests are strictly monitored and regulated by the DOH. The revised rule requires more monitoring than under the prior requirements. In addition, every public water system is required to develop a coliform monitoring plan, subject to approval by DOH.

WAC 246-290 establishes bacteriological testing requirements for public water systems. Compliance with this rule is based on the presence/absence of total coliforms. The number of routine samples required depends on the system size. For systems like Enumclaw that take fewer than 20 samples per month, one sample that contains coliforms would exceed the legal limit and trigger the follow-up sampling requirements.

The Revised Total Coliform Monitoring Rule specifies each total coliform positive routine sample must be tested for the presence of E. coli.; if any total coliform positive sample is also E. coli. positive, then the sample must be reported to the state by the end of the day. If a routine sample is positive for total coliform, repeat samples are required.

In the event that a sample tests positive for coliform, at least three repeat samples shall be collected and analyzed for total coliform. One repeat sample shall be taken at the same location as the suspect sample and two additional samples shall be taken within five service connections upstream and downstream of the suspect sample. This is in addition to the triggered source monitoring requirements discussed in the Groundwater Rule section earlier in this chapter. These repeat samples shall be taken and submitted for analysis within 24-hours after receiving the unsatisfactory result. If one or more repeat sample is positive for total coliform, the sample must be analyzed for E. coli. If the total coliform positive sample is positive for E. coli, the sample must be reported to the state. Another set of repeat samples must then be collected unless an assessment has been triggered and the state has been notified. Public notification requirements are discussed in the Emergency Response Plan in Appendix L.

Based on the residential population listed in the City's Water Facilities Inventory Form in Appendix B, the City is required to collect a minimum of 15 coliform samples per month from different locations throughout the system. Regulations for bacteriological testing schedule are given in WAC 246-290-300(3). The City's Coliform Monitoring Plan is located in Appendix K.

Two positive coliform samples were collected in September 2019, which triggered the requirement to conduct a Level 1 Assessment of the system. The City completed a Level 1 Assessment, which was provided to DOH in October of 2019. Subsequent coliform samples have been in compliance with the water quality requirements, and a Level 2 Assessment was not necessary.

Unregulated Contaminant Monitoring Rule

Under the 1996 amendments to the SDWA, EPA is required to publish a new list of no more than 30 unregulated contaminants every 5 years that may warrant regulation due to their potential health effects and occurrence. EPA requires water systems to sample and test for the unregulated contaminates and use the resulting data to determine if regulation is warranted. The next round of required sampling will be taken in 2023 to 2025.

Volatile Organic and Synthetic Organic Compounds

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 3-9. SOCs were last tested in 2021 and VOCs were last tested in 2022. All recent testing for these contaminants did not yield any results above the MCL and the detection limit.

TABLE 3-9

Regulated VOCs and SOCs

Organic Chemical	Primary MCL (mg/L)	Organic Chemical	Primary MCL (mg/L)
Vinyl chloride	0.002	Chlordane	0.002
Benzene	0.005	Dibromochloropropane	0.0002
Carbon tetrachloride	0.005	2,4-D	0.07
1,2-Dichloroethane	0.005	Ethylene dibromide	0.00005
Trichloroethylene	0.005	Heptachlor	0.0004
para-Dichlorobenzene	0.075	Heptachlor epoxide	0.0002
1,1-Dichloroethylene	0.007	Lindane	0.0002
1,1,1-Trichloroethane	0.2	Methoxychlor	0.04
cis-1,2-Dichloroethylene	0.07	Polychlorinated biphenyls (PCBs)	0.0005
1,2-Dichloropropane	0.005	Pentachlorophenol	0.001
Ethylbenzene	0.7	Toxaphene	0.003
Monochlorobenzene	0.1	2,4,5-TP	0.05
Ortho-Dichlorobenzene	0.6	Benzo(a)pyrene	0.0002
Styrene	0.1	Dalapon	0.2
Trichloroethane	0.005	Di(2-ethylhexyl) adipate	0.4
Toluene	1	Di(2-ethylhexyl) phthalate	0.006
Trans-1,2-Dichloroethylene	0.1	Dinoseb	0.007
Xylenes (total)	10	Diquat	0.02
Dichloromethane	0.005	Endothall	0.1
1,2,4-Trichlorobenzene	0.07	Endrin	0.002
1,1,2-Thrichloroethane	0.005	Glyphosate	0.7
Alachlor	0.002	Hexachlorobenzene	0.001
Aldicarb	0.003	Hexachlorocyclopentadiene	0.05
Aldicarb sulfone	0.002	Oxamyl (Vydate)	0.2
Aldicarb sulfoxide	0.004	Picloram	0.5
Atrazine	0.003	Simazine	0.004
Carbofuran	0.04	2,3,7,8-TCDD (Dioxin)	$3x10^{-8}$

Surface Water Treatment Rule (Long-Term 1 and 2 Enhanced Rules)

The Long-Term 1 and 2 Enhanced Surface Water Treatment Rules (LT1ESWTR and LT2ESWTR) build upon the existing Surface Water Treatment Rule requirements. For systems using conventional filtration, the maximum turbidity allowed is 1 NTU with at least 95 percent of all combined filter effluent turbidity measurements below 0.3 NTU.

Under the Surface Water Treatment Rule, filtered water systems must meet certain removal criteria for *Giardia lamblia* and viruses. Purveyors are required under WAC 246-290-630 to provide 3-log (99.9 percent) removal of *Giardia lamblia* and 4-log removal (99.99 percent) removal of viruses. The removal is attained with a combination of filtration and disinfection. Disinfection is used in addition to filtration to provide additional *Giardia* and virus inactivation to comply with the requirements.

LT2ESWTR establishes treatment technique requirements for filtered systems based on their risk level for contamination, calculated from the system's average Cryptosporidium concentration. Additional requirements include up to 2.5-log Cryptosporidium treatment in addition to existing requirements under the Interim Enhanced Surface Water Treatment Rule (IESWTR) and LT1ESWTR. Filtered systems which demonstrate low levels of risk are not required to provide additional treatment. Unfiltered systems under this proposed rule must achieve at least a 2-log removal of Cryptosporidium if the source water is monitored for Cryptosporidium and its mean level remains below 0.01 oocysts/L. If an unfiltered system elects not to monitor, or the mean level of Cryptosporidium exceeds 0.01 oocysts/L, the LT2ESWTR requires the system to provide a minimum 3-log removal of Cryptosporidium. All unfiltered systems are required to utilize a minimum of two disinfectants in their treatment process.

The LT2ESWTR also addresses systems with unfinished water storage facilities. Under this rule, systems must either cover their storage facilities, provide at least a 4-log virus removal, or perform state-approved risk mitigation. Lastly, the rule extends the requirement of the disinfection profiles mandated under the LT1ESWTR to the Stage 2 D/DBPR.

Since the City does not use surface water sources or groundwater sources under the direct influence of surface water (GWI), this rule does not impact the City. However, in response to the rule, the City of Tacoma installed filtration on its Green River surface water supply. Operation of the new filtration system began in 2015.

Wellhead Protection Program

A wellhead protection program is a proactive and ongoing effort of a water purveyor to protect the health of its customers by preventing contamination of the groundwater that it supplies for drinking water. Purveyors of water systems using surface water or groundwater sources under the direct influence of surface water as their source are required to develop and implement a watershed control program. The Washington State

mandate for Wellhead Protection and Watershed Control Programs are in WAC 246-290-135, which became effective in July of 1994.

DOH requires that a hydrogeologic assessment be made of the potential for well contamination for Class A water systems. Groundwater is the source of drinking water which Enumclaw provides to its customers. Groundwater is often vulnerable to contamination, consequently a wellhead protection plan is necessary to protect the groundwater supply from contamination.

Enumclaw retained hydrogeologic consultants to prepare a wellhead protection plan in 1998 that was compliant with the provisions of DOH's Wellhead Protection Program. The 1998 plan was subsequently updated in 2009 and is provided in Appendix M. Chapter 6 summarizes the Wellhead Protection Plan.

WATER QUALITY MONITORING SCHEDULE

Water quality monitoring is required for regulatory compliance and to monitor water system conditions. DOH prepares a Water Quality Monitoring Report each year that is distributed to each water purveyor annually. This report defines a monitoring schedule and provides sample locations.

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

In 1994, DOH developed the Susceptibility Assessment Survey Form for water purveyors to complete for use in determining a drinking water source's potential for contamination. The results of the susceptibility assessment may provide monitoring waivers that allow reduced source water quality monitoring. DOH assigned a high susceptibility rating to Boise Spring and Watercress Spring and a moderate rating to the PC Johnson Wellfield and the Golf Course Well, based on the results of the susceptibility assessment survey of each source.

A copy of the 2022 Water Quality Monitoring Report is included in Appendix K, which notes all current waivers and the date that sampling is due for each source. Monitoring plans for Stage 2 D/DBP and Coliform are also included in Appendix K.

FACILITY ANALYSIS

SOURCES OF SUPPLY ANALYSIS

A detailed description of the City's sources of supply is provided in Chapter 1. According to the Department of Health Group A Public Water Systems Waterworks Standards, source production capacity must be sufficient to supply peak day demands.

Additionally, peak day and average daily demands must comply with the maximum instantaneous and maximum annual withdrawal limitations of associated water rights.

WATER RIGHTS ANALYSIS

The City currently holds twelve water right certificates that authorize a total additive annual quantity (Qa) of 5,218.8 acre-ft/y, and a total additive instantaneous quantity (Qi) of 5,635.8 gpm. Within that total number of rights, the City holds nine additive rights, and three non-additive rights. The City's water right sources fall within the Puyallup/White and Green River basins. Because of their senior priority dates, the City's water rights are not subject to the instream flow rules set for the Green and Puyallup/White River basins. The City's water rights are described in detail in Chapter 1 while the Water Rights Self-Assessment Form and certificates are provided in Appendix I. A comparison of the water use and available water rights is shown in Table 3-10.

TABLE 3-10

Water Rights Analysis

Year	Annual Withdrawal			Instantaneous Withdrawal		
	Authorized by Water Right (ac-ft/yr)(1)	Projected Withdrawal (ac-ft/yr)	Surplus/ (Deficit) (ac-ft/yr)	Authorized by Water Right (gpd)(1)	Peak Day Production Requirement (gpd)(2)	Surplus/ (Deficit) (gpd)
2021	5,218	2,106	3,112	8,115,552	4,277,000	3,838,552
2032	5,218	2,301	2,917	8,115,552	4,724,700	3,390,852
2043	5,218	2,398	2,821	8,115,552	4,922,900	3,192,652

(1) Based on the total authorized water rights provided in Table 1-6.
(2) 2021 values are from Table 2-5; 2032 and 2043 values are from Table 2-15.

The results of the above water rights evaluation indicate that the City has sufficient annual and instantaneous water rights to meet the projected demands through the 20-year planning horizon.

SOURCE PRODUCTION CAPACITY ANALYSIS

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

Water supply to the City's water system is provided from four water sources to the east of the City: Boise Spring, Watercress Spring, PC Johnson Wellfield, and the Golf Course Well. Boise Spring is located approximately one-half mile east of the city limits, just south of SR 410 and Boise Creek, whereas Watercress Spring is located near the

intersection of 280th Avenue SE and SE 436th Street. The PC Johnson Wellfield is located at the intersection of SE 424th Street and 284th Avenue SE and is comprised of two individual wells. The Golf Course Well is located in the south parking of the Enumclaw Expo Center property next to the golf course. The City also has an emergency intertie with the City of Tacoma. Additional information on each of the City's existing sources is presented in Chapter 1 and Appendix G.

Table 3-11 shows the City's source capacities. Capability of City sources to meet both existing and future demand requirements is also presented in Table 3-11. The future demand projections are without reductions from conservation efforts; if additional reductions in water use are achieved through water conservation efforts, the total source capacity required in the future will be less than that shown in the table.

TABLE 3-11

Source Production Capacity Analysis (All Sources)

Year	20-Hour Source Pumping Capacity (gpd)(1)	Peak Day Production Requirement (gpd)(2)	Production Capacity Surplus/(Deficit)	ERU Capacity
2021	6,435,600	4,277,000	2,158,600	10,793(3)
2032	6,435,600	4,724,700	1,710,900	9,005(4)
2043	6,435,600	4,922,900	1,512,700	7,962(4)

(1) Based on pumping capacity from Table 1-5.
(2) 2021 values are from Table 2-5; 2032 and 2043 values are from Table 2-15.
(3) Based on ERU_{ADD} of 200 gpd/ERU for 2021 and including 8.8 percent DSL.
(4) Based on ERU_{ADD} of 190 gpd/ERU and including 8.8 percent DSL for future projections.

The results of the analysis indicate that the City has enough source capacity to meet demands for the planning period.

TREATMENT SYSTEM ANALYSIS

The City of Enumclaw is required to perform treatment and distribution system water quality monitoring in accordance with WAC 246-290. The City has been in compliance with all monitoring requirements since the publication of the 2013 WSP.

All water that is produced by the City is chlorinated to disinfect and kill harmful bacteria that may be present in the water. Chlorination is achieved through a chlorine gas disinfection system located onsite at Watercress Springs, PC Johnson Wellfield, and the Golf Course Well. Boise Spring's water is disinfected with chlorine gas at a building next to the Weyerhaeuser Booster Pump Station site. Chlorine gas is fed from 150-pound cylinders.

Water supply from the spring sources is further treated to increase the pH to reduce the potential for the water to corrode metal piping. This is accomplished by injection of sodium hydroxide prior to the water entering the distribution system. The City does not add fluoride to its water sources; however, water supplied by Tacoma does contain fluoride. Additional information on each of the City's treatment facilities is presented in Chapter 1.

An analysis of the treatment and distribution system water quality monitoring within the City's system is presented below.

Disinfectant Residual Concentration and Chlorine Contact Time (CT)

The City must comply with disinfectant residual concentration requirements for treated groundwater in hydraulic connection with surface water at the Watercress and Boise Springs, both being deemed highly susceptible to contamination. Disinfection requirements applicable to the springs are contained in WAC 246-290-451, which states that a disinfectant residual concentration shall be detectable in all active parts of the distribution system and a minimum contact time of 6.0 mg/L-min shall be provided before the first connection to provide 4-log inactivation for viruses. Table 3-12 shows the CT provided for the springs based on the typical targeted chlorination residual at the treatment plant. To verify adequate contact time, chlorine residual is noted daily from each continuous analyzer located at the point of injection and a grab sample measurement is taken once a week at the point of entry to the distribution system. The P.C. Johnson Well Field and Golf Course Well are not subject to a minimum contact time requirement and have a typical initial target residual of 0.5 mg/l. Tacoma achieves adequate CT in the Tacoma supply pipeline before water reaches the Enumclaw intertie.

TABLE 3-12

Contact Time Provided

Location	Pipe Length (ft)	Pipe Diameter (inches)	Pipe Volume (cf)	Flow Rate (gpm)	Water Velocity (ft/s)	Detention Time (minutes)	Free Chlorine Residual (mg/L)	CT Available (mg-min/L)	Inactivation Ratio(1)
Boise Springs	4,080	10	2,225	898	3.7	18.5	0.50	9.3	1.5
Watercress	5,800	15.23	7,337	2,289	4.0	24.0	0.55	13.2	2.2
Weyerhaeuser	4,520	6	887	50	0.6	132.8	0.50	66.4	11.1
PC Johnson	3,840	10	2,094	1,500	6.1	10.4	0.6	6.3	1.0
Golf Course	350	24	1,100	676	0.5	12.2	0.5	6.1	1.0

(1) Average inactivation ratio achieved.

pH Monitoring

The City continuously monitors pH levels of the Watercress and Boise Spring source water treated by the Corrosion Control Facility and at the Weyerhaeuser Booster Pump Station. Grab samples of these sources are tested for pH on a weekly basis and pH is

measured at the weekly coliform monitoring sites. The average pH for 2021 was 7.9 as shown in Figure 3-1.

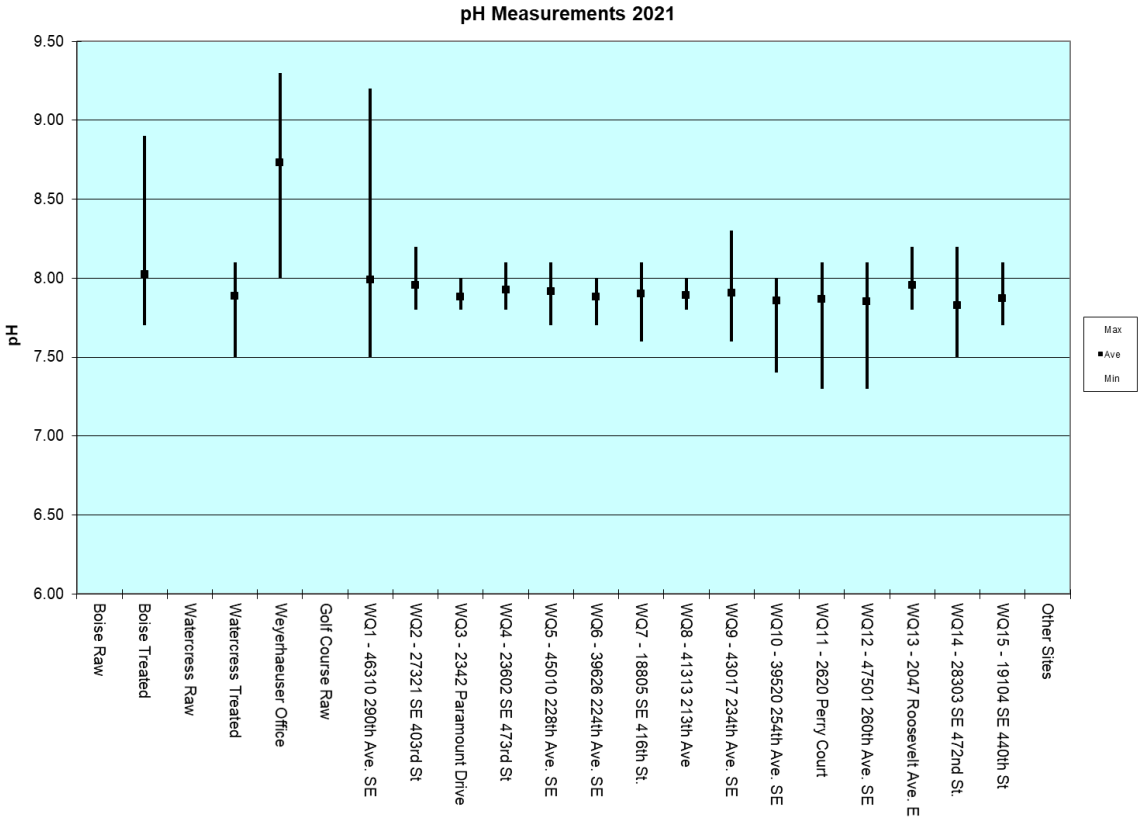


FIGURE 3-1

pH Measurements

Treatment Monitoring

Amounts of chlorine and caustic soda used and water quantity produced are recorded in a monthly report to DOH. This report is also used to document measured chlorine residuals and pH.

INDIVIDUAL ZONE SUPPLY AND BOOSTER PUMP STATION ANALYSIS

The capacity of the facilities supplying each of the City's pressure zones was determined according to the DOH reliability guidance. The estimated demand in each zone is based on the breakdown provided in Table 2-8, which uses metered and estimated consumption data from 2021.

888 Zone Facilities

Table 3-13 summarizes the supply requirements of the 888 Zone based on existing and projected water demands. The table also summarizes the current amount of water supply available to the 888 Zone based on current production rates of the supply facilities.

TABLE 3-13

888 Zone Supply Analysis

Year	Required Supply			Total Available (gpm)[1]	Surplus/ (Deficit) (gpm)
	888 Zone MDD (gpm)	Transfer to Upper Zones (gpm)	Total Required (gpm)		
2021	2,812	62	2,874	5,363	2,489
2032	3,210	71	3,281	5,363	2,082
2043	3,345	74	3,419	5,363	1,944

The results of the analysis indicate that supply is sufficient to meet the demands of the 888 Zone for the planning period.

The 2020 DOH *Water System Design Manual* establishes certain criteria for booster pump stations that pump to open systems, where the hydraulic grade line (HGL) is governed by a storage tank open to the atmosphere, and closed systems, where the HGL is governed by a closed distribution system or a pressure tank. The open zone booster station must be able to supply average day demand (ADD) with the largest pump out of service, and maximum day demand (MDD) with all pumps, while maintaining pressures of 30 psi within the supply and discharge zones.

The 995 Zone, 1013 Zone, 1040 Zone, 1175 Zone and the 1245 Zone are zones without storage, or closed zones, which are supplied solely by booster pump stations. A closed system booster pump station must provide both flow and pressure required by the closed zone. A closed system booster pump station must be capable of meeting peak hour demands (PHD) with the largest pump out of service at no less than 30 psi while maintaining 30 psi and peak hour demand in the supplying zone, and must also supply PHD at 30 psi while maintaining 20 psi and meeting maximum day demand and fire flow in the supplying zone.

Stanridge Hill Booster Pump Station

The Stanridge Hill BPS supplies water to the 1040 Zone, which is a closed zone, and indirectly to the 899 Zone through the New Horizons PRV. During a fire or other high-demand emergency event, flows from the Stanridge Hill Reservoir (HGL of 988 feet) can bypass the station through a check valve and supply the zones at a reduced pressure. Therefore, the Stanridge Hill BPS is not required to supply fire flow demand to the

899/1040 Zones. Table 3-14 summarizes the existing water supply evaluation, based on supply requirements and current pumping rates.

TABLE 3-14

Stanridge Booster Pump Station Pumping Capacity

Year	Required Supply			Total Available (gpm)(1)	Surplus/ (Deficit) (gpm)
	899 Zone PHD (gpm)	1040 Zone PHD (gpm)	Total Required (gpm)		
2021	8	29	38	100	62
2032	9	34	43	100	57
2043	10	35	45	100	55

(1) Based on one pump out of service (two pumps operational).

The Stanridge Booster Pump Station is projected to have adequate pumping capacity through the end of the 2043 planning period.

983 Zone Booster Pump Station

The 983 Zone BPS currently provides water supply to the 983 Zone and indirectly to the 1175 Zone through the Fairway Hills Reservoir and BPS. Table 3-15 summarizes the current and future supply requirements of the 983 Zone, based on supply requirements and current pumping rate of the 983 Zone BPS. The booster station also includes a 100 hp 1,700-gpm high flow pump, which is activated when pressure in the 983 Zone drops excessively due to a high-flow event (i.e., a fire flow).

TABLE 3-15

983 Zone Booster Pump Station Pumping Capacity

Year	Required Supply(2)			Total Available (gpm)(1)	Surplus/ (Deficit) (gpm)
	983 Zone MDD (gpm)	1175 Zone MDD (gpm)	Total Required (gpm)		
2021	23	4	27	225	198
2032	27	4	31	225	194
2043	28	4	32	225	193

(1) Based on only one 15 hp pump being operational.
(2) The above table excludes the demand of the City golf course that the zone supplies in combination with direct feed from the Golf Course Well.

The 983 Zone booster station pumps to the 60,000-gallon Fairway Hills Reservoir and therefore must be able to supply the average day demand with the largest pump out of service. The booster station can pump 225 gpm with the largest pump and the 2nd 15-hp pump out of service, which is sufficient to supply the average day demand projected for the 983 and 1175 Zones in 2043 of 32 gpm.

The station is also capable of meeting the maximum day demand with the City golf course usage with only the largest 100-hp pump out of service. The back nine of the golf course is typically irrigated directly by the golf course well, while the front nine is irrigated with water supplied by the booster station. The maximum hourly usage for the front nine is approximately 413 gpm, and the back nine is expected to have a similar water demand though this is not metered. If the well is not operational and all irrigation water must be supplied by the booster station, the City can stagger the irrigation schedule on both halves of the golf course to reduce the instantaneous demand on the booster station.

New Horizons Booster Pump Station

The New Horizons BPS currently provides all water supply to the 988 Zone, filling the Stanridge Hill Reservoir, and indirectly to the 1040 Zone through the Stanridge Hill BPS and the 899 Zone via the New Horizons PRV. Table 3-16 summarizes the current and future supply requirements of the booster station, based on supply requirements and the current pumping rate of the BPS. The results of the analysis indicate that the capacity of the New Horizons BPS is sufficient to meet both the existing and future demands of the supplied zones. The Stanridge Hill Reservoir provides fire flow to all zones.

TABLE 3-16

New Horizons Booster Pump Station Pumping Capacity

Year	Required Supply				Total Available (gpm)(2)	Surplus/ (Deficit) (gpm)
	988 Zone MDD (gpm)(1)	899 Zone MDD (gpm)	1040 Zone MDD (gpm)	Total Required (gpm)		
2021	0	5	17	22	90	68
2032	0	6	20	26	90	64
2043	0	6	21	27	90	63

(1) The 988 Zone has only one single-family residential service.
(2) All pumps operational.

The New Horizon Booster Station pumps to a closed zone, and therefore must also be able to supply the average day demand with the largest pump out of service. The booster station can pump 45 gpm with the largest pump out of service, which is sufficient to supply the average day demand projected for the 988, 899, and 1040 Zones in 2043 of 12 gpm.

Highview Booster Pump Station

The Highview BPS currently provides all water supply to the 995 Zone, which is a closed zone. Table 3-17 summarizes the current and future supply requirements and the water supply available to the 995 Zone based on the current pumping rate of the BPS. The results of the analysis indicate that the capacity of the Highview BPS is sufficient to meet both the existing and future demands of the zone. Fire suppression is not provided to the 995 Zone based on the lot sizes greater than 35,000 square feet in unincorporated King County.

TABLE 3-17

Highview Booster Pump Station Pumping Capacity

Year	Required Supply 995 Zone PHD (gpm)	Total Available (gpm)(1)	Surplus/(Deficit) (gpm)
2021	20	120	100
2032	23	120	97
2043	24	120	96

(1) Based on one pump out of service (two pumps operational).

1013 Zone Booster Pump Station

The 1013 Zone BPS supplies water to the 1013 Zone, which is a closed zone. Table 3-18 summarizes the existing and future water supply evaluation, based on supply requirements and pumping rates for a new booster pump station constructed in 2023, replacing the original booster station constructed in 2002. The analysis indicates that the 1013 Zone BPS is sufficient to meet the current and future demands of the 1013 Zone. The booster station also includes two 1,600-gpm high flow pumps activated when pressure in the 1013 Zone drops excessively due to a high-flow event (i.e., a fire flow).

TABLE 3-18

1013 Zone Booster Pump Station Pumping Capacity

Year	Required Supply 1013 Zone PHD (gpm)	Total Available (gpm)(1)	Surplus/(Deficit) (gpm)
2021	1	40	39
2032	190	193	3
2043	190	193	3

(1) Based on one pump out of service (one pump operational).

Fairway Hills Booster Pump Station

The Fairway Hills BPS supplies water to the 1175 Zone, which is a closed zone. Table 3-19 summarizes the water supply evaluation, based on supply requirements and current pumping rates. Fire suppression is not provided to the 1175 Zone based on the lot sizes greater than 35,000 square feet in unincorporated King County.

TABLE 3-19

Fairway Hills Booster Pump Station Pumping Capacity

Year	Required Supply 1175 Zone PHD (gpm)	Total Available (gpm)(1)	Surplus/(Deficit) (gpm)
2021	6	60	54
2032	7	60	53
2043	7	60	53

(1) Based on one pump out of service (two pumps operational).

Weyerhaeuser Booster Pump Station

The Weyerhaeuser BPS currently provides water supply to the 1245 Zone, which is a closed zone. Table 3-20 summarizes the current and estimated future supply requirements of the 1245 Zone, which is based only on the total system demand in the 1245 Zone. Fire suppression is not provided by the City to the former Weyerhaeuser mill because the site has its own fire system which is fed by water from Boise Creek. The table also summarizes the current amount of water supply available to the 1245 Zone based on the current pumping rate of the Weyerhaeuser BPS.

Under a pending retail water service agreement with Lisa Inc., the current owner of the former Weyerhaeuser mill site, the maximum purchased capacity that the City has committed to supply is 20,000 gallons per day. This calculates to an average day demand of 13.9 gpm. Actual demand is well below the maximum allowed and there is currently no long-range plan for the site that would indicate that future demand for water would exceed that assumed in Table 3-20. Any capacity improvements to the BPS that may be necessary to meet additional demand will be the responsibility of the developer.

TABLE 3-20

Weyerhaeuser Booster Pump Station Pumping Capacity

Year	Required Supply 1245 Zone PHD (gpm)(1)	Total Available (gpm)(2)	Surplus/(Deficit) (gpm)
2021	1	42	41
2032	1	42	41
2043	1	42	41

(1) The maximum committed supply to the zone is 13.9 gpm, but demand is not projected to reach this amount.
(2) Based on largest pump out of service (one pump operational).

STORAGE ANALYSIS

Storage requirements for Enumclaw will be determined by applying the criteria outlined in the June 2020 DOH *Water System Design Manual*. The storage recommended according to this guidance document is based on the sum of the following:

- Dead Storage
- Operational Storage
- Equalizing Storage
- Standby Storage
- Fire Suppression Storage

Storage analysis is based on an evaluation of the existing storage facilities providing water to the three operating areas that they serve: the 888 Zone, 983 Zone, and 988 Zone. The 888 Zone operating area includes the 888, 995, 1013 and 1245 Zones and is supplied by the Crews and City Reservoirs. The 983 Zone operating area, provides water storage to the 983 and 1175 Zones from the Fairway Hills Reservoir. The 988 Zone operating area is supplied by the Stanridge Hill Reservoir and provides storage to the 988, 1040 and 899 Zones.

Dead Storage

Storage in a reservoir that is below the minimum elevation for serving residences is termed dead storage. The WAC requires that distribution system pressure be maintained above 30 psi during normal operation and above 20 psi during fire flow. Any storage volume below the level required to maintain those pressures would be dead storage. Zone 988 has a dead storage of 1 foot, Zone 983 has 0.5 feet of dead storage and Zone 888 has 0.5 feet of dead storage for the City Reservoir and 4 feet of dead storage for the Crews Reservoir.

The City has a small number of customer meters in all the reservoir zones that are close to the reservoirs in elevation, but these customers are served by booster stations within smaller zones to provide adequate service pressures. Therefore, the dead storage in each reservoir is due to only the volume in the lower part of each tank below the elevated outlet pipes.

Operational Storage

Operational storage is the volume of the reservoir devoted to supplying the water system while under normal operating conditions and the source(s) of supply are in "off" status. This volume is dependent upon the sensitivity of the reservoir water level sensors and the tank configuration necessary to prevent excessive cycling of source pump motors. Operational storage is in addition to other storage components, thus providing a factor of safety for equalizing, standby, and fire suppression components.

The operational storage in the City's reservoirs is the amount of storage between the fill, or pump starting setpoint level, and the overflow elevation of the tank. Booster pumps and wells used to fill reservoirs are typically called on and off by water level sensors in the reservoirs. The call level in the City's reservoirs has been set 1 foot apart; therefore, each reservoir has 1 feet of operational storage.

Equalizing Storage

Equalizing storage is typically used to meet diurnal demands that exceed the average day and maximum day demands. The volume of equalizing storage required depends on peak hour system demands, the magnitude of diurnal water system demand variations, the source production rate, and the mode of system operation. Sufficient equalizing storage must be provided in combination with available water sources and pumping facilities such that peak system demands can be satisfied.

Equalizing storage (V_{ES}) is calculated using the following equation from the DOH *2020 Water System Design Manual* (Eq 7-1):

V_{ES} = (PHD-Qs) *150 minutes (but not less than zero)

Where:

PHD = Peak Hour Demand
Qs = Sum of all installed and active supply source capacities, except emergency supply.

Standby Storage

Standby storage is provided in order to meet demands in the event of a system failure such as a power outage, an interruption of supply, or a break in a major transmission line. The amount of emergency storage should be based on the reliability of supply and pumping equipment, standby power sources, and the anticipated length of time the system could be out of service.

Standby storage and fire suppression may be nested, meaning only the larger of the two is required. The City allows nesting of these storage volumes.

Standby storage (V_{SB}) is calculated using the following equation from the DOH 2020 *Water System Design Manual* (Eq 7-2):

$$V_{SB} = N*SB_i*T_d$$

Where:

N = Number of system ERUs
SB_i = Locally adopted unit SB volume in gallons per day per ERU (DOH recommends MDD)
Td = Number of days selected to meet water system demand reliability Standard = 1 day

Fire Suppression Storage

Fire suppression storage is provided to ensure that the volume of water required for fighting fires is available when necessary. Fire suppression storage also reduces the impact of firefighting on distribution system water pressure. DOH requires that fire flow storage be stored above an elevation that will provide a minimum pressure of 20 psi at all points throughout the distribution system under maximum day demand conditions.

Fire suppression storage (V_{FSS}) is calculated using the following equation from the DOH *2020 Water System Design Manual* (Eq 7-3):

$$V_{FSS} = (FF)*(T)$$

Where:

V_{FSS} = Fire suppression storage volume, gallons
FF = Maximum fire flow flowrate requirement
T = Duration of fire flow needed, minutes

The City's maximum fire flow requirement is 3,000 gpm for a 3-hour duration in the 888 Zone. The fire flow requirement in the other zones that have reservoirs (988 Zone and 983 Zone) is 500 gpm for 30 minutes, per King County code.

Storage Capacity Summary

Table 3-21 summarizes storage analysis with storage components nested. As shown in the Table, the maximum combined storage capacity of the City's reservoirs is 4.74 MG when all the reservoirs are online.

TABLE 3-21

Storage Analysis (MG)

Year	Existing			Projected					
	2021			2032			2043		
Pressure Zones	**888**	**899/988/1040**	**983/1175**	**888**	**899/988/1040**	**983/1175**	**888**	**899/988/1040**	**983/1175**
Operational Storage	0.285	0.005	0.004	0.285	0.005	0.004	0.285	0.005	0.004
Equalizing storage	0	0	0	0.032	0	0	0.067	0	0
Standby Storage	4.138	0.032	0.039	4.725	0.037	0.044	4.923	0.039	0.046
Fire Suppression	0.540	0.015	0.015	0.540	0.015	0.015	0.540	0.015	0.015
Required Storage(1)	4.423	0.038	0.043	5.042	0.042	0.048	5.275	0.044	0.050
Total Storage (MG)(2)	4.500	0.180	0.060	4.500	0.180	0.060	4.500	0.180	0.060
Dead storage(3)	0.371	0.005	0.002	0.371	0.005	0.002	0.371	0.005	0.002
Available storage	4.129	0.175	0.058	4.129	0.175	0.058	4.129	0.175	0.058
Surplus (Deficit)	(0.294)	0.137	0.015	(0.913)	0.132	0.010	(1.147)	0.131	0.008
Total Surplus/(Deficit)			**(0.142)**			**(0.771)**			**(1.008)**

(1) Storage nesting adopted, the larger of SB/FSS.
(2) 1 MG tank is not included in this analysis, as it is planned to be decommissioned.
(3) Assumes 1 foot of dead storage in the Stanridge Hill Reservoir, 0.5 feet of dead storage in the 3 MG Reservoir and the Fairway Hills Reservoir, and 4 feet of dead storage in the Crews Reservoir.

Table 3-21 indicates that the system has a storage deficit of 142,000 gallons, which will increase to 771,000 gallons by 2032, and to over 1 million gallons by 2043. This storage analysis is conservative, as it assumes that standby storage to meet the maximum day demand must be provided. DOH allows for a reduction in the standby storage volume for systems that have multiple, reliable sources. The City's sources within the 888 Zone are equipped with backup power and can; therefore, be considered reliable in the event of an emergency. The use of any one of the City's sources would offset the standby storage enough to resolve the deficiency, as the City's smallest source can provide 676 gpm, or 811,000 gallons per day (assuming 20 hours of pumping). However, the City is planning to provide additional storage through several projects included in Chapter 8.

Storage Facility Condition

A sanitary survey of the storage facilities was completed in 2020 and resulted in the following recommendations:

- Replace the duckbill valves on the overflow from the Watercress Spring collection to keep insects out of the collection chamber.
- Routine operations and maintenance programs need to consider incorporating air/vacuum valve maintenance and testing.

Seals and screens on storage tank vents, access hatches, overflows, and all other appurtenances are in good condition. All closed zones in the system have backup power.

DISTRIBUTION SYSTEM ANALYSIS

See Chapter 4 for an analysis of the City's distribution system.

SYSTEM CAPACITY SUMMARY

This section evaluates the capacity of the City's existing and future water system components (supply, storage, transmission and water rights) to determine the maximum number of equivalent residential units (ERUs) it can serve. Once determined, system capacity becomes useful in determining how much capacity is available in the water system to support new customers that apply for water service through the building permit process. The system capacity information, together with the projected growth of the system expressed in ERUs, as shown in Table 2-15, provides the City with a schedule of when additional system capacity is needed.

The capacity of the City's system was determined from the limiting capacity of the water rights, treatment, supply, storage and transmission facilities. The supply capacity analysis was based on the limiting capacity of the supply facilities and the system's maximum day demand per ERU. Likewise, the treatment capacity analysis was based on the limiting capacity of the treatment facilities and the system's maximum day demand

per ERU. The storage capacity analysis was based on the total useable capacity of the storage facilities and the minimum standby storage maximum day demand. The transmission capacity analysis was based on the total capacity of the transmission system for the supply sources and the system's maximum day demand per ERU. The annual water rights capacity evaluation was based on the existing annual water rights, and the system's average day demand per ERU. The instantaneous water rights capacity evaluation was based on the existing instantaneous water rights, and the system's maximum day demand per ERU. The ERU-based demand data was derived from the average day demand of the system and demand peaking factors presented in Chapter 2. The system capacity analysis results are summarized in Table 3-22.

TABLE 3-22

ERU Capacity Analysis Summary

2021 Water System Connections Correlated to ERUs(1)			
Service Classification	**Consumption (gpd)**	**Total Connections**	**ERUs**
Single-Family	1,094,989	5,471	5,471
Multi-Family	277,553	235	1,387
Commercial	200,794	383	1,003
School	36,270	22	181
City	21,375	35	107
Agricultural	97,247	106	486
DSL	134,370		672
Total	**1,862,598**	**6,252**	**9,307**

Service Capacity (gpd) as ERUs		
Water System Component/Facility	**Capacity (gpd)**	**ERU Capacity(2)**
All sources and Treatment	9,162,720	19,120
Well Source and Treatment	7,722,720	16,115
Standby Storage	4,067,000	8,487
Equalizing Storage	N/A	N/A
Annual Water Rights	8,115,552	38,950
Instantaneous Water Rights	8,727,840	18,213
Water System ERU Capacity(3)		**8,487**
Estimated ERUs for 2022(4)		**8,834**
Estimated ERUs for 2032(4)		**9,859**
Estimated ERUs for 2043(4)		**10,273**

(1) From Table 2-5.
(2) Based on a production ERU_{ADD} of 208 gpd/ERU and a production ERU_{MDD} value of 479 gpd/ERU. Both of these ERU values include 8.8 percent DSL on top of the consumption ERU values noted in Chapter 2.
(3) Limited by storage capacity.
(4) From Table 2-15.

SYSTEM DEFICIENCIES

WATER QUALITY

The City has maintained compliance with source monitoring requirements with no contaminant exceeding regulated maximum contaminant levels. In the latest arsenic, VOC, SOC, and radionuclide tests for each source, no regulated contaminants were detected. Nitrate monitoring has also been performed once per year with the average level for each source for the past 5-years being less than 1.9 mg/L. The results of inorganic chemical monitoring indicate that all primary and secondary standards were met, except for levels of manganese at the PC Johnson Wellfield which have exceeded the secondary standard in the past.

SOURCES OF SUPPLY

The City of Enumclaw has adequate capacity to meet projected demand through the 20-year planning period.

WATER RIGHTS

Annual and instantaneous water rights are adequate to meet projected demands through the 20-year planning period.

BOOSTER PUMP STATIONS

Currently, the City has emergency power generators at the Highview, 1013, Stanridge, and Fairway Booster Stations as well as at Watercress Springs, PC Johnson Wellfield, Boise Spring and the Golf Course well. The City has adequate capacity to meet all average day, peak day, and peak hour scenarios summarized in Tables 3-17 through 3-23.

STORAGE

The system is deficient in storage based on the DOH recommended storage capacity analysis, as demonstrated in Table 3-24. The existing deficiency is approximately 142,000 gallons, which increases to over 1 million gallons by 2043. This is due to the large standby storage requirement based on the maximum day system demand. It should be noted that the storage analysis assumes that no sources are operational and that all standby storage is provided by the reservoirs. The City's sources are all equipped with backup power and can be considered reliable during an emergency, and the storage deficit would be fully offset if even one source is active.

Projects to address this deficiency are identified and described in Chapter 8.

DISTRIBUTION SYSTEM

The northern and western portions of the 888 Zone have pressures exceeding 100 psi. Although maintaining the higher pressures can be justified due to the type of pipe material and the redundancy benefits of a looped system, further study should be given to whether it is possible to install main line pressure reducing stations in a way that achieves lower pressures while minimizing reductions in redundancy and/or fire flows.

The City's system includes over 7 miles of steel or galvanized iron water mains ranging in size from less than 1 inch to 6 inches in diameter, which have been identified for replacement due to their small size and their tendency to corrode and leak. Most of the mains are inside the City limits.

Some parts of the distribution system include water mains that are around 80 years old. There are no main replacements identified that are based solely on the age of the mains, but the City's future planning efforts will look proactively at replacing older mains in a scheduled program as funding allows rather than reactive projects based on failures. The City's asset management program is intended to help inform this process.

The western portion of the City's system includes long runs of main with few isolation valves. Some sections of main extend for 2,000 feet or more between valves. In order to facilitate maintenance activities such as flushing, additional valves should be installed to reduce valve spacing to distances of 1,000 to 1,500 feet at maximum.

Additional improvements to the City's distribution system are discussed in Chapter 4, Hydraulic Analysis, and Chapter 8, Capital Improvement Program, of this Plan. The priority and cost of the noted improvements are also discussed in Chapters 8 and 9.

ASSET MANAGEMENT

The City uses Cartegraph for its asset management program. The data fields used in the City's Cartegraph program are noted in Appendix G. Any problem experienced in the water distribution system is currently captured or logged in Cartegraph and linked to a specific asset. This data will be used to help determine the condition of the water system assets. Installation dates are noted for all assets where known, though older parts of the system lack records to determine their age or date of installation. The City will continue to work to fill data gaps and ultimately utilize the program to prioritize assets for replacement.

CHAPTER 4

HYDRAULIC ANALYSIS

INTRODUCTION

The operation of a water system involves dynamic interactions between various water system components including source, storage, and distribution system facilities. These interactions and their effect on the level of service provided to the City's customers are dependent on the distribution and magnitude of water demands within the system and the performance characteristics of the water system facilities. In addition, infrequent high water demand events, such as firefighting and other emergencies, can significantly alter the normal flow patterns and pressures in the municipal water system and its components. These factors must be considered in analyzing the ability of a water system to provide for future demands, while maintaining an adequate level of water service to customers.

The development of a hydraulic model, which can accurately simulate the performance of a water system in response to a variety of conditions and scenarios, has become an increasingly important element in the planning, design, and analysis of water systems. The Washington State Department of Health's WAC 246-290 requires hydraulic modeling as a component of a water system plan.

This Chapter presents the development and information on the computer hydraulic model for the Enumclaw water system and the results of hydraulic analysis conducted to evaluate the existing and future capabilities of the water system.

HYDRAULIC MODELING PROGRAM

The existing water system was analyzed using Innovyze's InfoWater hydraulic modeling program, which operates in an ArcMap GIS environment to identify areas of the distribution system which are deficient in flow and pressure. In preparation for this Plan's modeling, the full model was checked for consistency with City GIS records and any discrepancies were resolved. The model was also recalibrated using 2022 field testing data to ensure it accurately reflects real-world conditions.

The InfoWater model is configured with a graphical user interface. Each water system element, including pipes, valves, pumps, and reservoirs, is assigned a unique graphical representation within the model and is connected in a network of nodes, or pipe intersections. Each element is assigned a number of attributes specific to its function in the actual water system. Typical element attributes include spatial coordinates, elevation, water demand, pipe length and diameter, as well as pump and reservoir characteristics. With attributes of each system element as the model input, the InfoWater software produces the model output in the form of flows and pressures throughout the simulated water system.

MODEL ASSUMPTIONS

To develop the hydraulic model, the basic layout of the water system is recreated within the InfoWater model. The lengths, diameters, and connection points of system piping are assigned using an updated base map of the water system. Elevations of nodes are assigned using County LiDAR data, adjusted from the NGVD88 datum to the NAVD29 datum by subtracting 3.5 feet. The locations of normally closed valves, check valves, and pressure reducing valves (PRVs) are found on water system base maps. The assumptions regarding the modeling of the City's water sources, system demands, and the settings of PRVs are included in the following sections.

SOURCES

Boise and Watercress spring sources, P.C. Johnson Wellfield, and Golf Course Well are included in the hydraulic model. Both the springs and the wells are modeled as fixed head reservoirs, with the head set to a level above the maximum HGL of the tank. This ensures that the modeled wells will supply flow to the storage reservoir at all reservoir levels. A pressure sustaining valve and/or flow control valve is included for each source in order to limit the flow from the sources to their maximum physical or instantaneous water rights capacity, whichever is lower.

The sources are assumed to be operational during fire flow events and during the peak hour analysis, as the City has backup power available for emergencies.

STORAGE

Reservoirs in InfoWater are modeled as "tanks" with finite size, using actual reservoir dimensions and elevations. The model includes the City's four active storage tanks. Dimensions and critical elevations of the storage facilities are provided in Table 1-7. Reservoir levels were modeled to reflect full utilization of operational, equalizing and fire flow storage as described in Chapter 3 and as summarized in Tables 4-1 and 4-2.

TABLE 4-1

Maximum Day Demand (Fire Flow) Model Inputs

Maximum Day Demand (Fire Flow)			
Condition	**2021**	**2033**	**2043**
Maximum Day Demand, total (gpm)(1)	2,870	3,303	3,433
System Configuration			
Source Conditions	Boise Springs: 700 gpm Watercress: 2,280 gpm (to City Reservoir) P.C. Johnson Wells: 1,500 gpm Golf Course Well: 676 gpm		
Booster Station Status	All Active		
City Reservoir HGL (ft)(2)	865.89	865.50	865.50
Crews Reservoir HGL (ft)(2)	872.00	872.00	872.00
Fairway Hills HGL (ft)(2)	972.62	971.25	970.78
Stanridge Hill HGL (ft)(2)	980.89	980.02	979.73

(1) Total system demand may be slightly different from demand determined in Chapter 2 due to rounding in the demands input to each model node.

(2) All elevations are provided in NAVD29. Where the storage analysis in Chapter 3 indicates insufficient storage volume in the 888 Zone, the storage in the two reservoirs in the Zone was set to the reservoirs' dead storage levels.

TABLE 4-2

Peak Hour Demand Model Inputs

Peak Hour Demand			
Condition	**2021**	**2033**	**2043**
Peak Hour Demand, total(1)	4,889	5,575	5,846
System Configuration			
Source Conditions	Boise Springs: 700 gpm Watercress: 2,280 gpm (to City Reservoir) P.C. Johnson Wells: 1,500 gpm Golf Course Well: 676 gpm		
Booster Station Status	All Active		
City Reservoir HGL (ft)(2)	887.04	886.88	886.70
Crews Reservoir HGL (ft)(2)	886.79	886.65	886.50
Fairway Hills HGL (ft)(2)	982.30	982.30	982.30
Stanridge Hill HGL (ft)(2)	987.00	987.00	987.00

(1) Total system demand may be slightly different from demand determined in Chapter 2 due to rounding in the demands input to each model node.

(2) All elevations are provided in NAVD29.

BOOSTER STATIONS

The City's seven booster stations are included in the hydraulic model. Each booster pump station was modeled based on the City's current operational practices. Pump elevations, curves, and design points have been assigned to each pump based on data obtained from the City.

PRESSURE REDUCING VALVES (PRVS)

All distribution system pressure reducing valves (PRVs) are included in the model. The PRV settings and elevations included in the model were obtained from City staff.

SYSTEM DEMANDS

A key element in the hydraulic modeling process is the distribution of demands throughout the water system. Total demand of the system is based on existing and projected demands developed in Chapter 2 of this Plan, which are used as model inputs. Demand distribution among the pressure zones has been determined from an analysis of the booster station flow meters, as discussed in Chapter 3. Demands are assigned to all areas of the system in which service meters are present in order to evaluate the system pressure at service locations in accordance with DOH requirements. The total demand determined for each zone was distributed between all nodes throughout the zone where a service meter is present. For example, demands are not just assigned to nodes immediately adjacent to the reservoirs or booster stations.

The modeling software allows numerous hydraulic scenarios to be loaded into the model. In order to evaluate the system under different demand conditions, several demand scenarios are included in the model and are summarized in Tables 4-1 and 4-2.

The following scenarios and their respective demands were modeled:

- 2021 Peak Hour Demand: These demands were used to verify the system's current ability to meet the DOH standards to supply domestic water at a minimum system wide pressure of 30 psi during peak hour demand.

- 2021 Maximum Day Demand: These demands were used to evaluate the system's current ability to meet the maximum day demands plus fire flow with a residual pressure of 20 psi system-wide at all service locations per DOH requirements.

- 2033 Peak Hour Demands: These demands were used to verify the system is able to meet the DOH standards to supply domestic water at a minimum system wide pressure of 30 psi during the projected peak hour demand in 10 years.

- 2033 Maximum Day Demand: These demands were used to evaluate the system's ability to meet the maximum day demands plus fire flow with a residual pressure of 20 psi system-wide at all service locations per DOH requirements in 10 years.

- 2043 Peak Hour Demand: These demands were used to verify the system is able to meet the DOH standards to supply domestic water at a minimum system wide pressure of 30 psi during the projected peak hour demand in 20 years.

- 2043 Maximum Day Demand: These demands were used to evaluate the system's ability to meet the maximum day demands plus fire flow with a residual pressure of 20 psi system-wide at all service locations per DOH requirements in 20 years.

MODEL CALIBRATION

The calibration of a hydraulic model provides a measure of assurances that the model is an accurate and realistic representation of the actual system. The hydraulic model of the City's water system was calibrated using data obtained through fire hydrant flow testing at various locations throughout the water system during 2022 and 2023.

FIELD TEST

Seven fire hydrant tests were conducted with the assistance of City personnel on October 5, 2022, four additional tests at schools in the City were conducted by City personnel on October 14, 2022, and a final five tests were conducted at repeat locations on January 20, 2023. Each hydrant test used two hydrants, one outfitted with a pressure gauge and one with a diffuser nozzle. During these tests, the hydrant with the pressure gauge was opened and static pressure was read before the second hydrant with the diffuser nozzle was opened. After the flow hydrant was opened, flow was calculated based on the pressure measured at the diffuser pitot tube while a residual pressure was recorded at the first fire hydrant. Field results were used to calibrate the hydraulic model through verification and adjustment of pipe sizes and roughness coefficients, and hydrant elevations. Locations for hydrant flow tests are noted in Table 4-3.

TABLE 4-3

Hydrant Field Testing Locations

Test Number	Date	Pressure Zone	Testing location	Pressure Node	Flow Node
1	1/20/23	888	2041 Railroad Street Enumclaw, WA 98022	J136	J808
2	1/20/23	888	1650 Battersby Avenue East Enumclaw, WA 98022	J602	J601
3	10/5/22	899	27437 SE 403rd Street Enumclaw, WA 98022	J1007	J1008
4	10/14/22	888	Thunder Mt. Middle School	J749	J750
5	10/5/22	888	25807 SE 398th Street Enumclaw, WA 98022	J1793	J1787
6	1/20/23	888	Westwood School	J2179	J801
7	10/5/22	888	43317 192nd Avenue SE Enumclaw, WA 98022	J1067	J1068
8	1/20/23	888	2925 Highpoint Street Enumclaw, WA 98022	J2133	J243
9	1/20/23	888	Southwood Elem School	J559	J2051
10	10/14/22	888	Enumclaw High School	J703	J705
11	10/5/22	888	209 Warner Avenue Enumclaw, WA 98022	J1034	J816

The system conditions during each hydrant test were recorded, including reservoir levels, source on/off status, and booster station on/off status for an accurate model. During the testing, water was being produced at Boise Spring and Watercress Spring, which were both discharging only to the 3 MG reservoir at the east end of the system, and no sources were pumping directly into the distribution system. Boise Spring was producing 700 gpm and Watercress Spring was set to produce 1,100 gpm; however, since both sources were discharging into the 3 MG Reservoir, the system pressures were dictated by the reservoir level rather than source status or head. The reservoir levels during each test were recorded in order to reproduce the system conditions during each test. Table 4-4 summarizes the reservoir and source conditions during testing. Using the system conditions for each hydrant test, the hydraulic model has been used to generate static pressure and residual pressure at the measured flow rate.

TABLE 4-4

Conditions During Hydrant Testing

Test Number	Date	Pressure Zone	3 MG Reservoir Level (ft)	Crews Reservoir Level (ft)	Boise Spring (gpm)	Watercress (gpm)
1	1/20/23	888	22.7	17.1	700	1,100
2	1/20/23	888	22.7	17.1	700	1,100
3(1)	10/5/22	899	23.3	14.1	700	1,100
4	10/14/22	888	23.3	19	700	1,100
5(2)	10/5/22	888	23.3	14.1	700	1,100
6	1/20/23	888	22.7	17.1	700	1,100
7	10/5/22	888	23.3	14.1	700	1,100
8	1/20/23	888	22.7	17.1	700	1,100
9	1/20/23	888	22.7	17.1	700	1,100
10	10/14/22	888	23.3	19	700	1,100
11	10/5/22	888	23.3	14.1	700	1,100

(1) Stanridge Reservoir level was at 29.2 ft at the time of test 3.

(2) Highview Booster Pump Station was on during the testing with a discharge head pressure of 108.17 psi; however, no testing was conducted in this zone as fire flow is not provide in the zone served by this station.

Static pressure results were generated by running the model with only domestic demands. The domestic demands used for calibration were assumed to be average day demand for 2021, distributed between pressure zones as described in Chapter 3. Residual pressure results were generated by assigning the testing flow rate as a demand at the location of the diffuser hydrant during the test.

The system pressure and pipe flow rates determined in the calibration process are highly dependent on the friction loss characteristics for each pipe. The friction factors for the model pipes are adjusted throughout the calibration process until the model output best approximates the measured values. Hazen-Williams C-factors between 100 and 150 are used throughout the system. These friction factors are typical for most pipe types and are generally conservative. These friction factors are also intended to compensate for system losses through valves and pipe fittings.

The model output has been produced for two data comparisons; static pressure and residual pressure. Table 4-5 provides the flow rates, measured static and residual pressures, and modeled static and residual pressures. Calibration of the hydraulic model produced results that are within 2 psi of static pressure and 5 psi of residual pressure at nearly all locations. The modeled static pressure at one test location differs from the field measurement by more than 2 psi, however, this location has a pressure of over 100 psi, and the percent difference in the values is less than 3 percent.

TABLE 4-5

Model Calibration

Test	Field Flow	Static Pressures (psi)			Residual Pressure(psi)		
		Field	Model	Difference (Model - Field)	Field	Model	Difference (Model - Field)
1	1,244	62	62.6	0.6	60	59.8	-0.2
2	1,126	50	51.5	1.5	48	50.1	2.1
3	544	50	49.2	-0.9	37	37.3	0.3
4	2,382	67	67.2	0.2	60	58.2	-1.9
5	650	83	84.6	1.6	71	69.6	-1.5
6	1,404	104	106.5	2.5	91	89.1	-2.0
7	787	115	116.8	1.8	98	97.8	-0.2
8	1,501	70	71.2	1.2	67	67.2	0.2
9	1,256	67	67.7	0.7	60	56.9	-3.1
10	2,224	64	64.8	0.8	53	51.0	-2.0
11	557	58	58.7	0.7	56	57.7	1.7

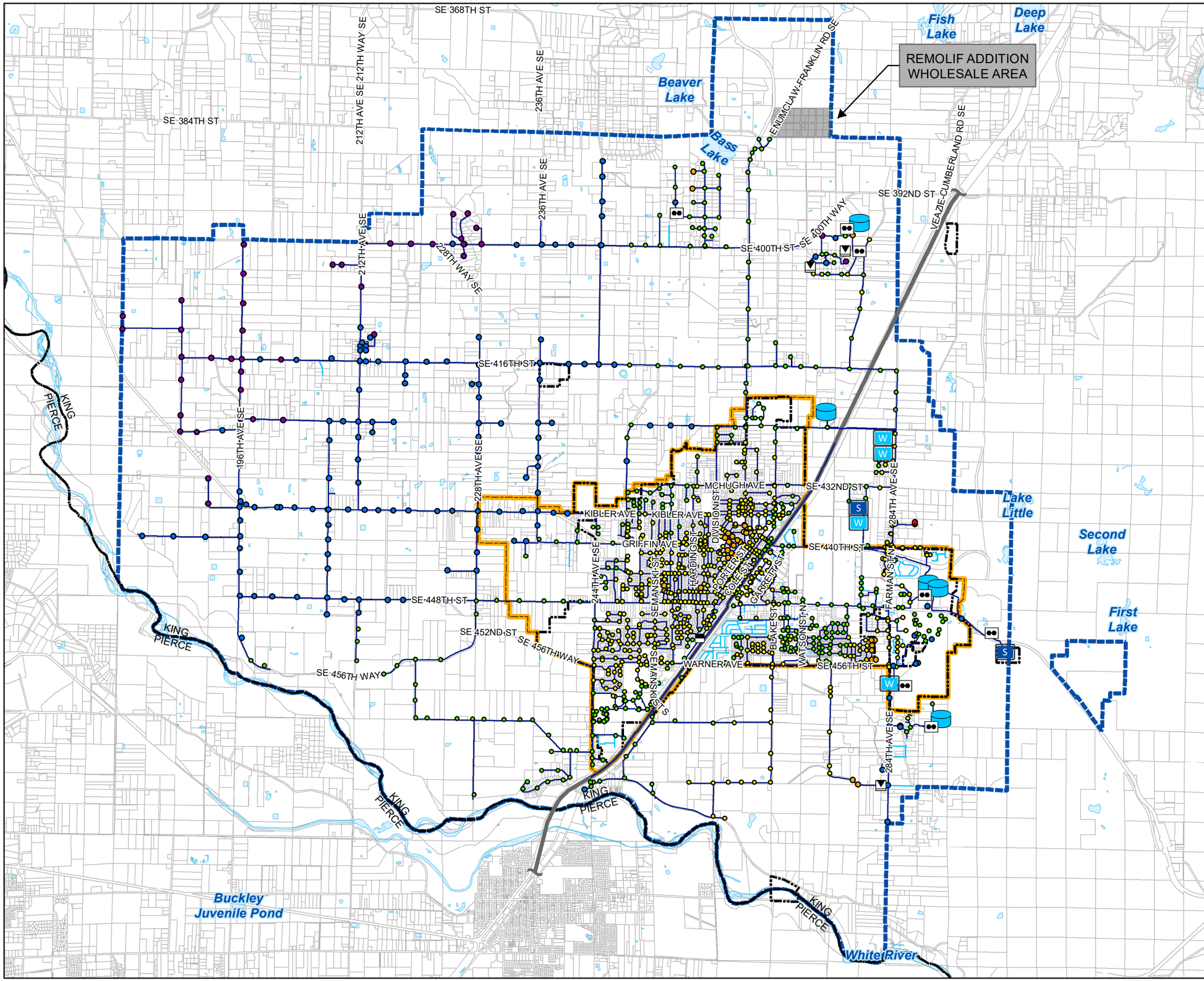
The DOH Water System Design manual does not dictate any requirements or standards for hydraulic model calibration. However, static pressure results within 2 psi and residual pressure results within 5 psi are generally considered acceptable. The calibration produced results within an acceptable range, and the model presents a conservative approximation of the system overall.

MODELED SCENARIOS AND RESULTS

The results of the peak hour and maximum day demand fire flow scenarios under 2043 demands are described below and are indicated on Figures 4-1 and 4-2. Complete modeling results are included in Appendix N.

PEAK HOUR ANALYSIS

Water systems must maintain a minimum pressure of 30 psi in the distribution system, with equalizing storage depleted from any reservoirs, under peak hour demand conditions in accordance with WAC 246-290-230 (5). The storage analysis, which provides a breakdown of storage components, is presented in Chapter 3 of this plan. Table 4-2 include the reservoir settings during each model scenario. To evaluate the water system's ability to meet future demands, the City's existing distribution system has been modeled under existing (2021) and projected (2033, 2043) peak hour demand conditions.



LEGEND

CITY WATER MAIN

PRIVATE WATER MAIN

TACOMA TRANSMISSION MAIN

WATER FACILITIES

BOOSTER STATION

INTERTIE

PRV STATION

RESERVOIR

SPRING

WELL

WATER SERVICE AREA

CITY LIMITS

URBAN GROWTH AREA

WATER BODY

PARCELS

2043 Pressure (psi)

- < 30
- 30 - 40
- 40 - 50
- 50 - 80
- 80 - 100
- > 100

Source: City of Enumclaw GIS Data, King Couty GIS Data, Washington Geospacial Open Data

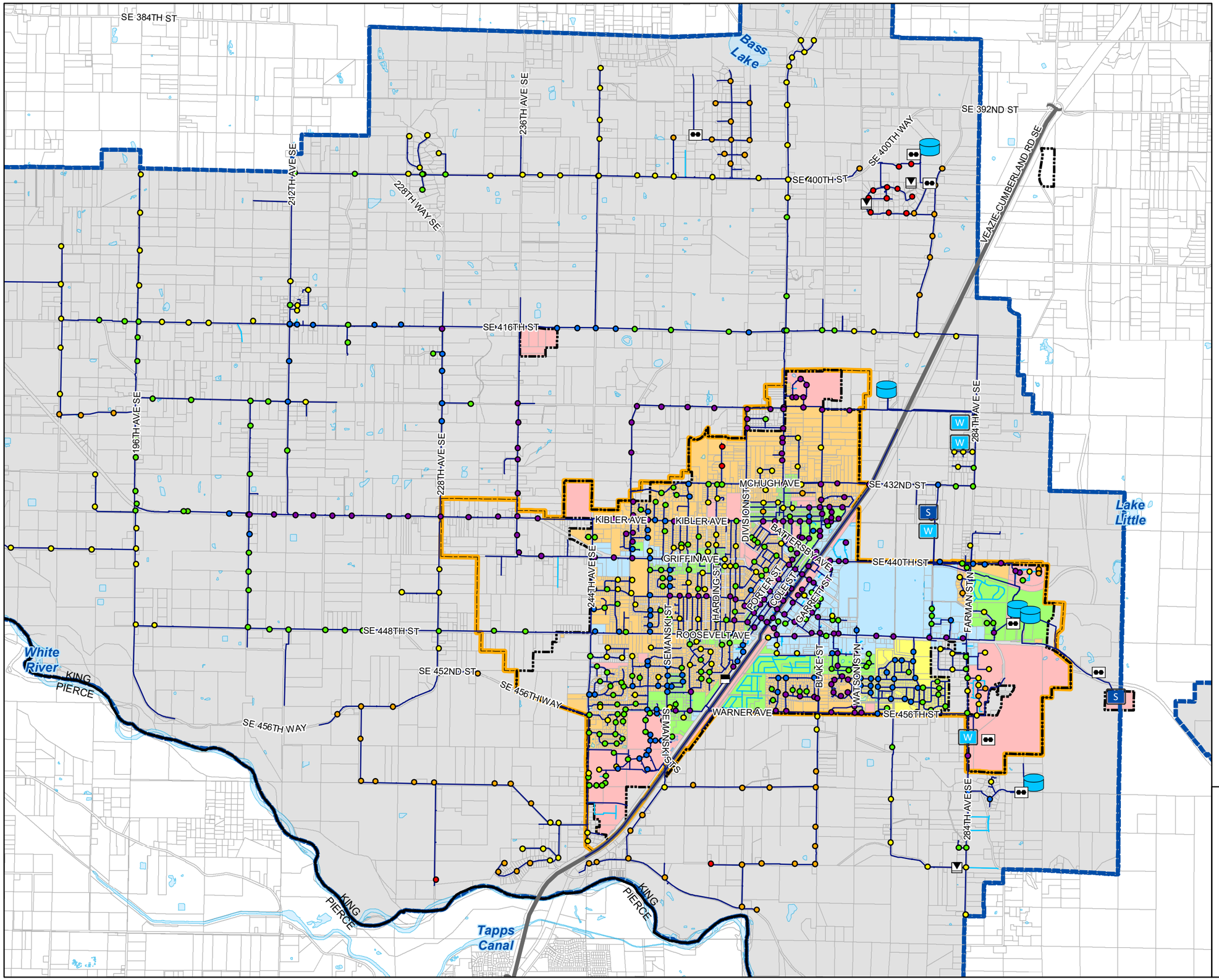
N

0 2,500 5,000 10,000 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 4-1
PHD MODELING (2043)

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 4-x 2043PHD.mxd



LEGEND

- CITY WATER MAIN
- PRIVATE WATER MAIN
- TACOMA TRANSMISSION MAIN

WATER FACILITIES

- BOOSTER STATION
- INTERTIE
- PRV STATION
- RESERVOIR
- SPRING
- WELL
- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- WATER BODY
- PARCELS

Modeled Fire Flow (gpm)

- < 500
- 500 - 1,000
- 1,000 - 1,750
- 1,750 - 2,500
- 2,500 - 3,000
- > 3,000

Land Use

- Unincorporated (500 gpm)
- Single-Family (1,000 gpm)
- Planned Unit Dev (1,750 gpm)
- Multifamily (2,500 gpm)
- Public/Institutional (3,000 gpm)
- Commercial (3,000 gpm)

Source: City of Enumclaw GIS Data, King Couty GIS Data, Washington Geospacial Open Data

N

0 1,950 3,900 7,800 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 4-2
FIRE FLOW MODELING W/ 2043 MDD

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 4-x 2043FF.mxd

The peak hour model analysis indicates that the system is able to sustain the required 30 psi at all service locations system-wide under current demands. Under the projected 10- and 20-year demands, pressures along SE 436th Place at 284th Avenue SE are shown to fall below 30 psi. Peak hour pressures for the 20-year demand scenario with the existing system are included in Figure 4-1. Some parts of the downtown area show peak hour pressures between 30 and 40 psi, but this is above the DOH minimum requirement.

The City will replace the undersized main serving the deficient area during the summer of 2023, and as such, a CIP project is not included in this Plan to address this deficiency as the project is already in progress. Other projects in the capital improvement plan in Chapter 8 will improve system resiliency, reliability, and fire flows, and will not provide a significant change to the peak hour demand pressures.

The peak hour pressure analysis also indicates that the western end of the system includes many areas where pressure exceed 100 psi, which is higher than recommended. The CIP plan also includes a project to install new PRV stations in the western part of the system to reduce pressures in this area.

AVAILABLE FIRE FLOW ANALYSIS

The hydraulic model has been used to assess the availability of fire flows throughout the water system. WAC 246-290-230 (6) requires systems providing fire flow to be designed to provide maximum day demands plus the required fire flow, while maintaining system wide pressure of 20 psi. In addition, operational, equalizing, and fire suppression storage are depleted from the reservoirs for these analyses. Storage volumes are provided in Chapter 3, and Table 4-1 includes the reservoir settings during each model scenario. Target fire flows were assigned based on zoning in each part of the City as noted in Table 4-6, based on City input and information included in the previous WSP.

TABLE 4-6

Target Fire Flows

Land Use Designation	Target Fire Flow (gpm)
Unincorporated King County	500 to 1,000
Single-Family Residential	1,000
Planned Unit Development	1,750
Multifamily Residential	2,500
Commercial, Office, Institutional	3,000

The City's system consists of a number of older areas with smaller diameter mains dating back to the 1940s or earlier, which were not designed in accordance with current best practices for fire flow availability. While fire flow is sufficient in many parts of the system, there are some areas with older piping that cannot supply the target fire flow. The City intends to upsize piping per the CIP plan to improve fire flows, but many of the

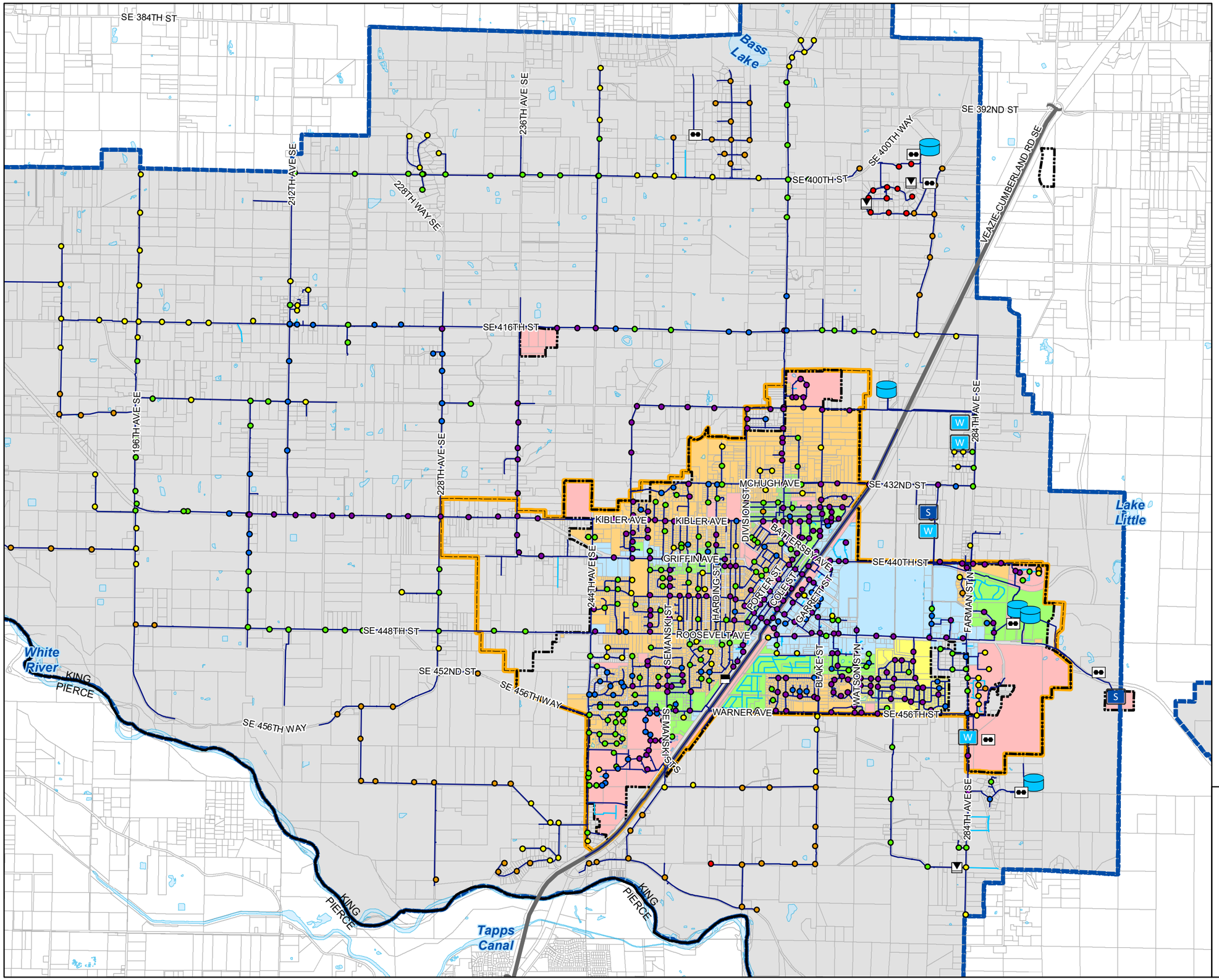
older pipes will be replaced as development occurs throughout the City or as the opportunity arises when other infrastructure or road work will occur. The City will maintain a list of recommended sizes for replacement pipes throughout the system in order to eventually meet the target fire flow goals.

Figure 4-2 includes the results of the fire flow analysis for the 20-year projected demands with the existing system. Due to the presence of smaller pipes in the downtown grid, some hydrants are shown to have less than the target 3,000 gpm fire flow available. However, other hydrants adjacent to or in the vicinity of these locations are able to supply 3,000 gpm from the larger mains. It should also be noted that the City's existing storage volume is not sufficient to provide fire flow with the standby storage of 1 day of MDD depleted. This is described further in the storage analysis in Chapter 3. The City's sources have a high degree of reliability, and are likely to be available to offset any storage deficit. However, the 888 Zone reservoirs have been set to their dead storage levels for the fire flow analysis in this chapter as a level of conservatism.

The City's sources within the 888 Zone are equipped with backup power and are therefore considered reliable in the event of an emergency. The City's smallest source can provide 676 gpm, or 811,000 gallons per day alone (assuming 20 hours of pumping) to offset the storage deficiency. The largest source, Watercress Springs, can supply 2.7 MG per day assuming 20 hours of operation, further offsetting the storage deficiency. The modeled results presented here therefore represent a very conservative view of the system with the system storage depleted beyond a level that would be expected to occur even in an emergency scenario.

Some areas of the City have a designated land use with a target fire flow that is higher than the system can currently provide in those locations, such as the multifamily-zoned areas along Porter Street near McHugh Avenue and along Griffin Avenue west of Harding Street. The actual land use in some of these areas is single-family residential, where 1,000 gpm would be sufficient. The City aims to improve mains in these areas as needed to address development as it occurs rather than preemptively upsizing large parts of the system before growth or development happens. The 1040 Zone and 899 Zone in the northern part of the system are shown with less than the target fire flow, as fire flow to this area is provided directly from the Stanridge Hill Reservoir (HGL 899), which does not have a high enough level to provide 20 psi to all services in these zones, though flow can be provided at a lower residual pressure. The area was approved for development with a lower fire flow prior to the City's acquisition of the area.

Many of the distribution system capital improvements in Chapter 8 will improve fire flow as well as replacing aging mains in critical areas within the system, though the primary intent of the improvements is to replace aging infrastructure. Figure 4-3 includes the results of the fire flow analysis under 2043 maximum day demands if all capital projects identified in Chapter 8 are implemented. Figure 4-4 includes a comparison of the modeled fire flow under the existing system conditions and the modeled fire flow after the identified CIP projects in Chapter 8 are completed. The projects that will improve fire



LEGEND

- CITY WATER MAIN
- PRIVATE WATER MAIN
- TACOMA TRANSMISSION MAIN

WATER FACILITIES

- BOOSTER STATION
- INTERTIE
- PRV STATION
- RESERVOIR
- SPRING
- WELL
- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- WATER BODY
- PARCELS

Modeled Fire Flow (gpm)

- < 500
- 500 - 1,000
- 1,000 - 1,750
- 1,750 - 2,500
- 2,500 - 3,000
- > 3,000

Land Use

- Unincorporated (500 gpm)
- Single-Family (1,000 gpm)
- Planned Unit Dev (1,750 gpm)
- Multifamily (2,500 gpm)
- Public/Institutional (3,000 gpm)
- Commercial (3,000 gpm)

Source: City of Enumclaw GIS Data, King Couty GIS Data, Washington Geospacial Open Data

N

0 1,950 3,900 7,800 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 4-3
FIRE FLOW W/ 2043 MDD AND CIP PROJECTS

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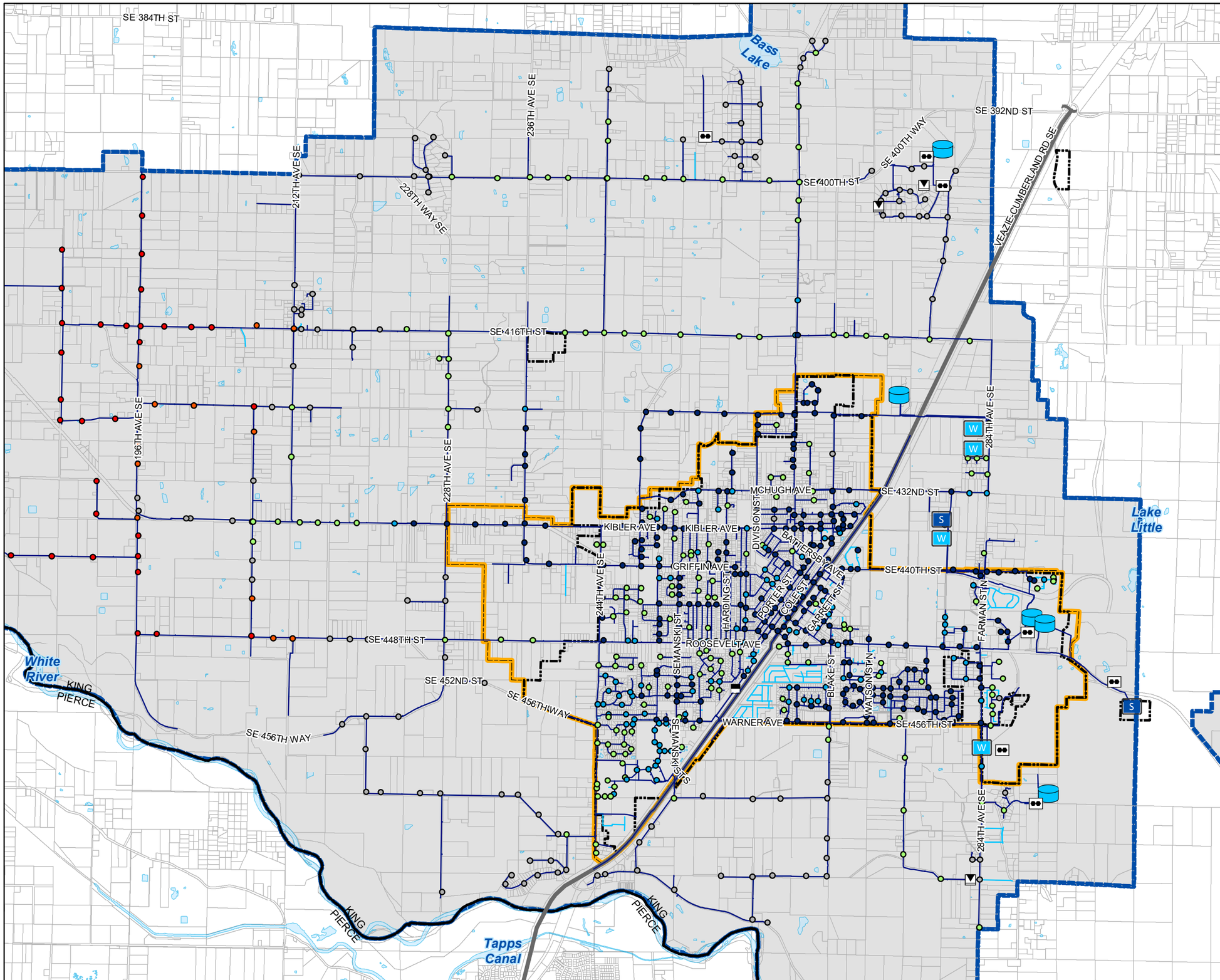
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 4-x 2043FFCIP.mxd



LEGEND

- CITY WATER MAIN
- PRIVATE WATER MAIN
- TACOMA TRANSMISSION MAIN

WATER FACILITIES

- BOOSTER STATION
- INTERTIE
- PRV STATION
- RESERVOIR
- SPRING
- WELL
- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- WATER BODY
- PARCELS

Change in Fire Flow

- Decrease by > 100 gpm
- Decrease by 0 to 100 gpm
- Increase by 0 to 100 gpm
- Increase by 100 to 300 gpm
- Increase by 300 to 500 gpm
- Increase by > 500 gpm

Source: City of Enumclaw GIS Data, King Couty GIS Data, Washington Geospacial Open Data

N

0 1,950 3,900 7,800 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 4-4
CHANGE IN FIRE FLOW AFTER CIP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 4-x FF Change.mxd

flow include main upsizing and replacements and a new storage facility. Fire flow in the western part of the system will be slightly diminished due to the creation of a new, lower pressure zone to reduce typical service pressures, which results in the disconnection of some of the existing looping in that area.

CHAPTER 5

WATER USE EFFICIENCY PROGRAM

OBJECTIVE

A viable water use efficiency program is a requirement of water system planning. The City of Enumclaw recognizes that water is a valuable and essential natural resource that needs to be used wisely. This program provides an approach to increase water use efficiency (WUE) within the City's water service area and has been prepared to be fully compliant with Washington State Department of Health WUE requirements.

This chapter identifies conservation and water use efficiency requirements, evaluates past conservation efforts and outlines the City's WUE plan for the next 10 years, including proposed measures and City goals.

WATER USE EFFICIENCY PLANNING REQUIREMENTS

The Washington Legislature passed the Water Use Efficiency Act of 1989 (43.20.230 RCW), which directs DOH to develop procedures and guidelines relating to water use efficiency.

In 2003, the Municipal Water Supply – Efficiency Requirements Act (Municipal Water Law) was passed and amended RCW 90.46 to require additional conservation measures. The Municipal Water Law, among other things, directed DOH to develop the Water Use Efficiency Rule (WUE Rule), which is outlined in the *Water Use Efficiency Guidebook* and became effective January 22, 2007.

These documents provide guidelines and requirements regarding the development and implementation of conservation and efficiency programs for public water systems. Conservation and efficiency programs developed in compliance with these documents are required by DOH as part of water system planning documents, and by the Washington State Department of Ecology (Ecology) as part of a public water system water right application. Conservation must be evaluated and implemented as an alternate source of supply before state agencies approve applications for new or expanded water rights.

Conservation can be used effectively to help meet increased demand for water, to protect the environment, to delay the development of costly infrastructure, and to ensure that water is available to meet economic and population growth consistent with the Growth Management Act by using existing supplies more efficiently. Public awareness and participation are necessary for the City to develop an active and beneficial conservation plan.

The third and most recent edition of the *WUE Guidebook* was released in January 2017. As an extension to the Conservation Planning Requirements, the WUE Rule sets more stringent requirements for public water purveyors. The WUE Rule is composed of the following six sections:

1. Water Use Efficiency Requirements
2. Water Meters
3. Data Collection
4. Distribution System Leakage
5. Demand Forecasting
6. Water Use Efficiency Program and Goals

WATER USE EFFICIENCY REQUIREMENTS

The *Water Use Efficiency Guidebook* establishes varying implementation and evaluation requirements for Municipal Water Suppliers (MWS). The requirements focus on the importance of measuring water usage and evaluating the effectiveness of the WUE program. The Rule outlines three fundamental elements which include planning, distribution leakage standards, and goal setting and performance reporting.

Table 5-1 provides a summary of the WUE Rule requirements applicable to the City.

TABLE 5-1

Summary of WUE Requirements

Requirement	City Compliance
Include WUE Program in Planning Documents	✓
Set WUE Goals	✓
Submit Service Meter Installation Schedule	✓
Submit First Annual Performance Report	✓
Meet Distribution Leakage Standard (Based on 3-Year Rolling Average)	✓
Complete Installation of All Service Meters	✓

The City has met all WUE requirements outlined above in Table 5-1.

SOURCE AND SERVICE METERING

Installing meters is one of the most significant WUE requirements because meters provide the information necessary to calculate accurate distribution system leakage (DSL) and evaluate the effectiveness of a WUE program.

The WUE Rule required all sources and customer service connection be metered by 2017. The City currently meters all production and intertie sources and customer services and is therefore in full compliance with this requirement. Service meters are read monthly and source meters are read every day. Automatic read meter usage data can be extracted at any time. All new sources and customers will also be metered.

DATA COLLECTION

The WUE Rule requires regular collection of production and consumption data. Data must be reported in the City's planning documents and annual performance report to DOH. Water use data will be used for the following:

- Calculating leakage;
- Forecasting demand for future water needs;
- Identifying areas for more efficient water use;
- Evaluating the success of the WUE program;
- Describing water supply characteristics;
- Aiding in decision-making about water management.

Table 5-2 summarizes the water use data collection requirements.

TABLE 5-2

Summary of Water Use Data Collection

Data Type	Comments
Source of Supply Meter Data	Monthly and annual totals of production, purchased water from another system, and/or supplied to other system through interties
Service Meter Data	Total annual consumption, annual consumption by each customer class, and customer class seasonal variations.

Data from the metering program and system-wide demand forecasts are contained in Chapter 2. This information is needed to meet planning and performance reporting requirements and to check compliance with the distribution system leakage standard of the WUE Rule. The City is currently in compliance with this regulation.

DISTRIBUTION SYSTEM LEAKAGE

The WUE Rule requires that water distribution systems maintain a DSL rate of less than 10 percent of finished water production based on a 3-year rolling average. DSL is defined as the difference between total water production and authorized consumption. Authorized consumption includes metered water consumption by customers and known or credibly estimated uses that were unbilled or unmetered. DSL is typically attributed to

water loss due to leaks or unauthorized uses such as illegal service connections, accounting errors, inaccurate source and customer meters, and water leaving the system for any unmetered use. Unmetered uses typically include flushing of mains and fire flows.

DSL for 2013 through 2021 is summarized in Table 2-11. In 2021, DSL was 7.1 percent of production, while the 3-year rolling average was 7 percent of production. The 3-year rolling average has been below 10 percent since 2017, in compliance with the Rule, and has steadily decreased since 2017.

WATER DEMAND FORECAST

The water demand forecast is presented in Table 2-14 and is based on historic water use data and anticipated population growth. A detailed discussion of demand forecast assumptions and parameters can be found in Chapter 2.

WATER USE EFFICIENCY GOALS AND PROGRAM

The following sections describe the City's past and present water use efficiency goals and a description of the conservation measures.

Past Water Use Efficiency Goals and Measures

Past WUE Goals

The WUE goal adopted by the City in the 2007 Comprehensive Water System Plan (CWSP) targeted achieving an average water use reduction of 5 percent by the year 2012 with 2004 as the base year. By the end of 2011, average residential water use dropped by 12 percent from 2004 based on a 3-year average, representing a savings of nearly 150,000 gallons a day.

The City's 2013 Plan set the primary WUE goals to address both water demand and supply. These are described below.

- Goal 1: Maintain a 3-year running annual average of less than 200 gallons per connection per day (gpcd) for single family residential usage.

- Goal 2: Reduce the yearly ratio of maximum day demand (MDD) to average day demand (ADD) so that by 2017 and thereafter it does not exceed 1.8.

Goal 1 was met with the three-year annual average of water consumption ranging between 185 and 191 gallons per day since 2013. An estimated annual average reduction in consumption for single-family residential customers of 15 million gallons, or an average of 41,000 gallons per day, was achieved for the period of 2013-2018 compared to

the prior period of 2007-2012. Goal 2 has not been consistently achieved except in 2013 when the ratio was 1.74. The average ADD to MDD peaking factor has been 1.8 or higher since 2014, reaching a peak of approximately 2.3 in both 2015 and 2021.

In 2019 the City adopted the following revised goals:

- Goal 1: Reduce DSL to 5 percent by 2023 through additional steel water main replacements, by conducting annual leak surveys and fixing any identified leak as soon as practicable, and completing the conversion to a new automated meter read system to more accurately measure consumptive use.

- Goal 2: Reduce the annual volume of single-family residential customer leakage billing adjustments by 10 percent by 2023 utilizing the new automated meter reading system to identify and notify customers of leaks more quickly than possible through the manual monthly read system.

In 2021, DSL was 7.1 percent of production so the 5 percent target has not been met, but efforts to reduce DSL are continuing. As of the end of 2021, the City completed its conversion to automated read meters at a total cost of $2.1 million. Billing adjustments made in 2021 were 14 percent less than in the 2019 base year.

WUE measures evaluated and/or implemented by the City are discussed below.

Past WUE Measures

<u>Public Education</u>

Theme Shows and Fairs – Portable displays and other educational materials are exhibited at local fairs and theme shows. This measure has been accomplished by the Saving Water Partnership, King County, and larger water suppliers. Because resources to accomplish this conservation measure are allocated at the regional level, rather than directly from Enumclaw, this measure is highly cost effective for the City.

Program Promotion – Conservation-related informational and/or promotional materials are included in each annual consumer confidence report. The City has also included information with utility bills and on the City's website. Other more costly measures such as newspaper articles, radio advertisements, or presentations at local schools are not implemented due to limited resources and the fact that other measures, such as water and sewer rates, have a much larger effect.

Bill Showing Consumption History – Water bills received by the City's customers compare current water use with consumption history of the same period in the previous year.

System Measures

Source and Customer Meters – Every source has a water meter that is read and recorded each day. All customer services are metered and are read at least monthly. Hourly usage information is available for customer meters through the City's automated meter reading system.

Leak Detection and Repairs – The City has previously conducted leak surveys when its Distribution System Leakage was near or exceeded 10 percent and when contracting leak detection services for pinpointing a known leak and more time was available in the minimum charge allotted for a service call. Leaks are repaired as soon as practical.

Incentives/Other Measures

Conservation Pricing – The City adopted an increasing rate block structure for residential customers beginning in 2007. Water used above specified levels is charged at a higher rate. Although separate from the water utility, the City's sewer rates include a volumetric charge that in 2021 was 2.9 times larger than the middle rate block for inside City residential customers and may be the largest contributing factor to reduced customer water consumption.

Seasonal Demand Management – The City has requested customers to voluntarily restrict outdoor water usage to odd/even days in accordance with their street address to reduce summertime peak water demands. With sufficient participation, this measure may be very cost effective in reducing maximum day demand. Unfortunately, experience from 2013-2018 has shown that request for voluntary restriction did not yield any noticeable results.

Recycling/Reuse – The City considered potential water reclamation opportunities in the 2007 and 2013 CWSP. All of the potential opportunities identified would require Class A effluent that would require a filtration system at the City's Wastewater Treatment Plant to produce. This could cost over $7 million just for the additional treatment. However, use of reclaimed water by many of the City's largest potential non-potable water consumers would be unlikely because they are scattered throughout the water service area and their distance from the wastewater treatment plant would make such use cost prohibitive. Customers in closer proximity to the wastewater plant are the most likely candidates for use of reclaimed water, but the costs to install the infrastructure to deliver the treated effluent could easily as much or more than that estimated for installing the treatment. In summary, the cost of providing reclaimed water would still easily exceed the cost savings that would be realized from the reduced use of potable water. In addition, current regulation and opposition from other stakeholders would likely prevent implementation of a reuse program that would remove any of the flow that enters the White River from the City's wastewater treatment plant. Documentation of the assessment of water reuse opportunities is provided in Appendix O.

New Water Use Efficiency Goals

Under the WUE Rule, the City must set new water use efficiency goals. These goals must include a measurable outcome, address water supply or demand characteristics, and include an implementation schedule.

Goals that support the Water Use Efficiency Program are to be established by the elected governing board, the City Council, through a public process, including a public hearing with notice of the hearing placed in the local newspaper, on the City website, and on customer utility bills. Goals must be evaluated at least every 6 years and at every Water System Plan update.

It is recommended that the WUE goals continue to focus on achieving a reduction in the maximum day demand. Limiting the maximum day demand will defer the need for expensive manganese removal treatment at the PC Johnson Wellfield or the need to convert the Tacoma intertie from an emergency to a seasonal source. Although the cost to convert the intertie to a seasonal source would be minimal since the infrastructure is already in place, City policy is to avoid using the intertie due to the substantial difference in water quality and the fact that it costs less to produce water from City sources. Also, once the intertie is converted to a seasonal source the City will have to comply with the more rigorous reporting and frequent monitoring required of a surface water source.

The following goals are proposed for the 2023 to 2029 time period.

- Goal 1: Achieve and maintain DSL below 7 percent through additional steel water main replacements, by conducting annual leak surveys and fixing any identified leak as soon as practicable.

- Goal 2: Reduce the annual volume of single-family residential customer leakage billing adjustments by 10 percent from 2023 to 2029 utilizing the new automated meter reading system to identify and notify customers of leaks more quickly than possible through the manual monthly read system.

<u>Target Water Savings Projection</u>

Table 5-3 compares average day consumption, DSL, and production with and without savings from the enactment of water use efficiency goals. If these goals are met, a cumulative 240 million gallons of water could be saved between 2023 and 2032.

TABLE 5-3

Projected Water Use Efficiency Savings

Year	Average Day Consumption without WUE Goals (gpd)(1)	Average Day Consumption with WUE Goals (gpd)(2)	DSL without WUE Goals (gpd)(3)	DSL with WUE Goals (gpd)		Average Day Production without WUE Goals (gpd)(1)	Average Day Production with WUE Goals (gpd)(4)	Yearly Water Savings (MG)(5)
2023	1,716,200	1,699,038	165,800	140,930	7.7%	1,882,000	1,839,968	15
2024	1,755,000	1,737,450	169,500	138,111	7.4%	1,924,500	1,875,561	18
2025	1,794,800	1,776,852	173,400	135,349	7.1%	1,968,200	1,912,201	20
2026	1,835,800	1,817,442	177,400	132,642	6.8%	2,013,200	1,950,084	23
2027	1,842,000	1,823,580	178,000	129,989	6.7%	2,020,000	1,953,569	24
2028	1,848,200	1,829,718	178,600	127,390	6.5%	2,026,800	1,957,108	26
2029	1,854,400	1,835,856	179,200	124,842	6.4%	2,033,600	1,960,698	27
2030	1,860,600	1,841,994	179,800	122,345	6.2%	2,040,400	1,964,339	28
2031	1,866,900	1,848,231	180,400	119,898	6.1%	2,047,300	1,968,129	29
2032	1,873,200	1,854,468	181,000	117,500	6.0%	2,054,200	1,971,968	30
Total								**240**

(1) From Table 2-14.
(2) Calculated by multiplying ERUs by ERU_{ADD}.
(3) Based on projected daily DSL in Table 2-14.
(4) Average Day Production with WUE Goals = (Average Day Consumption with WUE Goals) + (DSL With WUE Goals).
(5) Yearly Water Savings = Average Day Production w/o WUE Goals – Average Day Production w/WUE Goals.

Water Use Efficiency Measures

The WUE Rule requires the evaluation or implementation of different water use efficiency measures to help meet the WUE goals. The WUE Guidebook gives a list of mandatory measures that must be implemented or evaluated as well as a list of supplemental measures that can be counted toward the WUE Program. WAC 246-290-810 identifies the minimum number of water use efficiency measures that must be evaluated based on system size. As the City of Enumclaw serves between 2,500 and 9,999 customers, the WUE Program must evaluate or implement a minimum of six water use efficiency measures.

The following sections describe both the mandatory and supplementary water use efficiency measures adopted by the City, and indicate which have been or will be implemented.

Mandatory Measures

Implement Source and Service Metering

The City currently meters all sources and customer connections and will continue to meter all new customers and sources. Every source water meter is read and recorded each day. All customer services are metered and data is recorded hourly in real time.

Leak Detection

The City focuses on areas of suspected leakage for leak detection on an as-needed basis. The City also accurately tracks flushing use, main break water losses, fire department usage and compliance sampling usage.

Implement Customer Education

Educating customers more than once per year about the importance of using water efficiently counts as a WUE measure. This will be accomplished through an article in the annual consumer confidence report, through an informational note at least once per year on each customer's utility bill, and conservation tips on the City's website. The cost is nominal but will serve as a reminder to customers of the need to use water efficiently.

Implement Conservation Rate Structure

The City previously evaluated and has implemented a conservation rate structure. Rates are evaluated to ensure customers are encouraged to use less water while also providing funding for the WUE program and maintaining revenue. The City's intent with its water rate structure is to encourage conservation by incrementally increasing the overage volume charge.

The City's increasing block structure has been in place since 2007 and has played a role in reducing consumption. The actual water reduction benefit attributable to the water rate structure is impossible to quantify because several significant sewer rate increases were also implemented during the same period. Regardless, it is believed that this measure is cost effective at reducing water use.

Table 5-4 summarizes the inclined block rates and volume charge. Charges include a base charge depending on the meter size and a volume charge based on consumption. Single-family residential customers are subject to an increasing block volume charge rate structure. All other customer classes have a standard volume rate for all consumption. Water used above specified levels is charged at a higher rate. Outside City limit base and volume charges are 50 percent higher than inside City charges. These conservation rate structures encourage efficient water use.

TABLE 5-4

2023 Water Rate Schedule

Base Charge			
Meter Size	**In City**	**Out of City**	
Up to 3/4"	$15.07	$22.61	
3/4" LI(1)	$10.56	$15.84	
1" & 1 1/4"	$20.28	$30.42	
1 1/2"	$28.94	$43.42	
2"	$39.37	$59.05	
3"	$67.43	$101.15	
4"	$98.70	$148.04	
6"	$185.44	$278.18	
8"	$289.56	$434.33	
Water Volume Charge			
Customer Type	**Block 1**	**Block 2**	**Block 3**
Inside City Customers	(0-7.5 CCF)	(7.5-20 CCF)	(20+ CCF)
Single-Family Residential	$2.13	$2.82	$3.53
Low Income	$1.50	$2.82	$3.53
Multi-Family Residential	$2.10		
Commercial	$2.43		
Agricultural	$1.60		
Outside City Customers	(0-8 CCF)	(8-20 CCF)	(20+ CCF)
Single-Family Residential	$3.21	$4.25	$5.27
Low Income	$2.25	$4.25	$5.27
Multi-Family Residential	$3.16		
Commercial	$3.65		
Agricultural	$2.38		

(1) Low income customers.

Supplementary Measures

The City has either evaluated or implemented all mandatory measures discussed in the previous section in an effort to further reduce water use. The following supplementary measures will also be implemented as part of the WUE Plan. It is noted in the 2013 Plan, that these measures have proved very effective in reducing overall demand and all the measures described below will continue.

Bill Showing Consumption History

The City will continue to include on water bills current water use compared to consumption of the same period in the previous year. This measure does not require any additional resources from the City that are not already in place. Therefore, this is a cost-effective measure.

Demand-Side Leak Identification and Water Accounting

The automated read system alerts staff to high consumption at a particular service based on a staff-selected threshold. The customer is notified of the potential leak on the customer's side of the meter by posting a notice on the customer's door and/or by phone or email. This measure has been highly effective in identifying customer-side leaks.

Additional Customer Education

The City's website includes water use efficiency information on a page titled "Conservation Tips." This page includes an introduction to water conservation as well as links to more in-depth documents to help customers use water more efficiently. The topics covered apply to single-family residential, multi-family residential, commercial customers, and landscaping.

Table 5-5 includes the City's WUE measures and their applicability for each customer class. The City has four customer classes - residential, multi-family, commercial, and agricultural, and therefore has implemented 9 WUE measures.

TABLE 5-5

City WUE Measures

Implemented Measures	Number of Applicable Customer Classes
Conservation Rate Structure	1
Customer Leak Detection	4
Bills Showing Consumption History	4
Total	**9**

PERFORMANCE REPORTING

The City must report water use efficiency goals progress annually. The annual report must include:

- Total source production.
- Distribution system leakage in percentage and volume.
- Goal description, schedule, and progress toward meeting goals.

The City will continue to monitor overall water use and the amount of distribution system leakage on an annual basis. The City will monitor the success or failure of its water conservation program by analyzing this data and determining the long-term trend in water usage. The City will also evaluate the cost-effectiveness of water conservation methods, both implemented and not implemented, to determine if existing methods should be continued, or if new methods should be instituted. If the results of the program monitoring show that the water savings' goals are not being met, more rigorous program implementation or additional program items will be considered.

Annual performance reports will be submitted to DOH as required and a copy of the report posted on the City's website. City water customers will also be provided updates on WUE program results in the City's annual Consumer Confidence Report. The most recent copy of the Annual Report is included in Appendix J.

CHAPTER 6

SOURCE WATER PROTECTION PROGRAM

INTRODUCTION

Water from underground aquifers, commonly referred to as groundwater, forms the primary source of drinking water for approximately 65 percent of Washington State residents. To protect groundwater supplies, the Environmental Protection Agency (EPA) and Washington Department of Health (DOH) require all Group A public water systems to develop and implement a wellhead protection program (WHPP). Water systems using surface water or groundwater under the direct influence of surface water (GWI) are also required to develop and implement a watershed control program. The minimum requirements for Wellhead Protection and Watershed Control Programs are specified in WAC 246-290-135.

A WHPP is intended to provide local utilities with a proactive and ongoing program for preventing groundwater contamination. A watershed control program is an effort to identify and inventory any existing contaminants in the surface water watershed and prevent any additional contaminants from entering the water system. Chapter 6 will provide a summary of the City of Enumclaw's Wellhead Protection Program, with a copy of the full program provided in Appendix M of this Plan.

In October 2000, DOH ruled that the Boise Creek and Watercress Spring sources are not considered to be surface water or groundwater under the influence of surface water (GWI). As such, the City is not required to prepare a Watershed Control Plan under WAC 246-290-135(4). A copy of DOH's determination is included in Appendix M. Consequently, the City only needs to have Wellhead Protection Programs for its drinking water sources.

WELLHEAD PROTECTION PROGRAM

A successful wellhead protection program consists of a number of elements that must be developed before the plan can be fully implemented. The required elements for a WHPP are contained in WAC 246-290-135(3) and include:

- A *Description of the Geology* of the area, describing the ground water source and any natural protection provided by geologic structures.

- A *Susceptibility Assessment* that determines the susceptibility of each source of contamination.

- A *Delineated Wellhead Protection Area* (WHPA) based on all reasonable available hydrogeologic information, inclusive of the Susceptibility Assessment.

- An *Inventory* of potential sources of contamination within each WHPA with documentation of potential contaminant source owners/operators notifications.

- A *Spill Response Plan* for each WHPA containing documentation for coordination with local first responders.

- A *Contingency Plan* for providing alternate sources of drinking water in the event that contamination does occur and management recommendations to reduce the likelihood those potential contamination sources will pollute the drinking water supply.

The elements described above form the basis of this chapter. Each element is addressed in the City's 2009 WHPP by Robinson Noble & Saltbush and summarized here. A copy of the full WHPP is provided in Appendix M.

GEOLOGY

The City of Enumclaw lies on the relatively flat upland of the Osceola Mudflow Plain at the base of the Cascade foothills. The City is located near the hydrologic divide of the Green and White Rivers. The rivers, and their tributaries, have eroded the lithified volcanic mudflow (lahar) deposits that form the plain. Water bearing units within the City's water system include the Vashon recessional outwash, Vashon ice-contact deposits, and pre-Vashon units. Boise Spring, Watercress Spring, and the Golf Course Well lie within the Vashon recessional aquifer which is formed by the Vashon recessional outwash and Vashon ice-contact deposits. The P.C. Johnson Wellfield wells reside in the pre-Vashon aquifer which is comprised of all units below the Vashon Drift but above the bedrock.

A more extensive description of the area's geology is available in the 2009 WHPP by Robinson Noble & Saltbush and is included in Appendix M of the Plan.

SUSCEPTIBILITY ASSESSMENT

A completed Susceptibility Assessment Form for each well is included in Appendix B of the City's 2009 WHPP by Robinson Noble & Saltbush (Appendix M of the Plan). Due to the natural geology of the area, DOH has ranked both the P.C. Johnson Wellfield and the Golf Course Well as having "moderate" susceptibility to contamination while Watercress and Boise Springs have a "high" susceptibility. These assignments indicate that the City's sources are fairly to poorly protected from contamination should such an event occur.

DELINEATION OF WELLHEAD PROTECTION AREAS

In developing a WHPP, the first step is to establish the land areas, or zones, around each well from which groundwater may flow to the well. The four primary zones include 6-month, 1-year, 5-year and 10-year time-of-travel factors. Together, these zones constitute the Wellhead Protection Area (WHPA) for each well. WHPAs require appropriate land use management to minimize the possibility of contaminants affecting ground water sources. The most commonly accepted tools for delineating zones are the calculated fixed radius method, analytical models, hydrogeologic mapping, and numerical models.

The 2009 Wellhead Protection Program by Robinson Noble & Saltbush includes delineated WHPAs for the City of Enumclaw's sources. Both analytical modeling and hydrogeologic mapping were used to delineate the zones. Further information regarding the methods employed to determine the City's WHPAs are available in the 2009 Wellhead Protection Program located in Appendix M.

INVENTORY OF POTENTIAL CONTAMINANTS

Detailed information on potential contaminant sources is included in the City of Enumclaw's 2009 Wellhead Protection Plan by Robinson Noble & Saltbush. An updated list of potential contaminant sources is included in Appendix M, ahead of the 2009 WHPP. The inventory is based on the DOH Source Water Assessment Program Mapping Application which lists the potential contaminants per WHPA zone for a given water source. Information on and locations of the pollutants are provided by the Washington State Department of Ecology database. Water source locations and WHPA zone projections are based on data made available to DOH by water purveyors. DOH recommends providing updated information to the Office of Drinking Water when significant water source changes occur or during the completion of an updated Water System Plan.

The inventory is current as of August 2022 and does not include properties with septic systems. A sample notification letter for owners/operators of potential contaminant sources is included in Appendix M, immediately following the list of potential contaminants. All owners/operators of potential contaminants were notified of the City's WHPA zones in 2023.

SPILL RESPONSE PLAN

Planning for spills and incident response is an important aspect of both an emergency management plan and a wellhead protection program. Specific response procedures for WHPAs must be determined prior to the occurrence of a contamination incident. The information obtained by completing the Susceptibility Assessment Form and the contaminant inventory can be used to determine what types of spill and incident response

measures are necessary for the protection of drinking water sources. Response procedures for WHPAs should be realistic and easily implemented for local emergency personnel.

Coordination, cooperation, and communication among the responding agencies, organizations, and individuals is imperative for response procedures to be effectively executed. Depending on the magnitude and type of incident, any of the following organizations may be involved in a spill or incident response for a WHPA in Washington State. Involvement from an organization not listed below may also be required. All listed organizations were sent a WHPA notification letter and a copy of the City's 2009 WHPP in 2023. A sample notification letter is provided in Appendix M. In the event of an emergency, 9-1-1 should be called immediately followed by notifications to the organizations listed below.

- Local Fire and Police Departments: Initial response to a hazardous spill will often come from the local fire and police districts. The City's water sources lie within the jurisdiction of the Enumclaw Fire District 28, the City of Enumclaw Police Department, and Precinct 3 of the King County Sheriff Office. The Enumclaw Fire District 28 should be kept up to date on current WHPA boundaries.

- Department of Ecology (Ecology): Both the Northwest Regional Office and Spill Response Team should be notified in the event of a pollutant spill. The Spill Response Team is responsible for determining the spill's source, cause, and liable party. If the liable party is unknown, Ecology will commence an investigation to ensure that containment, cleanup, and disposal proceedings begin. Ecology's 24-Hour Spill Report Line is 1-800-645-7911.

- Department of Health (DOH): The Department of Health works with Ecology's Spill Operations Section and the Association of Fire Chiefs to set standard operating procedures for first responders in regards to WHPAs, critical aquifer recharge areas, and other sensitive ground water areas. DOH may also aid in the cleanup effort through laboratory support and other services, if necessary.

- King County Emergency Management: The King County Department of Emergency Management (KCEM) assists with regional coordination of other government and non-government entities during incidents of regional significance. KCEM may notify additional agencies of the incident if necessary.

A comprehensive Spill Response Plan was completed as part of the City's 2009 WHPP by Robinson Noble & Saltbush. The Spill Response Plan was last updated in March of 2009 and is included in Appendix M.

CONTINGENCY PLAN

Contingency planning is an essential component of a WHPP. In the event that any drinking water sources need to be taken offline due to contamination, a contingency plan provides immediate mitigation. A properly prepared and updated contingency plan ensures the water system and local officials are prepared to respond to emergency situations. The City has an Emergency Response Plan which was last updated in 2021 and is provided in Appendix L. The Emergency Response Plan includes a contingency operation plan for the water sources and other water system facilities.

CHAPTER 7

OPERATION AND MAINTENANCE PROGRAM

INTRODUCTION

This chapter summarizes the operation and maintenance programs conducted by the City of Enumclaw to ensure performance and reliability of the water system. The City owns and operates six groundwater supply facilities, four reservoirs, seven booster pump stations and more than 145 miles of water main. The City has an emergency intertie connected to the Tacoma water pipeline that carries water from Tacoma's Green River Filtration Facility through the City.

WATER SYSTEM MANAGEMENT

The City's water system staff includes several maintenance and operation personnel that function under the Certified Water System Operator/Water Supervisor. The City maintains operation and maintenance manuals with specific component-related documentation for use by operations personnel.

The water system's O&M program should include the following elements:

- Water System Personnel and Certifications
- System Operation and Control
- Water Quality Monitoring
- Emergency Response Program
- Cross-Connection Control Program
- Recordkeeping and Reporting

OPERATOR CERTIFICATION

State law requires Group A public water systems to retain operators certified as competent to operate and manage the system. WAC 246-292 describes the requirements for cities and for operators. The City serves a population between 15,001 and 50,000 and is classified as a Group 3 water system per WAC 246-292-040. The City is required to employ at least one water distribution manager (WDM) with a certification level at or above the City's group classification. The City has two employees with suitable certifications as shown in Table 7-1.

TABLE 7-1

Personnel Certifications

Name	Position	Certification	Contact #
Scott Woodbury, P.E.	Assistant Public Works Director	WDM4, CCS	(360) 615-5728
Kyte Ramberg	Certified Operator/Water Supervisor	WDM4, CCS	(360) 825-5541

PROFESSIONAL GROWTH REQUIREMENTS

In order to promote and maintain expertise for the various grades of operator certification, Washington State requires that all certified operators complete no less than three Continuing Education Units (CEU) within each 3-year period. Programs sponsored by both the Washington Environmental Training Resources Center (WETRC) and the AWWA Pacific Northwest Subsection are the most popular sources of CEUs for certified operators in Washington State. The City's operators have been able to consistently meet their required number of CEUs.

Operator training is an important component in maintaining a safe and reliable water system. At a minimum, all personnel performing water system related duties should receive training in the following areas:

- Confined space
- Trenching and Shoring
- Traffic Flagging
- Asbestos Cement Pipe Safety
- Cross-Connection Control (CCS)

The City's water system operators typically complete more than the required CEUs within a given period. All water department workers are certified in asbestos cement pipe safety, CPR and first aid, and all are certified in traffic flagging. It is the City's policy to maintain a well-qualified and technically trained staff. Each year, the City allocates funds for personnel training, certification and membership in professional organizations, such as the AWWA. The City believes that the time and money invested in training, certification and professional organizations are repaid many times in improved safety, skills, and confidence.

STAFFING REQUIREMENTS

The total City water operations and maintenance staff hours worked by activity for 2014-2022 are summarized in in Table 7-2. Any improvement in the current level of service would require additional staffing. Since the prior WSP, water department staffing has increased by 0.5 full time employees (FTE) with two meter reader positions being replaced by two water worker positions as a result of converting to an automated meter system.

TABLE 7-2

Annual Staff Hours by Activity

	2014		2015		2016		2017		2018		2019		2020		2021		2022	
	Hours	**%**	**Hrs**	**%**	**Hrs**	**%**	**Hrs**	**%**	**Hrs**	**%**	**Hrs**	**%**	**Hrs**	**%**	**Hrs**	**%**	**Hrs**	**%**
Meter Reading	2,890.3	31.3%	2,871.7	32.9%	3,097.5	34.3%	3,278.7	33.8%	2,936.2	31.0%	2,219.0	24.2%	1,540.1	20.6%	607.4	8.6%	138.0	1.3%
Meter Turn On/Off	272.1	2.9%	237.0	2.7%	175.5	1.9%	169.0	1.7%	156.0	1.6%	164.7	1.8%	56.5	0.8%	108.0	1.5%	391.0	3.7%
Facility Check/Reads	559.5	6.1%	504.5	5.8%	597.0	6.6%	567.5	5.8%	512.5	5.4%	541.5	5.9%	532.5	7.1%	513.0	7.3%	558.8	5.2%
Compliance Sampling	149.0	1.6%	117.5	1.3%	118.0	1.3%	116.0	1.2%	103.5	1.1%	137.5	1.5%	133.0	1.8%	102.0	1.4%	162.0	1.5%
Locating	325.5	3.5%	498.5	5.7%	863.8	9.6%	1,010.5	10.4%	874.8	9.2%	711.0	7.8%	650.3	8.7%	548.4	7.8%	755.0	7.1%
Facility Maintenance	562.8	6.1%	443.5	5.1%	339.5	3.8%	540.0	5.6%	230.5	2.4%	246.0	2.7%	354.5	4.7%	420.1	5.9%	588.0	5.5%
Grounds Maintenance	459.3	5.0%	393.0	4.5%	429.0	4.7%	427.2	4.4%	179.5	1.9%	269.0	2.9%	256.5	3.4%	321.0	4.5%	514.5	4.8%
Inventory	27.5	0.3%	60.5	0.7%	41.0	0.5%	46.5	0.5%	41.5	0.4%	20.0	0.2%	47.5	0.6%	82.5	1.2%	140.0	1.3%
Meetings/Training	191.0	2.1%	213.0	2.4%	283.5	3.1%	347.0	3.6%	492.5	5.2%	284.3	3.1%	143.0	1.9%	273.5	3.9%	511.8	4.8%
Hydrant Program	1,245.5	13.5%	558.0	6.4%	222.5	2.5%	274.5	2.8%	558.0	5.9%	43.5	0.5%	67.5	0.9%	83.5	1.2%	340.0	3.2%
Valve Program	126.5	1.4%	161.5	1.9%	125.0	1.4%	63.0	0.6%	28.5	0.3%	427.5	4.7%	387.0	5.2%	4.5	0.1%	299.5	2.8%
Flushing Program	160.5	1.7%	119.5	1.4%	99.0	1.1%	56.5	0.6%	38.0	0.4%	46.0	0.5%	5.0	0.1%	22.5	0.3%	224.0	2.1%
Service Leak Repair	218.0	2.4%	217.3	2.5%	206.5	2.3%	178.5	1.8%	210.5	2.2%	314.0	3.4%	188.5	2.5%	386.5	5.5%	1,021.0	9.6%
Main Leak Repair	192.5	2.1%	80.0	0.9%	117.0	1.3%	146.8	1.5%	44.5	0.5%	100.0	1.1%	44.0	0.6%	60.5	0.9%	120.5	1.1%
Meter Repair/Replace	332.0	3.6%	418.5	4.8%	381.0	4.2%	325.0	3.3%	431.0	4.5%	1,825.3	19.9%	1,124.8	15.0%	2,128.5	30.1%	816.0	7.7%
Complaint Response	57.5	0.6%	81.0	0.9%	230.0	2.5%	349.0	3.6%	206.5	2.2%	173.8	1.9%	173.0	2.3%	291.0	4.1%	564.0	5.3%
New Service	110.0	1.2%	192.5	2.2%	364.0	4.0%	110.5	1.1%	185.0	2.0%	282.0	3.1%	241.0	3.2%	332.5	4.7%	658.0	6.2%
Construction Inspection	77.0	0.8%	45.0	0.5%	261.3	2.9%	153.0	1.6%	134.8	1.4%	85.0	0.9%	77.0	1.0%	38.0	0.5%	178.5	1.7%
Cross Connection Control	31.0	0.3%	31.5	0.4%	38.0	0.4%	53.5	0.6%	22.5	0.2%	40.0	0.4%	26.5	0.4%	46.5	0.7%	34.0	0.3%
Admin/Reporting/Records	583.5	6.3%	990.0	11.4%	260.5	2.9%	230.0	2.4%	177.0	1.9%	149.5	1.6%	221.5	3.0%	152.0	2.1%	273.5	2.6%
Assist Other Division	506.0	5.5%	485.0	5.6%	286.0	3.2%	196.5	2.0%	267.2	2.8%	67.5	0.7%	160.5	2.1%	12.0	0.2%	559.5	5.3%
Capital Impr. Program	169.3	1.8%	3.5	0.0%	503.5	5.6%	1,063.0	11.0%	1,654.0	17.4%	1,024.5	11.2%	1,047.5	14.0%	539.5	7.6%	1,809.5	17.0%
Total	**9,246**	**100%**	**8,722**	**100%**	**9,039**	**100%**	**9,702**	**100%**	**9,484**	**100%**	**9,171**	**100%**	**7,478**	**100%**	**7,073**	**100%**	**10,657**	**100%**

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SYSTEM FACILITIES AND OPERATIONS

The locations of the major water system components are shown on Figure 1-2, the system facilities map. A description of the normal operation of each facility is provided in the following sections. A more complete system description is given in Chapter 1.

SOURCES AND TREATMENT FACILITIES

Boise Spring

Boise Spring is located approximately one half mile east from the City limits. The Boise Spring site is accessed by an unimproved road with a gated and locked entry from SR 410. The site is situated near the base of a steep slope on City owned property in an undeveloped area that has been partially logged. The property is fully enclosed and secured with a chain link fence topped with barbed wire.

Water from the spring is collected by horizontal collection pipes that extend from a covered collection vault into the aquifer formation that feeds the spring. The manhole cover on the collection vault was gasketed in the early 1990s and was buried under less than 12 inches of soil to deter unauthorized access into the vault.

Water from the spring is conveyed by gravity in a dedicated 10-inch water main from the spring to the City's reservoirs.

The chlorination system for the spring is located northwest of the Boise Spring site along SR 410, on a site that is shared with the Weyerhaeuser Booster Pump Station. A concrete building, located on the west side of the Weyerhaeuser Booster Pump Station, houses the chlorine gas disinfection system. Backup power supply to the facility is provided by a propane-powered 20 kW stationary engine generator set located within a fenced enclosure behind the chlorination building.

FIGURE 7-1

Chlorination System

Watercress Spring

Improvements to the spring, which included the addition of a second larger pump, were constructed in 1968. Gas chlorination was added in 1972.

Watercress Spring is located northeast of the City. The Spring site is accessed from a driveway with an entry that is gated and locked at its entrance off of SE 440th Street (Battersby Avenue East). The site itself is fully enclosed and secured with a chain link fence topped with barbed wire.

Watercress Spring has two facilities. The original facility is a large open bottom concrete vault covered with a wood frame roof with metal siding and roofing. Well 1 is housed in a CMU block building above the east side of the vault. The 1968 well pump is a 150-hp vertical turbine and draws water from the vault with a gravel bottom that overflows into

an adjacent drainage channel when the pump is not operating. Two small pumps, located in the building with Well 1, pump water from the vault to the channel downstream of the vault overflow and to another spring that emanates on the site about 300 feet north of the well building.

The Well 2 facility was constructed in 2008. The facility includes a 200-hp vertical turbine pump contained within a CMU block building with a metal roof. A gas chlorination system disinfects water produced from both wells. The chlorination equipment is contained in a separate room from the pump. A 350-kW stationary generator provides standby power to both buildings. A 4-inch surge anticipator valve is housed in a small wooden enclosure on the east side of the Well 1 pump station and protects the pumps from pressure surges emanating from the transmission main to the City reservoirs.

FIGURE 7-2

Watercress Springs Building

PC Johnson Wellfield

The PC Johnson Wellfield is located northeast of the City near the intersection of SE 424th Street and 284th Avenue SE. The well site is fully enclosed and secured with a chain link fence. The facilities for two wells, Wells 2 and 3, are housed in separate CMU block buildings. A gas chlorination system is housed in a separate room in the Well 3 building. This chlorination system disinfects water produced from both wells.

PC Johnson Well 2 was drilled in 1986 and has been rehabilitated multiple times. The 16-inch diameter, 227-foot deep well has a current supply rate of approximately 900 gpm, which is delivered by a submersible pump with a 100-horsepower motor. Water production from the well is metered through a 10-inch meter.

PC Johnson Well 3 was drilled in 1997 to replace the failed PC Johnson Well 1. The 16-inch diameter, 229-foot deep well has a current supply rate of approximately 900 gpm, which is delivered by a submersible pump with a 100-horsepower motor. Water production from the well is metered through an 8-inch flow meter. The Well 3 pump building is situated on the south side of the Well 2 building. The Well 3 wellhead is located outside and south of its pump building. Well 3 can be ran at the same time as Well 2 for a combined output of 1,500 gpm.

A portable 200 kW emergency diesel generator can provide backup power supply necessary to operate one well at a time.

FIGURE 7-3

PC Johnson Well 3 Building

Golf Course Well

The Golf Course Well is located in the south parking lot of the Enumclaw Expo Center. The facility shares the building with the 983 Zone Booster Pump Station. The facility is a CMU block building with a metal roof that includes a pump room with a booster pump station and a 125-hp vertical turbine well pump and a separate room for a chlorine gas disinfection system. A stationary 200-kW generator, located south of the building,

provides backup power supply to the booster pump station and Golf Course Well. The site is fully enclosed and secured with a chain link fence.

City of Tacoma Intertie

The Tacoma intertie is located on the west side of SR 410 north of Warner Avenue. The Tacoma intertie consists of a below-grade concrete vault which houses the mechanical and electrical equipment. The facility has a capacity of approximately 1,000 gpm, which is delivered by two end-suction centrifugal pumps with 100-horsepower motors. The intertie vault has a power receptacle to enable connection of a portable engine generator set for backup power supply. In 2014 completion of the City of Tacoma Green River Filtration Facility allowed Tacoma's disinfection compliance point on its transmission main to be moved upstream of the intertie, allowing the intertie to operate without having to calculate contact time as was required prior to 2014. Supply through the intertie is recorded by an 8-inch magnetic meter.

FIGURE 7-4

Tacoma Intertie Vault

TREATMENT

Chlorination in all the City's water sources is achieved through chlorine gas systems described above in the description of each source. In addition to chlorination, the two spring sources are treated for corrosion control at the Corrosion Control Facility (CCF) prior to entering the City's reservoirs.

The CCF adjusts the pH of the incoming water from approximately 6.8 to 7.8 by injecting a sodium hydroxide solution. A 13 percent sodium hydroxide (caustic soda) solution is injected by diaphragm pumps from two 300-gallon day tanks. The sodium hydroxide solution is delivered as a 25 percent concentrated sodium hydroxide solution and stored in two 3,000-gallon storage tanks within the facility, which is then diluted. A small booster pump station is also housed in the facility to increase service pressures and supply treated water to connections that were once served off of the dedicated transmission main from the Boise Spring. A 50-kW generator, located northeast of the CCF, provides backup power supply. The site is fully enclosed and secured with a chain link fence, topped with barbed wire.

FIGURE 7-5

Corrosion Control Facility

A small diaphragm pump is also installed at the Weyerhaeuser Booster Pump Station to inject a 13 percent concentrated solution of sodium hydroxide into water supplied by the Boise Spring before it leaves the pump station. The injection process is controlled by a signal from a 1-1/2-inch flow meter located on the service line to the former Weyerhaeuser Mill site. A 50-gallon on-site tank is used to store the sodium hydroxide solution, which is transported by City staff from the day tanks at the Corrosion Control Facility as needed.

The water obtained from the City of Tacoma intertie is already treated and requires no further treatment for City of Enumclaw use. The City of Tacoma filters, disinfects, and fluoridates its water and they also adjust the pH of the water for corrosion control.

RESERVOIRS

As described in Chapter 1, the City operates four reservoirs, with capacities of 3.0 MG (3.0 MG City reservoir), 1.5 MG (Crews), 0.18 MG (Stanridge Hill), and 0.06 MG (Fairway Hills). Water is normally pumped from the Boise and Watercress spring into the 3.0 MG City Reservoir (888.5 feet), which serves the 888 zone. The Crews Reservoir (888 feet) also serves the 888 Zone. Water is pumped through the Stanridge Hills BPS into the Stanridge Hills Reservoir (988 feet), which serves the 1040 and 899 Zones. The Stanridge Hill BPS is not required to supply fire flow demand to the 899/1040 Zones. The Fairway Hills Reservoir (983 feet) is supplied by the 983 Zone BPS and provides water to the 983 and 1175 Zones.

During periods of higher demand, flows from Watercress can be prevented from filling the 3.0 MG reservoir through the use of automated valves at the City reservoir site that force Watercress water back into the distribution system at a higher head. This allows Watercress to be used to fill the Crews Reservoir without using the PC Johnson Wellfield.

1.0 MG City Reservoir

The 1.0 MG Reservoir is not currently in use due to security concerns with the reservoir being at-grade. A 12-inch water main with a 12-inch control valve serves as an inlet and outlet for the reservoir and enters at the base of the facility near its northwesterly corner. The reservoir site is fully enclosed and secured with a chain link fence, topped with barbed wire. As mentioned, in Chapter 1 the City does not plan to return the 1.0 MG City Reservoir to operation and plans to eventually decommission the reservoir.

3.0 MG City Reservoir

The 3.0 MG City Reservoir is located on the same site as the 1.0 MG City Reservoir and the Corrosion Control Facility (CCF). The 3.0 MG City Reservoir provides water storage directly to the 888 Zone. The 25-foot tall, 114-foot diameter, cast-in-place, prestressed concrete reservoir was constructed in 2017 and provides approximately 132,000 gallons of storage per foot height. The structure has a base elevation of 864.5 feet and an overflow elevation of 888.5 feet.

The reservoir has a 12-inch water main on the southeast side of the reservoir to accept flow from the Boise Spring and Watercress Spring transmission mains, after it passes through either of the CCF injection vaults. An 18-inch water main inlet/outlet connects to the 1.0 MG City Reservoir in the northwest and also conveys flows from the reservoir out to the distribution system.

FIGURE 7-6

3 MG Reservoir

Crews Reservoir

The Crews Reservoir is located north of the intersection of SE 424th Street and 274th Avenue SE and provides water storage directly to the 888 Zone. The 114-foot diameter, 22-foot tall cast-in-place, prestressed concrete reservoir was constructed in 1989, has a total capacity of 1.5 MG and provides approximately 76,350 gallons of storage per foot height.

FIGURE 7-7

Crews Reservoir

A CMU block building located adjacent to the Crews Reservoir houses a 12-inch hydraulic altitude valve and a booster pump for tank cleaning. A portion of the western side of the reservoir site is leased for a cellular telephone tower and control building. The reservoir site is fully enclosed and secured with chain link fence topped with barbed wire.

A 10-inch pipe runs along SE 424th Street from the PC Johnson Wellfield on the east and then north up the access road to the reservoir. A 12-inch pipe runs along SE 424th Street from the west and then north as a 16-inch main up the access road to the reservoir. These pipes interconnect just south of the control building at the reservoir site with several valves that allow different inflow and outlet configurations. The 10-inch line branches into a 10-inch elevated inlet pipe that discharges water into the reservoir at an elevation of 886 feet and a second 12-inch pipe that discharges water into the reservoir at an elevation of 872 feet. The 16-inch line reduces to 12-inches and runs through the control building and then into the reservoir at an elevation of 872 feet.

When the PC Johnson Wellfield is being used, a valve interconnecting the 16-inch and 10-inch pipes south of the reservoir can be closed and flow from the PC Johnson Wellfield is forced to enter the reservoir through the 10-inch and 12-inch inlet pipes and exit the reservoir through the outlet that runs through the control building. However, the valves are typically configured so that flow goes in and out of the reservoir through the line with the altitude valve to utilize the protection this valve provides against reservoir overflow.

In the peak demand season, the reservoir is maintained at higher levels by pumping water from the Watercress transmission main. Control valves downstream of the injection vault can be actuated to direct Watercress transmission main flows directly into the system at higher pressure and this maintains the Crews Reservoir at its maximum level without having to operate the PC Johnson Wellfield.

Stanridge Hill Reservoir

The Stanridge Hill Reservoir is located approximately one-quarter mile north of the intersection of 278th Way SE and SE 400th Place. The reservoir is supplied by the New Horizons Booster Pump Station and provides water to the 1040 and 899 Zones through the Stanridge Hill Booster Pump Station. The 30-foot diameter, 36-foot tall, cast-in-place concrete Mt. Baker Silo reservoir was constructed in 1993, has a total capacity of 0.18 MG, and provides approximately 5,290 gallons of storage per foot height. The reservoir's base elevation is at 954 feet and the overflow elevation is at 988 feet.

The Stanridge Hill reservoir is equipped with an exterior level gauge and has a 10-inch water main that serves as its outlet pipe. The reservoir has a 6-inch transmission line from the New Horizons Booster Pump Station that increases to an 8-inch elevated inlet pipe that discharges water into the reservoir at an elevation of approximately 976.5 feet. The

reservoir site is fully enclosed and secured with a chain link fence, topped with barbed wire.

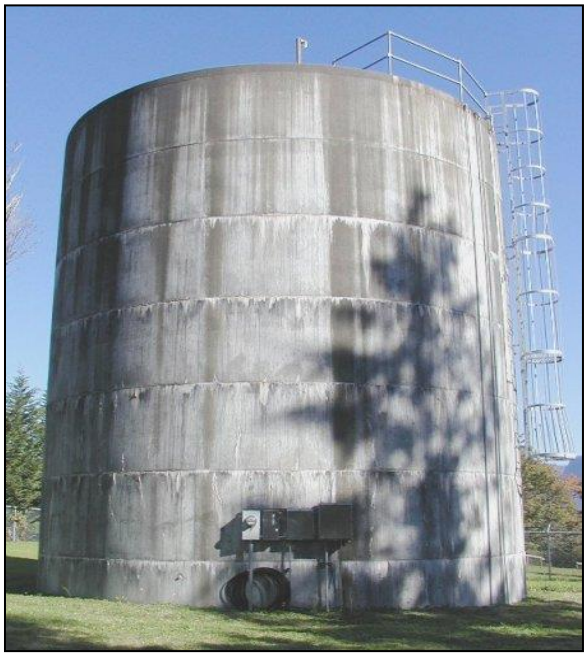


FIGURE 7-8

Stanridge Hill Reservoir

Fairway Hills Reservoir

The Fairway Hills Reservoir is located on a site that is shared with the Fairway Hills Booster Pump Station at the intersection of 290th Avenue SE and SE 464th Street. The reservoir is supplied by the 983 Zone Booster Pump Station and provides water storage directly to the 983 Zone and indirectly to the 1175 Zone. The partially buried, 26-foot diameter, 16-foot tall, cast-in-place, concrete Mt. Baker Silo reservoir was constructed in 1991, has a total capacity of 0.06 MG, and provides approximately 4,000 gallons of storage per foot height. The reservoir's base elevation is at 968 feet and the overflow elevation is at 983 feet.

The Fairway Hills reservoir is equipped with an exterior level gauge and has an 8-inch water main that serves as a common inlet/outlet pipe. A control valve on this pipe near the reservoir can be actuated to direct 983 Zone Booster Pump Station flows back out into the system at an elevated head pressure rather than flowing into the reservoir, allowing extended runs to exercise the 100-horsepower pump and to flush the lengthy dead-end lines created when the 983 Zone was expanded in 2017. The reservoir site is fully enclosed and secured with a chain link fence topped with barbed wire.

FIGURE 7-9

Fairway Hills Reservoir

BOOSTER PUMP STATIONS

Weyerhaeuser Booster Pump Station

The Weyerhaeuser Booster Pump Station (BPS) is located on a site that is shared with the Boise Spring chlorination building. The Weyerhaeuser BPS, which was constructed in 1993, is used to pump water from the discharge side of the Boise Spring chlorination system to the former Weyerhaeuser Mill site in the 1245 Zone. A concrete building houses the booster pump station's mechanical, electrical and corrosion control equipment. The booster pump station does not have standby power or a power receptacle to enable connection of a portable generator. Lisa, Inc. is the owner of this BPS, and an agreement recognizing this ownership is included in Appendix H.

FIGURE 7-10

Weyerhaeuser Booster Pump Station

New Horizon Booster Pump Station

The New Horizons BPS, which was constructed in 1962 and upgraded in 1996, is located near the intersection of 278th Way SE and SE 400th Place within an easement. A CMU building houses the mechanical and electrical equipment for the station. The station pumps water from the 888 Zone to the Stanridge Hill Reservoirs using two, end-suction, centrifugal pumps with three-horsepower motors and a capacity of 45 gpm each. The building is equipped with a power receptacle to enable connection of a portable engine generator.

FIGURE 7-11

New Horizons Booster Pump Station

Stanridge Hill Booster Pump Station

The Stanridge Hill BPS was constructed in 2021 and is located on the site of the Stanridge Hill Reservoir. The Stanridge Hill BPS pumps water from the Standridge Hill reservoir to the 1040 Zone, a closed pressure zone.

A CMU building houses the mechanical and electrical equipment for the station. The facility has three centrifugal pumps with 3-horsepower motors powered by variable frequency drives and combined capacity of 100 gpm. The lead pump runs continuously with additional pumps started as needed to meet demand. The BPS is designed to provide regular water service including the peak hour demand, but not fire flow. A 10-inch check valve installed in a vault next to the booster pump station supplies water to the 1040 Zone from the Stanridge Hill Reservoir in the event that pressures are excessively suppressed in the 1040 Zone (i.e., fire flow situation). A propane-powered 20 kW stationary generator located south of the building provides backup power supply to the station. The site is enclosed and secured with a chain link fence topped with barbed wire.

FIGURE 7-12

Stanridge Hill Booster Pump Station

Corrosion Control Facility Booster Pump Station

The Corrosion Control Facility BPS is housed within the Corrosion Control Facility located on SR 410 north of the Enumclaw Golf Course. The BPS pumps water from the 888 Zone into the closed 1013 Zone. The facility has two, three-horsepower pumps with a combined capacity of 80 gpm. An 80-gallon bladder tank controls the operation of the facility and prevents excessive pump cycling.

FIGURE 7-13

Corrosion Control Facility Booster Pump Station

The Corrosion Control Facility BPS was constructed in 2002 to increase service pressures and supply treated water to customers who were transferred off of the dedicated Boise Spring transmission main. A stationary 50-kW generator, located northeast of the building, provides backup power supply to the booster pump station. The site is fully enclosed and secured with a chain link fence topped with barbed wire.

A new BPS in its own separate building at the southwest side of the 3.0 MG reservoir will replace the existing BPS in 2023. The new BPS includes two, ten horsepower pumps designed to provide 193 gpm each and two, sixty horsepower pumps designed to provide 1710 gpm each. A 500-gallon pressure tank will prevent excessive pump cycling.

983 Zone Booster Pump Station

The 983 BPS is located in the south parking lot of the Enumclaw Expo Center in the shared facility with the Golf Course Well, and was constructed in 2017. The 983 Zone BPS is used to pump water from the City's 888 Zone into the 983 Zone to fill the Fairway Hills Reservoir. A stationary 200-kW generator, located south of the building, provides backup power supply to the booster pump station and Golf Course Well. The site is fully enclosed and secured with a chain link fence.

FIGURE 7-14

983 Zone Booster Pump Station

Fairway Hills Booster Pump Station

A new Fairway Hills BPS was reconstructed in 2017 and is located on a site that is shared with the Fairway Hills Reservoir, at the intersection of 290th Avenue SE and SE 464th Street. A concrete building houses the booster pump station's mechanical and electrical equipment. The BPS has a total capacity of 60 gpm with three, 3-horsepower pumps. A

natural gas 20-kW stationary generator located northwest of the building provides backup power supply to the station. Except for the generator and the front of the pump station, the site is enclosed and secured with a chain link fence topped with barbed wire.

FIGURE 7-15

Fairway Hills Booster Pump Station

Highview Booster Pump Station

The Highview BPS is located within an easement on the east side of 254th Avenue SE near SE 396th Street. The Highview BPS was constructed in 2010 and supplies water from the 888 Zone to the closed 995 Zone. A CMU block building houses the mechanical and electrical equipment for the station, which has a capacity of 120 gpm with three multi-stage centrifugal pumps with three-horsepower motors powered by variable frequency drives. The lead pump runs continuously with additional pumps started as needed to meet demand. A stationary 20-kW propane generator provides backup power to the facility.

FIGURE 7-16

Highview Booster Pump Station

DISTRIBUTION SYSTEM

The City has attempted to loop water mains wherever possible to improve water circulation (i.e., water quality and fire flow) and minimize impacts to the system in the event that a portion of the distribution system must be taken out of service for maintenance or repairs. The central portion of the system within the 888 Zone is well looped with many redundancies in the distribution network. Toward the western end of the system, the distribution piping becomes more sparse with larger distances between intersecting mains.

The City exercises valves within the system regularly to ensure that all valves are in good condition. The City also regularly flushes mains to improve water quality within the system. Flushing activities in the west end of the system are more difficult due to the long distances between valves and long lengths of main in that area.

PREVENTIVE MAINTENANCE PROGRAM

The most cost-effective method for maintaining a water system is to provide a planned preventive maintenance (PM) program. A planned PM program can provide the optimum level of maintenance activities for the least total maintenance cost. Maintenance schedules that meet or exceed manufacturer's recommendations have been established for all critical components in the water system. The routine maintenance procedures for each system component are described in the following sections.

MAJOR SYSTEM FACILITIES

Improperly maintained reservoirs can cause contamination in public water systems. This can happen if contaminants enter the reservoir through cracks or openings at the vent, overflow, or drain screens. Deteriorating hatch covers and vandalism can also compromise reservoir water quality. Poorly designed and maintained reservoirs can hamper the emergency operation of a water system. If reservoir drains are not functioning properly, it may be impossible to purge a contaminant from the system. Written documentation of reservoir maintenance must be completed with each inspection and repair, and a copy of the report retained on file.

Inspection of reservoir, source, and booster station sites, meters, pressure gauges, site and facility condition, are monitored daily. Inspection of facilities for proper operation and security is performed weekly. The City checks interior condition, vents, hatches, and other appurtenances annually and cleans the reservoirs if required. Booster station and source enclosures and buildings are inspected daily and kept clean. Chlorine residuals and pH measurements are recorded at the sources daily. To maintain sanitary conditions, repairs to facilities are performed as needed and a sanitary survey is conducted every 5 years.

An important aspect of distribution system valve maintenance is to ensure distribution valves are completely open. A partially closed valve can seriously impair peak day operation and fire flow supply. The City is working toward a program of exercising valves and cleaning out valve cans once per year.

The following schedule in Table 7-3 is used as a guide for maintenance and inspection frequency for the water system

TABLE 7-3

Water System Maintenance Schedule

Facility	Scheduled maintenance	Description
Reservoirs	Daily	Visual and audio inspections. Check site, meters, pressure gauges, reservoir levels, site and tank conditions, and chlorine residual.
	Weekly	Check security and inspect facilities for proper condition.
	Annually	Check interior condition, vents, hatches, etc. Clean if required.
	As Needed	Perform repairs to maintain sanitary condition.
Water Mains	Annual or As Needed	Leak Survey
	Annual or As Needed	Flush

TABLE 7-3 – (continued)

Water System Maintenance Schedule

Facility	Scheduled maintenance	Description
Wells and Springs	Daily	Visual and audio inspections, log and record volume delivered, hours run and current supply rate; check well level; check chlorine booster pumps, leak detector and scales; check for excessive heat and vibration of pump motors.
	Weekly	Check security and clean well house
	Annually	Check all valves and screens; check control valve settings
	As Needed	Maintain electrical and mechanical equipment; paint structures and piping; calibration of equipment.
Corrosion Control Facility	Daily	Visual and audio inspections. Check pumps, tank levels, scales, and meters, record pH and water usage; insert pump strokes; check for leaks
	Weekly	Clean building interior
	As Needed	Maintain electrical and mechanical equipment; paint structures and piping; calibration of equipment.
Booster Pump Station and Intertie	Daily	Log and record volume delivered, hours run and current supply rate; visual and audio inspections. Check meters, and pressure gauges; check packing and oil level; check for excessive heat and vibration of pump motors.
	Weekly	Check security and clean building interior
	Annually	Change oil. Take inventory of parts, pumps, and motors.
	As Needed	Check flow meter; maintain electrical and mechanical equipment; paint structures and piping.
Engine Generator Sets	As Needed	Replace fluids and filters in accordance with manufacturer's recommendations (or more frequently depending on amount of use). Perform tune-up; replace parts as necessary.
Pressure Reducing Valves	Annually	Flush and check all valves and screens; check pressure settings; refurbish every five years, or as necessary

TABLE 7-3 – (continued)

Water System Maintenance Schedule

Facility	Scheduled maintenance	Description
Isolation Valves	Annually	Operator full open/closed; uncover where buried; clean out valve boxes and repair as necessary; repair and/or install valve marker posts as necessary.
Hydrants	Annually	Check for leakage and visual damage; operate and flush; check drain rate; lubricate as necessary; measure and record pressure; paint as necessary; check nozzle and cap threads, clean and lubricate per manufacturer's recommendations; replace lost and damaged gaskets; check and operate auxiliary valve in accordance with the valve maintenance schedule; leave in open position; inspect drain system to ensure proper drainage and protection from freezing weather.
Air and Vacuum Release Valve Assemblies	Annually	Flush and inspect; repair as needed.
Blowoff Assemblies	Annually	Flush and inspect; repair as needed.
Backflow Prevention Devices	Annually	Test, inspect and record status; repair as needed.
Telemetry and Control System	Daily	Check master and RTUs for proper operation; repair as necessary.
	Bimonthly	Backup program and data
	Monthly	Visually inspect cabinets and panels for damage, dust and debris.
	Semi-Annually	Inspect inside cabinets and panels for damage, dust and debris; vacuum clean all modules; test alarm indicator units; clean and flush all pressure sensitive devices; visually inspect all meters to coordinate remote stations.

METERS

Accurate water metering is essential to the financial and conservation components of the water system infrastructure. Substantial revenue may be lost through inaccurate metering of residential, commercial, and industrial accounts. Without accurate master or service meter readings, the City cannot properly determine distribution system leakage volume. Service meters, including all residential and commercial customer meters, should be calibrated and/or replaced according to the schedule listed in Table 7-4.

TABLE 7-4

Preventive Maintenance Schedule for Meters

Meter Size	Inspection, Repair, and Replacement Frequency
3/4" and 1"	Every 15 Years
1.5" to 3"	Every 10 to 15 Years
Greater than 3"	Every 3 to 5 Years

TOOLS AND EQUIPMENT

The following schedule in Table 7-5 is includes a preventive maintenance schedule for tools and equipment.

TABLE 7-5

Tools and Equipment Maintenance Schedule

Tools and Equipment	Scheduled maintenance	Description
Rolling Stock	As Needed	Check all fluid levels and brakes
	As Needed	Replace fluids and filters in accordance with manufacturer's recommendations (or more frequently depending on amount of use); preventive maintenance per manufacturer's recommendation.
Tools	As Needed	Clean after each use; lubricate and maintain as necessary; inspect for damage and wear before each use; perform preventive maintenance per manufacturer's recommendation.

INVENTORY OF MATERIALS

The City has established and maintains an inventory of parts and supplies on-hand including the appurtenances needed for daily routine operation and maintenance and short-term emergency repairs. The equipment is stored at the City's maintenance shop. If additional equipment is required for specific projects, the City will rent or contract with a local contractor for the services needed. A list of major equipment available and chemicals used in the daily operation of the water system are shown in Table 7-6.

TABLE 7-6

Equipment List

Water Department Equipment	Equipment Shared W/Other Departments
Cl_2 H_2O Neutralizer	40 kW Generator W/Trailer
Tapping Machines	Asphalt Roller and Crack Sealer
	Hydroexcavator
Portable Trash pumps	Bucket Truck
Portable Generators	Portable Air Compressor
	Pressure Washer
John Deere 345 Tractor	2018 Ford PU
Pipe Locators	2018 Jeep Wrangler
Compactor Tamper	2012 Honda Civic
Mower trailer	2012 Ford Escape
	200 kw Generator W/Trailer
	Miscellaneous small tools, etc.
Cut off saws (3)	**Bulk Chemical Inventory**
Valve Actuator	Chlorine (150 lb cylinders)
2020 Ford PU	Sodium Hydroxide (25%)
2018 Cat Mini-Excavator	**Communication Equipment**
2018 Freightliner Dump Truck	
2021 420XE Backhoe/Loader	Two-way Radios in all Vehicles
2009 Freightliner MWV/IC Step Van	Cell Phones
2012 Ford F250 w/Lift Gate	High Accuracy GPS
2012 For F250 w/Service Body	
Miscellaneous small tools, etc.	

OPERATION AND MAINTENANCE

Routine operations involve the analysis, formulation and implementation of procedures to ensure that the facilities are functioning efficiently and meeting pressure and water quality requirements and other demands of the system. The City's maintenance

procedures are good, with repairs being made promptly, assuring customers receive high quality water service with limited interruptions.

WATER QUALITY

WATER QUALITY PROCEDURES

The City's water quality procedures (sampling frequency), and standard operations for water quality monitoring are discussed in Chapter 3. The City's Coliform Monitoring Plan is located in Appendix K.

WATER QUALITY MONITORING SCHEDULE

The City's water quality monitoring schedule is outlined in Chapter 3.

EMERGENCY RESPONSE PROGRAM

Water utilities have the responsibility to provide adequate and reliable quantity and quality of water at all times. To meet this requirement, utilities must reduce or eliminate the effects of natural disasters, accidents, and intentional acts. Although it is not possible to anticipate all potential disasters affecting the City's system, formulating procedures to manage and remedy common emergencies is appropriate.

WATER SYSTEM PERSONNEL EMERGENCY CONTACT LIST

The water system emergency phone list is summarized in Table 3 of the Emergency Response Plan in Appendix L.

EMERGENCY RESPONSE PLAN

An emergency response plan has been prepared by the City and is included in Appendix L. The emergency response plan contains a contingency operational plan for responding to emergency events, as well as a list of water personnel responsible for making decisions in emergency situations.

POWER FAILURE

Various types of weather can cause a loss of power, including wind, lightning, freezing rain, or freezing snowstorm. Additionally, power can be lost through traffic accidents. The City's sources and booster stations have backup generators except for the Weyerhaeuser BPS which does not have standby power or a power receptacle to enable connection of a portable generator, and the New Horizon BPS which is equipped with a power receptacle to enable connection of a portable engine generator. The combined system storage of 4.74 MG will provide average day demand to the City for 2.5 days in 2023, 2.3 days in 2032, and 2.2 days in 2043 under the anticipated demands forecasted in

Chapter 2. The City personnel will check reservoir levels at the tanks and will also check the well and spring sites to ensure engine generator sets are functioning properly. Puget Sound Energy will be contacted at 1-888-225-5773 to determine the length of the power outage. The City will contact DOH if emergency supply from the Tacoma intertie is required, and customers will be notified of the emergency. Water conservation will be requested through social media, radio, television, newspaper, and/or police loudspeaker.

WATER MAIN BREAK

The City has adopted the State protocol for water main break response. The Emergency Response Plan in Appendix L includes further detail regarding main break procedures.

SEVERE EARTHQUAKE

A severe earthquake can result in transmission line breaks, distribution system breaks and structural damage to the pump station, treatment facility, wells, reservoirs and vaults which house critical valves and meters.

Table 7-7 provides procedures to follow in the event of a severe earthquake.

TABLE 7-7

Severe Earthquake Response

System Component	Proposed Actions
Reservoirs	• Observe structures for visual signs of structural damage • If structural damage is apparent, drain reservoir and inspect the interior of the tank • Check storm drainage system for significant flows, indicating possible reservoir leakage. • If leakage is suspected, isolate one reservoir at a time and monitor level for at least 24 hours.
Distribution Lines	• Close valves to isolate breaks • Check reservoir level • Notify customers of emergency and request water conservation
Transmission Lines	• Shut down source pumps • Isolate break and check the base system section maps for valve locations • Repair break • Disinfect isolated section.

TABLE 7-7 – (continued)

Severe Earthquake Response

System Component	Proposed Actions
Booster Station, Wells, Treatment Facilities and Meters	• Inspect for joint leakage and leaking chemical storage tanks • Inspect wells for operation • Inspect well seals to prevent contamination from entering the wellhead • Inspect for alignment of pump column and casing • Inspect screen integrity.
Supply Facilities	• Inspect for leakage or other structural damage.

MAJOR FIRE

In the event of a major fire within the service area, low-pressure conditions could result in the extremities of the distribution system due to fire suppression demand. Proper function of the booster pumps and PRV should offset this effect. In the event of fire or drastically low static pressures, valves should be checked, followed by the system setpoints of pumps, reservoirs and PRV stations.

COLD OR SEVERE WEATHER CONDITIONS

Extended cold weather conditions could cause freezing problems at shallow service connections, valve vaults without an insulating earth cover, reservoirs, supply and treatment facilities. Frozen lines can be wrapped with heat tape or space heaters can be used.

Heavy snowfall may bring motor vehicle traffic to a standstill. Employees may not be able to reach the problem area. In order to minimize the effect of a snowstorm on the water system, streets should be plowed to maintain access to all facilities. If extremely cold, customers should be reminded to leave faucets dripping to help keep pipes from freezing.

WATER SHORTAGE EMERGENCY

The City is well equipped to accommodate short-term system failures and abnormalities. The City would lose the operation of one of its sources without adversely impacting its ability to meet normal demands of its customers. The City currently has four sources that could be used to provide customers with water in an emergency. Additionally, the City also has an intertie with the City of Tacoma that may be utilized in an emergency.

NOTIFICATION PROCEDURES

A procedure for quickly notifying all City staff, customers, other utilities, and, if necessary, the local health department and DOH of a water system related emergency is a necessary component of an Emergency Response Program.

PUBLIC NOTIFICATIONS

In response to certain water system emergencies, it may be necessary to notify the public of drinking water quality concerns. WAC 246-290-320 includes follow-up actions that must be taken in the event of water quality emergencies. The public notification (PN) requirements of WAC 246-290-320 refer to the environmental Protection Agency's (EPA's) PN Rule, which is codified in the Code of Federal Regulations (CFR) beginning at section 40 CFR 141.201 through 208. PNs must provide specific health effects language provided by EPA.

The EPA PN Rule has three categories of notification described below:

- **Tier 1:** Includes situations or violations that pose an acute health risk, such as *E. coli* or fecal coliform positive sample or nitrate MCL violation. Waterborne pathogens and any other water system situation determined by DOH to pose an acute health risk are also included in Tier 1. Tier 1 requires DOH consultation and public notification as soon as practical, but within 24 hours of learning of the violation.

- **Tier 2:** Includes situations or violations that do not pose an immediate health risk but still require prompt public notification. Tier 2 includes most MCL violations, except acute bacteriological and nitrate MCL violations, and requires DOH consultation within 48 hours and public notification as soon as practical but within 30 days of learning of the violation.

- **Tier 3**: Includes situations or violations that have the lowest health risk. Tier 3 includes most monitoring violations and the detection of unregulated contaminants. Tier 3 requires DOH consultation within 48 hours and public notification as soon as practical but within 1 year of learning of the violation. These notifications can be combined with the water system's annual consumer confidence report.

In the event that public notification is required during an emergency, the City maintains a list of both television and radio resources in Appendix L, that can be provided with public notification news releases during an emergency situation.

BACTERIOLOGICAL PRESENCE DETECTION

Public water systems may occasionally experience detection of bacteriological contaminants. Such detections are typically the result of sample tap contamination or improper bacteriological sample collection procedures. However, bacterial contamination of water systems can result from such events as main breaks or pollution from an isolated source. The persistent detection of coliform bacteria in the supply, particularly *E.coli* or fecal coliform, may require the issuance of a public boil water notice to ensure the health and safety of customers is not compromised. Emergencies such as floods, earthquakes, and other disasters can result in damage to the system infrastructure, which may also warrant a boil water notice as a precautionary measure.

The Revised Total Coliform Rule only requires public notification within 24 hours when two related samples (a routine and one or more of its corresponding repeat samples) test positive for total coliform bacteria and there is *E.coli* bacteria in one or more of the samples. All customers should be notified through a boil water notice. A sample boil water notification is provided in Appendix L. In the event a bacteriological presence is detected, the City's procedure is outlined in Table 7-8. WAC 246-290-320 requires utilities to follow specific procedures in the event coliform bacteria are detected in the system, as further discussed in the City's Coliform Monitoring Plan in Appendix K.

TABLE 7-8

Water Contamination Response

Distribution System Contamination
• Perform chemical and free chlorine residual analysis at various locations within the system, including the reservoirs and the system extremities.
• Disinfect distribution lines as dictated by the nature of the contamination.
• Routine and repeat sampling to confirm continued presence or absence of contaminant.
Reservoir Contamination
• Isolate reservoir from system.
• Resample to confirm contamination.
• Check distribution system for presence of contamination.
• Inspect vent screens, hatches, and piping to identify source of contamination.
• If reservoir water is contaminated and therefore considered unsuitable for consumption, drain and clean reservoir.
• Consider disinfecting reservoir if bacteriological standards are exceeded. Follow AWWA standards.

VOC AND SOC DETECTION

Volatile organic chemical (VOC) and synthetic organic chemical (SOC) samples are routinely taken from supply sources. VOC and SOC tests include numerous different chemicals. VOCs and SOCs are generally not detected in supply sources. Therefore, any detection of VOCs or SOCs may warrant follow-up investigation even if it does not exceed an MCL. If routine VOC or SOC samples detect one or more chemicals, additional samples may be taken specifically for that chemical or possibly for a surrogate such as Total Organic Carbon to reduce follow-up chemical testing costs. Follow-up procedures in the event of VOC or SOC detection are specified in WAC 246-290-320 (6). Follow-up actions may vary depending upon the specific chemical detected and the level at which it is detected. The DOH area representative should be contacted to coordinate follow-up sampling and appropriate responses.

INORGANIC CHEMICAL DETECTION

Inorganic chemical/physical characteristics (IOC) samples are routinely collected from sources. IOC tests include numerous different chemicals. If routine IOC samples detect one or more samples in excess of an MCL, additional samples may be collected specifically for that sample if it reduces follow-up chemical testing costs. Follow-up procedures in the event of an inorganic chemical/physical characteristics MCL violation are specified in WAC 246-290-320 (3). Follow-up actions may vary depending on the specific chemical detected and the level at which it is detected. The DOH area representative should be contacted to coordinate follow-up sampling and appropriate responses.

CONTINGENCY OPERATIONAL PLAN

A contingency operational plan is necessary for operation of the system when normal operating procedures are not available. Appendix L provides information regarding alternate modes of operation for system facilities in the event of an emergency.

SAFETY PROCEDURES

SAFETY PROGRAM

The City's safety program consists of staff education and providing resources to ensure a safe working environment. All water workers with operation and maintenance responsibilities must be certified by DOH and maintain that certification through continuing education. Each member of the operations staff is required to take the following safety training sessions;

- First Aid;
- CPR;
- Traffic Safety and Flagging;

- Asbestos Cement Pipe;
- Trenching;
- Equipment Operation;
- Lockout and Tagout Procedures;
- Chemical Handling;
- Confined Space Entry;
- Equipment Calibration.

CONFINED SPACES

The principal hazard associated with confined spaces, including valve vaults and interior inspection of reservoirs, are oxygen deficiency, explosions, and toxic gases. Oxygen deficiency occurs when air is displaced by some other gas, which may or not be toxic. The Washington State Department of Labor and Industries (L&I) has established regulations governing entrance into confined spaces in WAC 296-62-145. The regulations include the completion of a Confined Space Entry Permit, the establishment of Safe Operating Procedures, and the completion of a Confined Space Pre-Entry Checklist.

ELECTRICAL AND MECHANICAL EQUIPMENT

The presence of electrical and mechanical equipment at the booster stations within the City may present hazards to personnel during performance of operation and maintenance tasks. Proper training should be provided and all safety procedures for working on pumps and electrical equipment should be followed. Precautions should be taken whenever working on or near the booster station mechanical and electrical equipment.

CHEMICALS

Prior to a chemical spill or other emergency, it is vital for water system staff to know the characteristics of chemicals in use. Safety Data Sheets (SDS) are supplied for this purpose. The assigned staff is responsible for updating the SDS notebook, which should be located in an accessible location close to the storage and use location of any chemicals.

Chlorine products must be handled with care, storage or application areas must have adequate ventilation, and staff must wear safety glasses and rubber gloves. Two staff members must be present during replacement of empty chlorine bottles. Following the replacement, a check should be made for leaks with ammonia fumes.

Chlorine Gas Leak Procedure

In the event of a chlorine gas leak, stopping the gas flow is critical to preventing the concentration from reaching toxic and corrosive levels. The City's chlorine gas facilities are equipped with chlorine gas monitors which continuously measure the chlorine concentration in the chlorine rooms. Upon detection of a leak, the City's SCADA system would issue an alarm and operators would manually close valves to shut off gas supply.

If the gas flow from the leak is not immediately shut down, the evacuation of people who may be inside the chlorination buildings is critical. In the case of a life-threatening situation, the fire department is notified and emergency vehicles are dispatched to the location. Self-contained breathing apparatuses (SCBAs) are provided for personnel protection when entering the leak area.

AC AND PRESSURIZED WATER MAIN

When working on asbestos cement and pressurized water mains proper training should be obtained and safety procedures for working with asbestos materials and pressurized mains should be followed.

EQUIPMENT AND SUPPLIES

Critical repair parts, tools and equipment necessary for maintenance are available and kept in fully operational condition. As repair parts are used, they are reordered. Inventory of equipment and parts is kept current and is adequate for most common emergencies that can be reasonably anticipated. The City has access to an inventory of repair parts, including parts required for repair of each type and size of pipe within the service area.

The following includes a list of safety and first aid equipment available to Water Department staff to carry out safety procedures for operations and maintenance tasks.

- First Aid Kits in each department vehicle and workshop.
- Fire extinguishers in all facilities.
- Eye wash stations at Corrosion Control Facility and Weyerhaeuser Booster Pump Station
- Showers at Corrosion Control Facility.
- Trench shoring equipment.
- Air tester for confined spaces.
- Traffic safety equipment.
- Guards on moving parts.
- Radios and cell phones.

ENVIRONMENTAL AWARENESS PRACTICES

Protecting the environment is a high priority for the City. The operations and maintenance staff have been made aware of the City's commitment to protecting the environment through education and field training. The City recognizes that it can play a major role in protecting the environment.

Chinook salmon and bull trout were listed as a threatened species under the Federal Endangered Species Act (ESA) in 1999. The City has established practices to operate, maintain, repair, improve, and expand the water system in a manner that does not adversely affect the environment. For example, the City does not allow chlorinated water to enter surface water bodies or storm drainage system that discharge to surface water bodies.

CROSS-CONNECTION CONTROL PROGRAM

Water purveyors have the responsibility to protect customers from water contamination due to cross-connections. The City has adopted a cross-connection control program as required by WAC 246-290-490. A cross-connection is any physical arrangement where the potable water supply is connected, directly or indirectly, to any liquid, gas, or solid of unknown or unsafe quality that may contaminate the public water supply through backflow. Backflow prevention devices are required at service connections where a potential for contaminants exists. The City's Cross-Connection Control Program is included in Appendix P. The Program includes a backflow event response form.

WELLHEAD PROTECTION PLAN

The City's Wellhead Protection Plan is included in Appendix M.

RECORD KEEPING AND REPORTING

Record keeping and reporting requirements for public water systems are given in WAC 246-290-480. All records concerning source meter and water system operation are recorded each working day and kept on file at the City's maintenance shop. Select data is entered into spreadsheets for data analysis and trending. The City has transitioned to utilizing Cartegraph, a computerized maintenance management system, to replace its manual work order system. This system will be the primary repository of system maintenance and operation activities.

Several reports are required by state agencies. Reports include:

- SARA Title III (Emergency and Hazardous Chemical Inventory Community Right-to-Know).
- Boise Spring annual meter data.

- Boise and Watercress Spring treatment
- Water use efficiency
- Cross connection control program annual summary
- Backflow incident
- Consumer confidence
- WFI update.

In response to the Lead and Copper Rule Revisions requirement to document service line material, operations staff started in mid-2023 documenting service line material type on the customer side of the water meter when conducting a service line replacement. That process has been expanded to include confirming material type during routine operations as well.

Operations and maintenance manuals are available for staff reference. These manuals are kept on file at the City's maintenance shop, administration office, and at remote facilities. The City intends to maintain its policies of requiring complete operation and maintenance manuals for all new equipment and facilities.

Maintenance of drawings is essential to maintenance crews, city planners, developers, and anyone else needing to know how the water system is set up throughout the City. The City maintains a comprehensive mapping and record keeping system of the City's water system. This mapping is comprised of physical maps, historical data books and computer-generated maps in AutoCAD and GIS format. Mapping of the system is a continuous process of incorporating new data from surveys, sketches and digital pictures. The record drawings are stored in the engineering office and are maintained by the Public Works Department staff.

Records stored at the maintenance shop and administration office include;

- Hydrant repairs
- Pump motor tests
- Well sounding and static water levels
- Water production
- Material inventory
- Water main flushing
- Bacteriological and other water quality test reports
- Chlorination levels
- Meter records
- Customer complaints
- Backflow and cross-connection

CUSTOMER COMPLAINT PROGRAM

Customer complaints are reported to the office of administration, where they are kept on a file. City utility staff responds to customer complaints or questions related to water service or quality, while City finance staff respond to billing questions.

OPERATION AND MAINTENANCE DEFICIENCIES

Operations and maintenance deficiencies include the following:

- Long mains in the western end of the system may be easier to maintain with the addition of an automated flushing system.

CHAPTER 8

CAPITAL IMPROVEMENT PLAN

INTRODUCTION

This chapter presents the proposed schedule for the City of Enumclaw 10-year Capital Improvement Plan (CIP) in accordance with the requirements of WAC 246-290. Water system capital improvements are scheduled and prioritized on the basis of water quality concerns, population growth, regulatory requirements, component reliability, system benefit, and financial priority. For the proposed projects identified in this chapter, individual project descriptions and preliminary project cost estimates for the 10-year CIP are provided in Appendix Q. Additional projects for the 20-year planning period have also been identified. When the Water System Plan is updated after 10 years, the projects presented for the 20-year planning period should be reevaluated and scheduled for the subsequent 10-year planning period, as necessary. A water system base map indicating proposed improvement projects is included as Figure 8-1. Two projects are noted to be completed in 2023, and will be complete just before or just after the adoption of this plan so are not included as future projects.

In the future, other projects may arise that are not identified as part of the City's CIP. Such projects may be deemed necessary for ensuring water quality, preserving emergency water supply, accommodating transportation improvements proposed by other agencies, or addressing unforeseen problems within the City's water system. Due to budgetary constraints, the completion of these projects may require that the proposed completion date for projects in the CIP be rescheduled. The City retains the authority to reschedule proposed projects and to expand or reduce the scope of proposed projects, as best determined by the City Council. As the proposed completion date for the project approaches, each capital improvement project should be re-evaluated to consider the most recent planning efforts.

CAPITAL IMPROVEMENT PLAN

Table 8-1 summarizes the proposed capital improvement projects for the 10-year and 20-year planning periods. Project location can be seen in Figure 8-1. All costs discussed in this Chapter are in March 2023 dollars, which corresponds to an Engineering News Record (ENR) National Construction Cost Index of 15,107 for the Seattle metropolitan area. Each project is discussed further in the following sections. Detailed cost estimates for the capital improvement projects are included in Appendix Q. All project costs contain a 20 or 30 percent contingency factor and a 30 percent engineering and administration cost.

The CIP projects are categorized as follows:

- Storage Improvements (ST);
- Source Improvements (SO),
- Booster Pump Station (BS);
- Distribution System (D);
- Pressure Zone (Z);
- General Improvements (G).

STORAGE IMPROVEMENTS

ST-1: New 2 MG Reservoir (2033/2034+)
Estimated Project Cost: $4,831,000

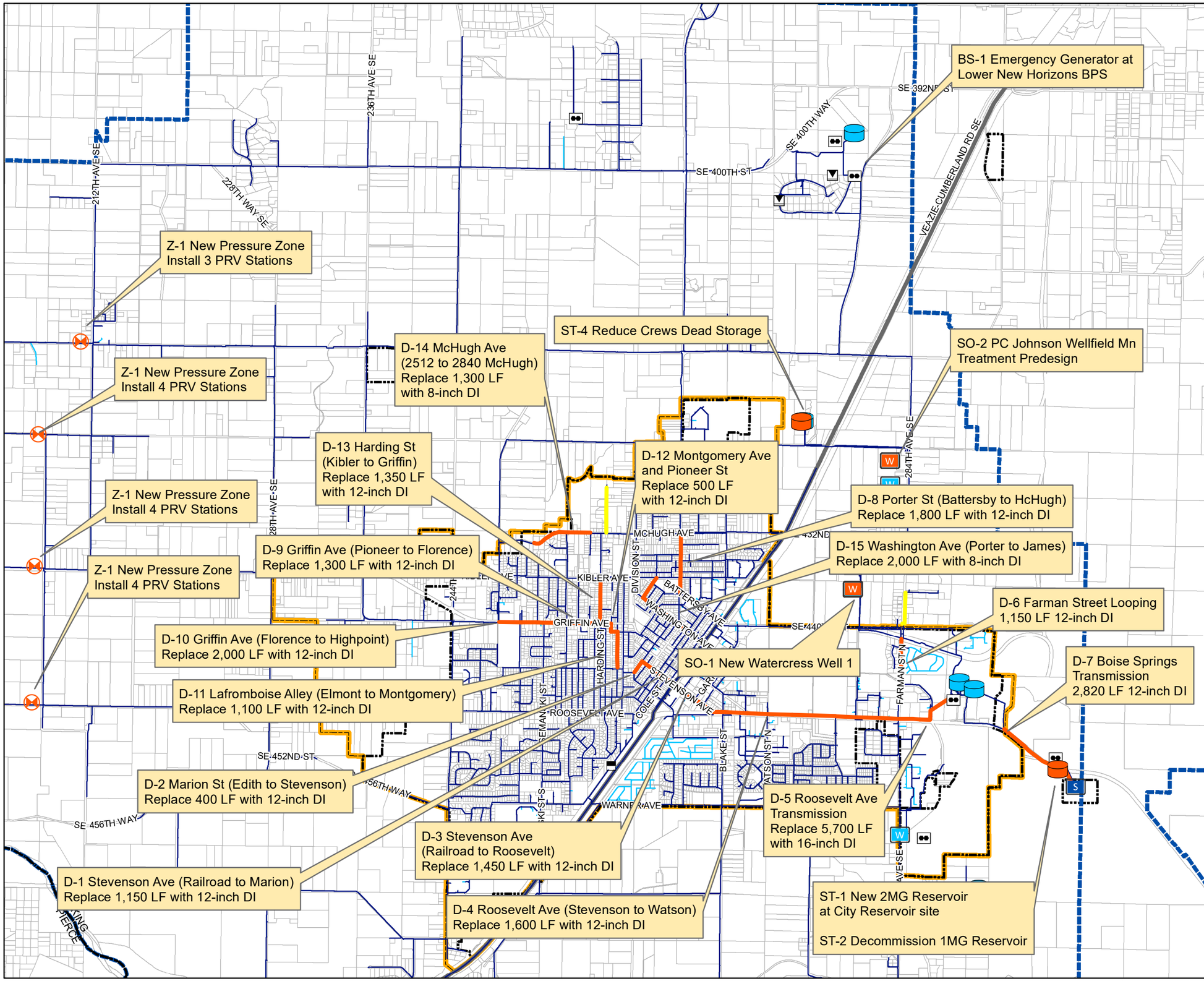
The storage analysis in Chapter 3 indicates that there is not sufficient storage capacity in the existing 888 Zone reservoirs to accommodate the anticipated growth over the next 10 to 20 years. While the City's sources are sufficiently capable of supplying the system's maximum day demand, DOH recommends that the City have adequate storage capacity to supply this demand even if the sources are inactive. The 10-year and 20-year projected storage deficits in the Zone are estimated to be approximately 0.9 million gallons (MG) and 1.2 MG respectively. A new reservoir with a capacity of 2 MG is proposed to provide storage for the growth anticipated in the 20-year period, as well as additional capacity as the lifespan of the reservoir will extend beyond the 20-year timeframe. It is assumed that a portion of this project will occur in 2033 with the remainder of the work including construction, will occur beyond the 10-year planning period.

ST-2: Decommission 1 MG Reservoir (2034+)
Estimated Project Cost: $674,000

The City's 1 MG reservoir located at the City Reservoir site is inactive and was taken out of service primarily due to vulnerability concerns of the reservoir's access, vents, and overflow. It is also one of the City's oldest assets with the base of the reservoir having been constructed in 1926. The City does not plan to bring the reservoir back into use and the structure should be demolished in order to allow the City to use the space in the future. It is possible that the new reservoir in project ST-1 could be located where the existing 1 MG reservoir is located. This project assumes the existing reservoir is demolished, pipes are plugged, components are salvaged as needed, and the site is filled to match the surrounding grade.

ST-3: Storage Integrity Evaluation (2033)
Estimated Project Cost: $50,000

An evaluation of the structural integrity of three of the City's water storage reservoirs; Crews, Fairway Hills, and Stanridge, is recommended due to their criticality to the system. A thorough review by a professional structural engineer would identify any



LEGEND

- CITY WATER MAIN
- PRIVATE WATER MAIN
- TACOMA TRANSMISSION MAIN

WATER FACILITIES

- BOOSTER STATION
- INTERTIE
- PRV STATION
- RESERVOIR
- SPRING
- WELL
- CIP PROJECT
- TO BE COMPLETED IN 2023
- KING - PIERCE COUNTY LINE
- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- PARCELS

Source: City of Enumclaw GIS Data, King Couty GIS Data, Washington Geospacial Open Data

N

0 1,625 3,250 6,500 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 8-1
CAPITAL IMPROVEMENT PROJECTS

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 8-x CIPS.mxd

deficiencies and the corresponding corrective measures. Corrective measures identified by the evaluation will be implemented later with separate projects, with a focus on safety and sanitary improvements, including resealing of interior or roof joints as needed.

ST-4: Reduce Dead Storage in Crews Reservoir (2024)
Estimated Project Cost: $2,000

The storage deficiencies identified in the 888 Zone in Chapter 3 could be alleviated by a modification to the Crews Reservoir to reduce the dead storage. The dead storage in the reservoir is currently 4 feet in depth, which equates to approximately 0.3 MG of volume. By cutting the intake pipe shorter to reduce the dead storage to 1 foot in depth, approximately 0.22 MG of additional storage will be available to the system, reducing the storage deficit before a new reservoir can be constructed. It is assumed that this work could be completed by City crews rather than a contractor, as a maintenance activity.

SOURCE IMPROVEMENTS

SO-1: New Watercress Well 1 (2034+)
Estimated Project Cost: $1,874,000

The City plans to replace Watercress Well 1 with a new well similar to Watercress Well 2. It is assumed that the new well will be drilled to the same depth as Well 2, approximately 50 feet below ground, with a 24-inch diameter casing. The project assumes that a new well building, well, casing, and pump will need to be installed, and that electrical and controls improvements will be necessary. The cost estimate assumes a new flow meter and chlorination system will also be necessary for the new well, but that other existing infrastructure on the site that currently supports the wells will be available for the new well. With the exception of the Well 1 collection vault, the buildings and interior improvements comprising the existing Well 1 would be demolished. The project also includes the installation of a new culvert to replace the existing drainage culvert that currently conveys water from the outlet of the existing Well 1 collection vault off of the site.

SO-2: PC Johnson Wellfield Manganese Treatment Predesign and 3rd Well Review (2025)
Estimated Project Cost: $50,000

The City plans to eventually install manganese treatment at the PC Johnson Wellfield, as this source sometimes tests higher than the regulatory maximum for manganese. This project would involve a predesign report and evaluation for design and construction of a treatment plant for the site. The predesign effort would include pilot testing to determine the size of the treatment plant required to provide the necessary level of treatment and an evaluation of whether a third well should be added to the wellfield for more efficient well production and to prevent excessive drawdown.

SO-3: PC Johnson Well 3 Pump Replacement (2032)
Estimated Project Cost: $548,000

The PC Johnson Well 3 pump has a capacity that is too high for the well's yield, and the pump must be throttled so that the well does not dewater while it is pumping. This project would replace the 100-hp well pump with a smaller pump, assumed to be 75 hp.

BOOSTER PUMP STATION

BS-1: Replace Equipment at Lower New Horizons BPS (2032)
Estimated Project Cost: $348,000

The Lower New Horizons Booster Station will be improved with larger pumps in order to fill the Stanridge Hill Reservoir more quickly. It is anticipated that the project will include replacement of the existing pumps with duplex 15-hp pumps, as well as improvements to the electrical system to support the larger pumps.

BS-2: Emergency Generator at Lower New Horizons BPS (2034+)
Estimated Project Cost: $270,000

The Lower New Horizons Booster Station is the City's only booster station without an emergency backup generator. This project would include the installation of a permanent emergency generator to provide electricity to the Lower New Horizons BPS in the event of a power outage. This includes minor site work, fencing, and installation of a generator slab and generator assembly along with electrical improvements. It is assumed that the generator will need to support 15-hp pumps planned in project BS-1.

DISTRIBUTION SYSTEM

The following distribution projects will help replace aging pipes, provide the system with increased reliability, provide redundancy, and further improve service pressure and fire flow availability (where possible). These projects fall under distribution system improvements.

It is assumed that the cost of these projects will involve installation of the new, larger pipes, connections to the existing system and reestablishment of existing services and hydrant laterals, and surface restoration in-kind to match the existing surface of the street, shoulder, or sidewalk that the main is currently beneath. The City's mains are generally installed along paved rights-of-way, though some mains are located below sidewalks and planter strips, while others are below asphalt or concrete travel lanes and curbs. It is assumed that additional overlay beyond the asphalt trench patch will not be necessary. Where concrete panels must be disturbed to install a replacement main, it is assumed that an entire row of panels will be replaced. Valves are assumed to be located every 400 feet along the mains, and the number of hydrants and services to replace as well as the

number of connections to the existing system was determined using the City's GIS information.

The improvements to fire flow within the system as a result of these projects is shown on Figure 4-4. Fire flow within City limits is shown to increase in most areas, with some areas increasing by more than 500 gpm. The areas of the system furthest to the west are shown with a decrease in fire flow due to a reduction in system looping as a result of the creation of a new pressure zone. Fire flow in these areas is still higher than the target of 500 gpm.

D-1: Stevenson Avenue from Marion Street to Railroad Street (2034+)
Estimated Project Cost: $856,000

This project includes construction of approximately 1,150 LF of 12-inch DI pipe to replace the existing 6-inch and 8-inch cast iron pipe between Marion Street and Railroad Street that dates to 1940 or earlier. This project will replace aging mains and will improve pressures and fire flow in the area surrounding the project. The existing water main is located along the northeast side of the street, and it is assumed that asphalt restoration will be necessary along most of the main, with some concrete panels to be replaced at Marion Street, and some sections of planter strips that may be disturbed. The City's GIS indicates two services on this section of main and no hydrants, as all hydrants are located on other mains adjacent to the alignment.

D-2: Marion Street from Stevenson Avenue to Edith Avenue (2034+)
Estimated Project Cost: $292,000

This project includes construction of approximately 400 LF of 12-inch DI pipe to replace the existing 8-inch cast iron pipe from 1965 between Stevenson Avenue and Edith Avenue. This project will bridge a connection between larger mains in the area, and will improve pressures and fire flow in the area surrounding the project. The existing water main is located along the northwest side of the street within the sidewalk and planter strip, and it is assumed that the sidewalk and any driveway crossing will need to be repaired, along with a small amount of pavement at the intersection of Edith Avenue. The City's GIS indicates 5 services on this section of main and 1 hydrant.

D-3: Stevenson Avenue from Railroad Street to Roosevelt Avenue (2028)
Estimated Project Cost: $1,735,000

This project includes construction of approximately 1,450 LF of 12-inch DI pipe to replace the existing 10-inch cast iron pipe between Railroad Street and Roosevelt Avenue that dates to the 1930s. This project will replace aging mains and will improve pressures and fire flow in the area surrounding the project. The existing water main is located along the northeast side of the street within the gutter line, and it is assumed that concrete panels will need to be replaced along the length of the project and that the curb and planter strip will need to be repaired. A small amount of sidewalk and pavement near the

intersection of Roosevelt Avenue will be repaired as well. The City's GIS indicates 17 services on this section of main, some of which are assumed to be commercial services, and two hydrants.

D-4: Roosevelt Avenue from Stevenson Avenue to Watson Street (2027)
Estimated Project Cost: $1,176,000

This project includes construction of approximately 1,600 LF of 12-inch DI pipe to replace the existing 10-inch and 12-inch cast iron pipe between Stevenson Avenue and Watson Street from the 1930s. This project will replace aging mains, improve capacity along a key transmission main for the City, and will improve pressures and fire flow in the area surrounding the project. The existing water main is located along the north side of the street within the planter strip and sidewalk area, and it is assumed that the curb, sidewalk, and planter strip will need to be repaired. Roosevelt Avenue is SR410, which is WSDOT right-of-way, and it is assumed that traffic control costs may be higher than a typical project in City right-of-way on a less busy road. A small amount pavement at road intersections and driveway entrances will be repaired as well. The City's GIS indicates eight commercial services on this section of main and two hydrants.

D-5: Roosevelt Avenue Transmission Main (2027)
Estimated Project Cost: $3,442,000

This project includes construction of approximately 5,700 LF of 16-inch DI pipe to replace the existing 12-inch cast iron pipe between Watson Street and the City Reservoir site from the 1930s. This project will replace aging mains, improve capacity along a key transmission main for the City, and will improve pressures and fire flow in the area surrounding the project. The existing water main is located along the north side of the street within the shoulder, and it is assumed that most of the restoration along the alignment will require reseeding or landscaping. There is some curb, sidewalk, and planter strip restoration that will be required along the western portion of the alignment, as well as a small amount of asphalt pavement at road intersections and driveway entrances. Roosevelt Avenue is SR 410, which is WSDOT right-of-way, and it is assumed that traffic control costs may be higher than a typical project in City right-of-way on a less busy road. The City's GIS indicates 20 commercial and multifamily services on this section of main and 8 hydrants. This cost assumes that 5,000 LF of the pipe will be replaced by the City, while 700 LF will be replaced by a developer when the property adjacent to the City's reservoir site develops. The City will pay for oversizing of the main across this property to 16-inch rather than 12-inch, and the estimated cost includes the difference in price for this upsizing.

D-6: Farman Street Looping (2031)
Estimated Project Cost: $845,000

This project includes construction of approximately 1,150 LF of 12-inch DI pipe to connect the existing main on Farman Street north of Mountain View Drive to the existing main on Farman Street at Alpine Place. This project will improve looping in the system to improve pressures and fire flow in the area surrounding the project. The new water main will be installed along the sidewalk, the same as the existing mains in this area. No hydrants or services are anticipated on this connection. This project will also include a new control valve which will close during peak demand times as needed in order to allow Watercress Springs to fill the reservoirs more efficiently, but can open if pressure on the south side of the valve drops.

D-7: Boise Springs Transmission Main (2024/2025)
Estimated Project Cost: $3,222,000

This project includes replacement of approximately 2,800 LF of 10-inch AC and cast iron pipe with 12-inch DI pipe to replace the existing Boise Springs transmission main from the 1930s and 1960s. This project will replace aging mains and will improve reliability of one of the City's major sources. A portion of the project alignment is through sensitive areas and will require some stream restoration and other critical area mitigation. Design of this project is currently underway as of 2023, and construction is planned for 2024 and 2025.

D-8: Porter Street from Battersby Avenue to McHugh Avenue (2034+)
Estimated Project Cost: $1,306,000

This project includes construction of approximately 1,800 LF of 12-inch DI pipe to replace the existing 6-inch cast iron pipe between Battersby Avenue and McHugh Avenue from the 1930s. This project will replace aging mains and will improve pressures and fire flow in the area surrounding the project. The existing water main is located within the planter strip along the roadside and it is assumed that restoration will mostly involve replacement of the planter strip and curb with some asphalt restoration at other intersections and concrete driveway replacement. The City's GIS indicates 26 services on this section of main and no hydrants, as all hydrants are located on other mains adjacent to the alignment.

D-9: Griffin Avenue from Pioneer Street to Florence Street (2034+)
Estimated Project Cost: $1,167,000

This project includes construction of approximately 1,300 LF of 12-inch DI pipe to replace the existing 6-inch and 8-inch cast iron pipe from the 1930s between Pioneer Street and Florence Street. This project will replace aging mains, improve capacity along a key transmission main supplying the western part of the system, and will improve pressures and fire flow in the area surrounding the project. This project is associated with

Projects D-10, D-11, D-12, and D-13 to improve capacity extending from the larger mains in other areas. The existing water main is located along the south side of the street within the gutter line, and it is assumed that the curb, sidewalk, and planter strip will need to be repaired and that the asphalt adjacent to the curb will need to be replaced. Griffin Avenue is SR 164, which is WSDOT right-of-way, and it is assumed that traffic control costs may be higher than a typical project in City right-of-way on a less busy road. The City's GIS indicates six services on this section of main and one hydrant.

D-10: Griffin Avenue from Florence Street to Highpoint Street (2034+)
Estimated Project Cost: $1,746,000

This project includes construction of approximately 2,000 LF of 12-inch DI pipe to replace the existing 6-inch and 8-inch cast iron and DI pipe between Florence Street and Highpoint Street. This project will replace aging mains, improve capacity along a key transmission main supplying the western part of the system, and will improve pressures and fire flow in the area surrounding the project. This project is associated with Projects D-9, D-11, D-12, and D-13 to improve capacity extending from the larger mains in other areas. The existing water main is located along the south side of the street within the gutter line, and it is assumed that the curb and sidewalk will need to be repaired and that the asphalt adjacent to the curb will need to be replaced. Griffin Avenue is SR 164, which is WSDOT right-of-way, and it is assumed that traffic control costs may be higher than a typical project in City right-of-way on a less busy road. The City's GIS indicates 19 services on this section of main and no hydrants.

D-11: Lafromboise Street Alley from Elmont Avenue to Montgomery Avenue (2030)
Estimated Project Cost: $693,000

This project includes construction of approximately 1,100 LF of 12-inch DI pipe to replace the existing 2-inch galvanized pipe in the alley between Elmont Avenue and Montgomery Avenue. This project will replace aging mains, improve capacity along a key transmission main supplying the western part of the system, and will improve pressures and fire flow in the area surrounding the project. This project is associated with Projects D-9, D-10, D-12, and D-13 to improve capacity extending from the larger mains in other areas. The existing water main is located within the alley, and it is assumed that the gravel surfacing in the alley will need to be replaced. The City's GIS indicates 28 services on this section of main and no hydrants.

D-12: Montgomery Avenue and Pioneer Street (2030)
Estimated Project Cost: $405,000

This project includes construction of approximately 500 LF of 12-inch DI pipe to replace the existing 6-inch cast iron pipe along Montgomery Avenue and Pioneer Street, some of which was installed in the 1930s. This project will replace aging mains, improve capacity along a key transmission main supplying the western part of the system, and will improve

pressures and fire flow in the area surrounding the project. This project is associated with Projects D-9, D-10, D-11, and D-12 to improve capacity extending from the larger mains in other areas. The existing water main is located along the planter strip on Montgomery Street and within the pavement along Pioneer Street, and it is assumed that the curb and planter strip will need to be repaired and that the asphalt will be replaced in-kind. The City's GIS indicates seven services on this section of main and two hydrants.

D-13: Harding Street from Kibler Avenue to Griffin Avenue (2027)
Estimated Project Cost: $1,176,000

This project includes construction of approximately 1,350 LF of 12-inch DI pipe to replace the existing 6-inch cast iron pipe between Kibler Avenue and Montgomery Avenue from the 1930s. This project will replace aging mains and will improve pressures and fire flow in the area surrounding the project. The existing water main is located along the grassed road shoulder, and it is assumed that the curb, sidewalk, and grass shoulder will need to be repaired and that the asphalt adjacent to the curb will need to be replaced. The City's GIS indicates 46 services on this section of main and one hydrant.

D-14: McHugh Avenue from 2512 to 2840 McHugh (2025)
Estimated Project Cost: $1,202,000

This project includes construction of approximately 1,750 LF of 12-inch DI pipe to replace the existing 6-inch AC pipe between 2512 and 2840 McHugh from the 1930s. This project will replace aging mains and will improve pressures and fire flow in the area surrounding the project. The existing water main is located along the southern side of the asphalt road, and it is assumed that the road will need to be repaired. The City's GIS indicates 19 services on this section of main and three hydrants.

D-15: Washington Avenue from Porter Street to James Street (2032)
Estimated Project Cost: $1,394,000

This project includes construction of approximately 2,000 LF of 12-inch DI pipe to replace the existing 6-inch AC pipe between Porter Street and James Street, and along James Street from Washington Avenue to Hillcrest Avenue, from the 1930s. This project will replace aging mains and will improve pressures and fire flow in the area surrounding the project. The existing water main is located along the grassed road shoulder, and it is assumed that the grass shoulder will need to be repaired along with some sidewalk, curb, and asphalt at intersections. The City's GIS indicates 20 residential and commercial services on this section of main and five hydrants.

D-16: Steel Main Replacement (Annual)
Estimated Project Cost: $150,000 per year

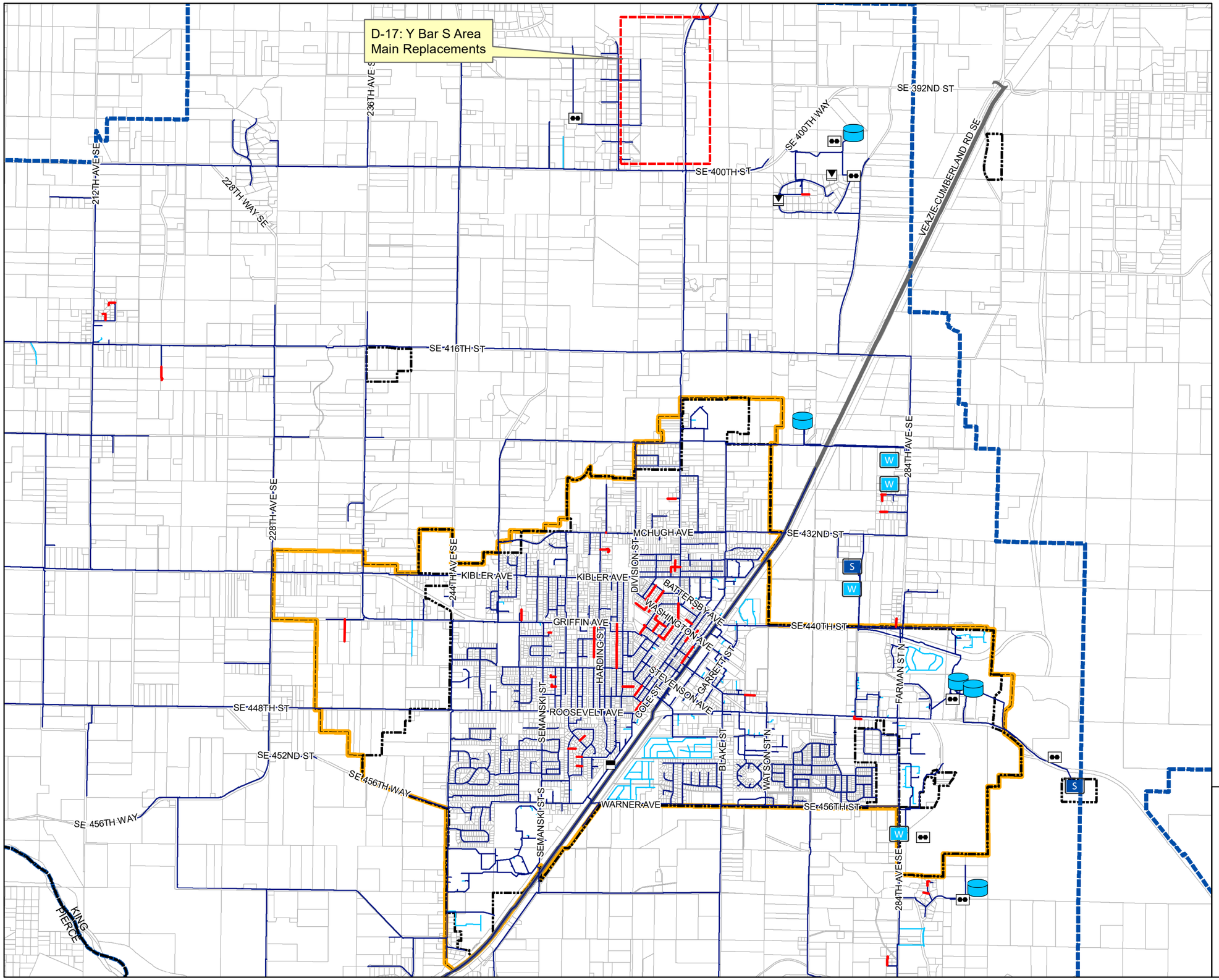
This project includes replacement of approximately 3.3 miles of small-diameter (1 to 6 inch) steel and galvanized iron mains located primarily within the downtown area. This project will improve system reliability and reduce system leakage, as these older mains have higher potential for corrosion. Mains will be replaced with new ductile iron water main or HDPE pipe in accordance with the City's construction standards. The City plans to complete approximately $150,000 of work under this program annually using primarily City staff labor, and the specific mains will be identified annually during the City's budgeting process. These mains are indicated on Figure 8-2.

D-17: Y Bar S Main Replacements (2029, 2034+)
Estimated Project Cost: $400,000 (2029), $800,000 (2034+)

This project includes replacement of all mains within the area that was previously the Y Bar S water system. The City acquired the water system in 2009 and collects funds from customers in this area through a service surcharge with the purpose of replacing the aging mains. The existing AC water mains will be replaced with new ductile iron or HDPE pipe in accordance with the City's construction standards. The selection of specific mains to be replaced each year will determined during the City's budget development process with costs paid out of the Y Bar S replacement fund. This area is indicated on Figure 8-2

Z-1: New Western Pressure Zone (2026)
Estimated Project Cost: $1,146,000

This project includes installation of four new pressure reducing valves in the western part of the City's water system to create a lower pressure zone and reduce system pressures in the west end of the system. The new valves will be located near the intersections of SE 416th Street and 212th Avenue SE, SE 424th Street and 208th Avenue SE, SE 448th Street and 208th Avenue SE, and SE 436th Street (SR 164) and 212th Avenue SE. This project will include restoration of asphalt as needed to install the new vaults. The system was modeled with these PRV stations installed and fire flow availability is reduced slightly below 1,000 gpm on SE 440th Street west of 196th Avenue SE, on SE 448th Street a short distance east of 196th Avenue SE, and on 188th Avenue SE a short distance north of SR 164. More than the state minimum fire flow of 500 gpm will still be provided in these low density areas that are zoned Agricultural-35 (one dwelling unit per 35 acres). Fire flow at Westwood school at 212th Avenue SE and SE 416th Street is not affected by the PRV stations but is currently less than the City's target. Flow to the school could be improved by replacing the water main in SE 416th Street from 212th Avenue SE to 228th Avenue SE. Peak hour pressures in the new zone will be between 40 and 100 psi within the new zone, and the HGL of the new zone will be approximately 760 feet, reducing pressures by about 55 psi from the existing system.



LEGEND

- CITY WATER MAIN
- PRIVATE WATER MAIN
- TACOMA TRANSMISSION MAIN

WATER FACILITIES

- BOOSTER STATION
- INTERTIE
- PRV STATION
- RESERVOIR
- SPRING
- WELL
- STEEL MAIN REPLACEMENTS
- KING - PIERCE COUNTY LINE
- WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- PARCELS

Source: City of Enumclaw GIS Data, King Couty GIS Data, Washington Geospacial Open Data

N

0 1,625 3,250 6,500 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 8-2
STEEL MAIN REPLACEMENTS

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\FIGURE 8-x steel mains.mxd

GENERAL IMPROVEMENTS

G-1: Comprehensive Water System Plan Update (2033)
Estimated Project Cost: $150,000

The City will update its Comprehensive Water system Plan every 10 years to comply with state requirements in WAC 246-290-100.

G-2: Boise Spring Rehabilitation (2034+)
Estimated Project Cost: $50,000

This project would involve a predesign report to evaluate the need for and extent of rehabilitation of the aging Boise Spring collection system. This project will ensure the integrity of the system is maintained and enable the full water right flow to be produced throughout the year. The scope and cost of improvements will be confirmed through a preliminary design study with the recommended improvements constructed later.

G-3: PC Johnson Automatic Transmission Main Control Valve (2031)
Estimated Project Cost: $448,000

A new valve controllable by the telemetry system will be installed to close on well startup and reopen on well shutdown. Most of the water produced by the wellfield would then be routed through Crews reservoir, but the transmission main would be returned to normal function as part of the distribution system when the wellfield is not operating.

G-4: PC Johnson Wellfield Chlorine Analyzer (2031)
Estimated Project Cost: $10,000

Install a chlorine analyzer at the PC Johnson Wellfield.

G-5: PC Johnson Wells 2 and 3 Rehabilitation (2029)
Estimated Project Cost: $250,000

Perform well cleaning and rehabilitation for the PC Johnson Wells 2 and 3.

G-6: Automated Flushing Devices (2027)
Estimated Project Cost: $15,000

This project will install as a pilot project two cellular/automated flushing devices to help maintain chlorine residuals in long dead-end mains in the western part of the system. It is assumed that a cold-weather, battery-powered, cellularly connected flushing system may be used, which requires no additional power connection or telemetry connection.

G-7: Rural Area Isolation Valves (Annual)
Estimated Project Cost: $20,000 per year

The City will install new isolation valves in the rural parts of the system, particularly in the western part of the system. In the more rural areas of the system, the length of mains between isolation valves can reach 2,000 to 2,500 feet. This project will include installation of new valves in this part of the system to reduce the length between valves to less than 1,500 feet and facilitate maintenance and flushing operations. It is assumed that the City adds 2 valves per year with this estimated cost using a contractor.

G-8: Facility Equipment Replacements (2034+)
Estimated Project Cost: $1,500,000

The City plans for major equipment replacement beyond the 10-year planning timeframe. This work will include replacement, improvement, or other modifications to system facilities such as reservoirs, booster stations, wells, or electrical and telemetry equipment. Specific projects will be identified and scheduled as needs arise.

G-9: Miscellaneous Water System Improvements (Annual)
Estimated Project Cost: $75,000 per year

As all maintenance and repair needs cannot be identified ahead of time, the City plans for additional repair work each year, with an anticipated total value of approximately $75,000 to replace aging or compromised components as needed.

PROJECT PRIORITIZATION AND SCHEDULING

The City intends to prioritize scheduling capital improvements projects based on the following criteria:

1. Improve present and future level of service, and address system capacity limitations discussed in Chapter 3;

2. Replace or refurbish aging pipe that is at or near the end of its useful life in an effort to reduce distribution system leakage and coordinate with other projects, with additional consideration given to the size of the benefit area of the improvement, and existing fire flow requirement;

3. Compliance with regulations, severity of the existing deficiency, safety concerns, maintenance, and redundancy requirements; and

4. Coordinating with the electric utility, County, and other local jurisdictions to take advantage of cost saving opportunities by having projects coincide.

SUMMARY OF RECOMMENDED IMPROVEMENTS

A prioritized schedule and cost summary for the recommended capital improvements over the next 10 years are shown in Table 8-1. All construction costs are presented in March 2023 dollars. The City may adjust and reschedule its capital improvement projects to accommodate unforeseen changes to projects and finances.

TABLE 8-1

Capital Improvement Plan Project Summary

Project Number	Project Description	Estimated Project Cost	Projected Date
D-1	Stevenson Avenue from Marion Street to Railroad Street	$856,000	2034+
D-2	Marion Street from Stevenson Avenue to Edith Avenue	$292,000	2034+
D-3	Stevenson Avenue from Railroad Street to Roosevelt Avenue	$1,735,000	2028
D-4	Roosevelt Avenue from Stevenson Avenue to Watson Street	$1,176,000	2027
D-5	Roosevelt Avenue Transmission Main	$3,442,000	2027
D-6	Farman Street Looping	$845,000	2031
D-7	Boise Springs Transmission Main	$3,222,000	2024/2025
D-8	Porter Street from Battersby Avenue to McHugh Avenue	$1,306,000	2034+
D-9	Griffin Avenue from Pioneer Street to Florence Street	$1,167,000	2034+
D-10	Griffin Avenue from Florence Street to Highpoint Street	$1,746,000	2034+
D-11	Lafromboise Street Alley from Elmont Avenue to Montgomery Avenue	$693,000	2030
D-12	Montgomery Avenue and Pioneer Street	$405,000	2030
D-13	Harding Street from Kibler Avenue to Griffin Avenue	$1,176,000	2027
D-14	McHugh Avenue from 2512 to 2840 McHugh	$1,202,000	2025
D-15	Washington Avenue from Porter Street to James Street	$1,394,000	2032
D-16	Steel Main Replacements	$1,500,000	annual
D-17	Y Bar S Main Replacement	$1,200,000	2029/2034+
Z-1	New Pressure Zone	$1,146,000	2026
ST-1	New 2 MG Reservoir	$4,831,000	2033/2034
ST-2	Decommission 1 MG Reservoir	$674,000	2034+

TABLE 8-1 – (continued)

Capital Improvement Plan Project Summary

Project Number	Project Description	Estimated Project Cost	Projected Date
ST-3	Storage Integrity Evaluation	$50,000	2033
ST-4	Reduce Dead Storage in Crews Reservoir	$2,000	2024
SO-1	New Watercress Well 1	$1,874,000	2034+
SO-2	PC Johnson Wellfield Manganese Treatment Predesign	$50,000	2025
SO-3	Replace PC Well 3 Pump	$548,000	2032
BS-1	Replace Equipment at Lower New Horizons	$348,000	2032
BS-2	Emergency Generator at Lower New Horizons	$270,000	2034+
G-1	Comprehensive Water System Plan Update	$150,000	2033
G-2	Boise Spring Rehabilitation	$50,000	2034+
G-3	PC Johnson Automatic Transmission Main Control Valve	$448,000	2031
G-4	PC Johnson Wellfield Chlorine Analyzer	$10,000	2031
G-5	PC Johnson Wells 2 and 3 Rehabilitation	$250,000	2029
G-6	Automated Flushing Devices	$15,000	2027
G-7	Rural Area Isolation Valves (annual)	$200,000	annual
G-8	Facility Equipment Replacements	$1,500,000	2034+
G-9	Misc. Water Improvements	$1,500,000	annual
Total		**$37,273,000**	

The capital improvement program includes approximately $21 million of work through 2034, with an additional $15 million planned beyond the 10-year planning period.

CHAPTER 9

FINANCIAL PROGRAM

INTRODUCTION

This Chapter outlines the City's financial plan for implementing the recommended capital improvement plan, paying operation and maintenance (O&M) expenses, and meeting debt service. This Chapter also reviews the City's past and present financial status, available revenue sources, allocation of revenue sources, as well as the fiscal impact of the recommended capital improvements and rates.

WATER RATES

The City's current water service rates became effective January 1, 2023. These rates are summarized in Table 9-1. The City charges for water service on a monthly basis. Water service rates consist of a monthly base charge that is dependent on meter size and a volume charge based on consumption. The fixed base charge is intended to recover costs associated with providing service to customers regardless of the level of water used, such as billing, meter reading, and administrative support. The monthly volume charge recovers costs associated with production, treatment, storage, and delivery of water used.

Single family residential customers have been subject to an increasing block volume charge rate structure since 2007. All other customer classes have a standard volume rate for all consumption. Outside city limit base and volume charges are 50 percent higher than in-city charges. On January 1 of each year, rates are to be adjusted for inflation according to the Consumer Price Index (CPI) for the Seattle-Tacoma-Bremerton area. However, under no circumstances will rates and charges decrease as a result of the annual adjustment without specific action by the City Council.

TABLE 9-1

2023 Monthly Water Service Rates

Base Charge		
Meter Size	**In City**	**Out of City**
Up to 3/4"	$15.07	$22.61
3/4" LI (1)	$10.56	$15.84
1" & 1 1/4"	$20.28	$30.42
1 1/2"	$28.94	$43.42
2"	$39.37	$59.05
3"	$67.43	$101.15

TABLE 9-1 – (continued)

2023 Monthly Water Service Rates

Base Charge			
Meter Size	**In City**		**Out of City**
4"	$98.70		$148.04
6"	$185.44		$278.18
8"	$289.56		$434.33
Water Volume Charge			
Customer type	**Block 1**	**Block 2**	**Block 3**
Inside City Customers	(0-7.5 CCF)	(7.5-20 CCF)	(20+ CCF)
Single-Family Residential	$2.13	$2.82	$3.53
Low Income	$1.50	$2.82	$3.53
Multi-Family Residential	$2.10		
Commercial	$2.43		
Agricultural	$1.60		
Outside City Customers	(0-8 CCF)	(8-20 CCF)	(20+ CCF)
Single-Family Residential	$3.21	$4.25	$5.27
Low Income	$2.25	$4.25	$5.27
Multi-Family Residential	$3.16		
Commercial	$3.65		
Agricultural	$2.38		

(1) Indicates low income senior/disability rates based on income levels determined by the US Department of Housing and Urban Development.

CONNECTION FEES

The City imposes a connection charge on new customers requesting service based on meter size or projected water consumption in equivalent residential units (ERUs), whichever is greater. The current connection fees schedule is illustrated in Table 9-2 below.

TABLE 9-2

2023 Connection Fees

Capital Facility Charges	**In City**	**Out of City**
Per Equivalent Residential Unit (ERU)	$5,627	$15,216
Meter Size	**In City**	**Out of City**
5/8" x 3/4"	$5,627	$15,216
1"	$14,068	$38,040
1-1/2"	$28,135	$76,080
2"	$45,016	$121,728
3"	$90,032	$243,456

Any building using the City water for an automatic sprinkler system for fire protection is assessed annually for the service by size of the supply line as shown in Table 9-3.

TABLE 9-3

2023 Fire Sprinkler System Charge

Fire Line Size	In City	Out of City
2"	$29.32	$66.49
3"	$53.51	$114.71
4"	$80.83	$169.07
6"	$155.97	$319.92
8"	$247.05	$500.94

Other charges adopted by resolution of the City Council include charges for tampering, late payment, meter setting and new service and main installation, inspection, design plan review, testing, meter removal/reinstallation, backflow device permit and inspection, and for issuing a certificate of water availability. Charges are also assessed for filling water trucks or using a hydrant for a temporary construction service.

FINANCIAL STATUS OF EXISTING UTILITY

EXISTING REVENUE AND EXPENSES

The City maintains separate water and sewer utilities. Table 9-4 shows historical water utility revenues and expenditures for 2013 through 2021. The City also maintains accounting of unrestricted and restricted cash reserves for the water utility. Restricted reserves include funds set aside as part of revenue bond covenants and cannot be used for purposes other than final payment on outstanding revenue debt obligations. Unrestricted reserves include cash and cash investments available for operation and capital activities. Capital reserves include transfers from the operating account in excess of recommended target balances, interest earnings on capital account balances and revenues from new customer connection charges. In general, the City has maintained approximately $1.0 million in restricted reserves annually.

TABLE 9-4

Historical Revenue and Expense Summary[1]

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Beginning Fund Balance	**$1,115,569**	**$1,300,383**	**$1,947,675**	**$2,383,380**	**$2,403,336**	**$3,063,525**	**$4,063,632**	**$4,862,709**	**$4,862,709**
Operating Revenues									
Metered Consumption Charges	$2,838,584	$3,055,854	$2,950,965	$3,125,446	$2,965,780	$3,314,502	$3,347,090	$3,614,726	$3,552,004
Miscellaneous Charges	$104,431	$95,261	$105,692	$82,985	$82,962	$97,121	$42,021	$31,883	$109,718
Miscellaneous Revenues	$32,780	$34,031	$37,019	$51,277	$74,592	$46,927	$79,087	$51,678	$109,832
Operating Revenues Subtotal	**$2,975,795**	**$3,185,146**	**$3,093,676**	**$3,259,708**	**$3,123,334**	**$3,458,550**	**$3,468,198**	**$3,698,287**	**$3,771,554**
Contributed Capital (Connection Charges)	$74,391	$212,463	$230,266	$195,635	$882,807	$1,014,812	$932,583	$396,354	$579,421
Y Bar S WM Replacement Acct	$50,542	$50,880	$50,880	$50,880	$46,542	$51,351	$52,072	$53,463	$62,122
Loan/Grant Revenue	$666,475	$190,388	$4,608,249	$1,896,980					
Non-Revenue Receipts							$212,904	$45,008	
TOTAL REVENUES (w/o BFB)	***$3,767,203***	***$3,638,877***	***$7,983,071***	***$5,403,203***	*$4,052,683*	***$4,524,713***	***$4,665,757***	***$4,193,112***	***$4,413,097***
TOTAL RESOURCES	***$4,882,772***	***$4,939,260***	***$9,930,746***	***$7,786,583***	*$6,456,019*	***$7,588,238***	***$8,729,389***	***$9,055,821***	***$9,275,806***
O&M Expenditures									
Salaries	$395,373	$400,181	$404,630	$484,739	$455,440	$581,844	$570,529	$567,221	$684,012
Benefits	$207,828	$208,706	$216,482	$251,397	$253,400	$271,998	$259,685	$251,950	$303,235
Supplies	$102,923	$123,186	$142,161	$128,622	$152,236	$155,567	$129,481	$158,071	$229,811
Services/Charges	$139,688	$180,613	$188,545	$173,601	$196,824	$231,277	$243,710	$231,842	$264,949
Intergovernmental/Taxes	$14,255	$15,513	$13,229	$13,416					
State Public Utility Tax	$146,490	$155,972	$151,967	$172,833	$179,121	$178,196	$173,757	$204,916	$176,913
City Utility Tax	$234,645	$251,325	$243,092	$256,017	$267,113	$265,378	$267,591	$346,138	$346,340
Interfund Services	$394,082	$323,418	$311,114	$312,532	$350,120	$389,483	$393,127	$413,341	$587,773
Total O & M Expenditures	**$1,635,284**	**$1,658,914**	**$1,671,219**	**$1,793,157**	**$1,854,254**	**$2,073,742**	**$2,037,880**	**$2,173,479**	**$2,593,033**
Debt Service - 2005 Rev Bond	$719,315	$717,803	$716,927	$200,000					
Debt Service - 1997 PWTF	$395,627	$390,603	$388,091	$384,323	$380,555				
Debt Service - 2013 DWSRF				$354,899	$343,465	$339,455	$335,446	$331,437	$327,428
Debt Service - 2013 Fall DWSRF				$107,053	$114,236	$112,903	$111,569	$110,236	$108,903
Debt Service - Interfund 3 Yr Loan	$305,940	$93,283	$121,813	$80,344					
Total O&M Expenditures + Debt	**$3,056,166**	**$2,860,603**	**$2,898,050**	**$2,919,776**	**$2,692,510**	**$2,526,100**	**$2,484,895**	**$2,615,152**	**$3,029,364**

TABLE 9-4 – (continued)

Historical Revenue and Expense Summary[(1)]

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Capital Project Expenditures	$71,804		$13,108	$390,740	$246,515	$203,819	$931,546	$1,292,561	$248,159
AMR Conversion					$453,469	$794,687	$453,222	$360,361	$53,487
Capital Exp - 2 MG Res	$430,696	$119,992	$3,669,696	$1,077,604					
Capital Exp - 2014 Water Impr.	$23,723	$10,991	$966,512	$995,127					
TOTAL EXPENDITURES	**$3,582,389**	**$2,991,585**	**$7,547,366**	**$5,383,247**	**$3,392,494**	**$3,524,606**	**$3,869,663**	**$4,268,074**	**$3,331,010**
ENDING FUND BALANCE	**$1,300,383**	**$1,947,675**	**$2,383,380**	**$2,403,336**	**$3,063,525**	**$4,063,632**	**$4,859,726**	**$4,787,747**	**$5,944,796**

(1) Financial information provided by City.

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WATER UTILITY FINANCIAL ANALYSIS

Table 9-4 shows the historical data upon which the future projections are based. Forecast factors used to determine the projections are shown in Table 9-5. The ERU growth rate reflects the City's anticipated population growth rate, which is detailed in Chapter 2.

TABLE 9-5

Forecast Factors

Forecast Factors	Value
Water ERU Growth Rate	2023-2026: 2.9%, Other Years: 0.3%
General Inflation Rate	3% (1)

(1) According to the St. Louis Federal Reserve Bank (https://fred.stlouisfed.org/series/EXPINF10YR), the projected 10-year inflation rate as of the end of 2022 was 2.5 percent. This is rounded up to 3 percent for conservativeness.

PROJECTED REVENUES AND EXPENDITURES

Future water utility revenues and expenditures for 2023 through 2033 are summarized in Table 9-6.

REVENUES

Future revenues have been projected based on a review of the historical financial data provided by the City, in conjunction with the forecast factors given in Table 9-5. Water sales are expected to increase as a result of the ERU growth rate and annual rate increases.

EXPENDITURES

Future expenses have been projected based on a review of the historical financial data provided by the City, in conjunction with the forecast factors given in Table 9-5. Inflation is assumed to be 3 percent per year, applied to all expenditures. The City's CIP program as described in Chapter 8 is included in the analysis. The cost for the CIP projects are also escalated according to the assumed inflation rate for the anticipated year of construction.

PROJECTED WATER UTILITY BALANCE

Table 9-6 presents projected revenue and expenditures with no CIP projects included. The expenditures are escalated at the inflation rate noted in Table 9-5, while ERUs are projected to grow at the rates noted in Table 9-5. No increase to the City's rates is assumed in this table. The City's revenue under the existing rate schedule is projected to exceed the anticipated operational and maintenance expenses.

Table 9-7 presents projected revenues and expenditures with several of the capital projects presented in Chapter 8. This table assumes a rate increase of 5 percent per year on the City's base and consumption rates, which is shown to be sufficient to fully cash-fund the high-priority projects in the City's CIP program over the next 10 years. The schedule for the high-priority projects is noted in Table 9-8. Other projects scheduled for the next 10 years in Chapter 8 may be implemented as funding allows. The scheduling of capital projects and the method of financing will be determined through the City's annual budgeting process.

An annual rate increase of 2 percent per year was also considered. With this rate increase, the City would need to procure additional funding in order to complete the high-priority CIP projects over the next 10 years, and the loan funding may result in annual payments exceeding $800,000 assuming a loan interest rate of 2.25 percent over 20 years. Other funding sources such as grants or lower rate loans could offset the CIP program costs, but grant funding was not assumed in this analysis.

TABLE 9-6

Projected Revenue and Expenditures[1]

Year	2023[2]	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenue											
Accounts	6,540	6,688	6,839	6,996	7,019	7,043	7,067	7,090	7,114	7,138	7,164
ERUs	9,033	9,237	9,446	9,662	9,695	9,727	9,760	9,793	9,826	9,859	9,894
Base Rates (per mo)	$15.07	$15.07	$15.07	$15.07	$15.07	$15.07	$15.07	$15.07	$15.07	$15.07	$15.07
Consumption Rate (per 1 ccf)	$2.13	$2.13	$2.13	$2.13	$2.13	$2.13	$2.13	$2.13	$2.13	$2.13	$2.13
Connection Fee	$526,940	$1,147,359	$1,179,771	$1,213,123	$183,251	$183,871	$184,493	$185,117	$185,743	$186,372	$199,646
Base Rates	incl. in "Water Sales"[3]	$1,380,330	$1,236,846	$1,265,074	$1,269,338	$1,273,616	$1,277,909	$1,282,217	$1,286,539	$1,290,875	$1,295,521
Water Sales	$3,513,000[3]	$1,924,125	$1,968,039	$1,974,672	$1,981,328	$1,988,006	$1,994,707	$2,001,431	$2,008,177	$2,015,404	$2,015,404
Misc. Charges[4]	$83,200										
Y Bar S Account[5]											
Other Revenue	$112,800	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,001
Total Revenue	***$4,017,471***	***$4,401,514***	***$4,390,742***	***$4,496,236***	***$3,477,261***	***$3,488,815***	***$3,500,408***	***$3,512,041***	***$3,523,713***	***$3,535,424***	***$3,560,572***
Expenses											
Salary/Benefits	$1,150,917	$1,185,445	$1,221,008	$1,257,638	$1,295,367	$1,334,228	$1,374,255	$1,415,483	$1,457,947	$1,501,686	$1,546,736
Supplies	$192,715	$198,496	$204,451	$210,585	$216,902	$223,410	$230,112	$237,015	$244,126	$251,449	$258,993
Services/Charges	$267,582	$275,609	$283,878	$292,394	$301,166	$310,201	$319,507	$329,092	$338,965	$349,134	$359,608
State Public Utility Tax (5%)	$185,000	$220,076	$219,537	$224,812	$173,863	$174,441	$175,020	$175,602	$176,186	$176,771	$178,029
City Utility Tax (9.5%)	$331,170	$418,144	$417,120	$427,142	$330,340	$331,437	$332,539	$333,644	$334,753	$335,865	$338,254
Interfund Services	$595,514	$613,379	$631,781	$650,734	$670,256	$690,364	$711,075	$732,407	$754,379	$777,011	$800,321
Loan Payments	$430,987	$430,987	$430,987	$430,987	$430,987	$430,987	$430,987	$430,987	$430,987	$430,987	$430,987
Total Expense	***$3,153,885***	***$3,342,136***	***$3,408,762***	***$3,494,292***	***$3,418,882***	***$3,495,068***	***$3,573,495***	***$3,654,230***	***$3,737,342***	***$3,822,903***	***$3,912,928***
Budgeted CIP Projects[6]	$1,761,965										
End of Year Balance	***$5,088,173***	***$6,147,550***	***$7,129,529***	***$8,131,473***	***$8,189,852***	***$8,183,599***	***$8,110,512***	***$7,968,323***	***$7,754,694***	***$7,467,215***	***$7,114,858***

(1) Assumes ERU growth and inflation rates per Table 9-5. No rate increase assumed.
(2) Financial information for 2023 provided from City budget. Future years are projected based on inflation and population growth rates.
(3) Base Rates and Water Sales line items are combined in City actuals and budgets, but separated for projecting future water service revenues. Projected water service revenues are based on an average consumption of 190 gpd per ERU.
(4) Misc. charges are not assumed for future years.
(5) Y Bar S revenues and project expenditures are not included in the financial analysis for future years (2023-2033). Revenues are collected separately for Y Bar S system pipe replacement and are not available for other use.
(6) CIP costs included based on 2023 budget.

TABLE 9-7

Projected Revenue and Expenditures with CIP Program, 5 Percent per Year Rate Increase[(1)(6)]

Year	2023[(2)]	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Beginning Fund	$5,830,883	$5,088,173	$5,806,061	$2,589,841	$2,545,408	$1,629,172	$2,157,682	$2,499,146	$2,405,934	$2,712,073	$3,734,232
Revenue											
Accounts	6,540	6,688	6,839	6,996	7,019	7,043	7,067	7,090	7,114	7,138	7,164
ERUs	9,033	9,237	9,446	9,662	9,695	9,727	9,760	9,793	9,826	9,859	9,894
Base Rates (per mo)	$15.07	$15.82	$16.61	$17.45	$18.32	$19.23	$20.20	$21.21	$22.27	$23.38	$24.55
Consumption Rate (per 1 ccf)	$2.13	$2.24	$2.35	$2.47	$2.59	$2.72	$2.85	$3.00	$3.15	$3.30	$3.47
Connection Fee	$526,940	$1,147,359	$1,179,771	$1,213,123	$183,251	$183,871	$184,493	$185,117	$185,743	$186,372	$199,646
Base Rates	incl. in "Water Sales"[3]	$1,449,347	$1,363,622	$1,464,481	$1,542,888	$1,625,493	$1,712,520	$1,804,208	$1,900,804	$2,002,571	$2,110,267
Water Sales	$3,513,000	$1,915,016	$2,121,348	$2,278,251	$2,400,226	$2,528,732	$2,664,118	$2,806,753	$2,957,025	$3,115,342	$3,282,881
Misc. Charges[4]	$83,200	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Y Bar S Account[5]											
Other Revenue	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
Total Revenue	***$4,173,140***	***$4,561,721***	***$4,714,741***	***$5,005,855***	***$4,176,365***	***$4,388,096***	***$4,611,132***	***$4,846,078***	***$5,093,572***	***$5,354,285***	***$5,642,794***
Expenses											
Salary/Benefits	$1,150,917	$1,185,445	$1,221,008	$1,257,638	$1,295,367	$1,334,228	$1,374,255	$1,415,483	$1,457,947	$1,501,686	$1,546,736
Supplies	$192,715	$198,496	$204,451	$210,585	$216,902	$223,410	$230,112	$237,015	$244,126	$251,449	$258,993
Services/Charges	$267,582	$275,609	$283,878	$292,394	$301,166	$310,201	$319,507	$329,092	$338,965	$349,134	$359,608
State Public Utility Tax (5%)	$185,000	$228,086	$235,737	$250,293	$208,818	$219,405	$230,557	$242,304	$254,679	$267,714	$282,140
City Utility Tax (9.5%)	$331,170	$433,364	$447,900	$475,556	$396,755	$416,869	$438,058	$460,377	$483,889	$508,657	$536,065
Interfund Services	$595,514	$613,379	$631,781	$650,734	$670,256	$690,364	$711,075	$732,407	$754,379	$777,011	$800,321
Loan Payments	$430,987	$425,644	$420,301	$414,959	$409,616	$404,273	$398,930	$393,587	$388,244	$382,902	$377,559
Total Expense	***$3,153,885***	***$3,360,024***	***$3,445,057***	***$3,552,159***	***$3,498,880***	***$3,598,749***	***$3,702,493***	***$3,810,266***	***$3,922,229***	***$4,038,552***	***$4,161,422***
CIP Total[6]	$1,761,965	$483,810	$4,485,904	$1,498,129	$1,593,720	$260,837	$567,175	$1,129,024	$865,204	$293,574	$503,969
End of Year Balance	***$5,088,173***	***$5,806,061***	***$2,589,841***	***$2,545,408***	***$1,629,172***	***$2,157,682***	***$2,499,146***	***$2,405,934***	***$2,712,073***	***$3,734,232***	***$4,711,635***

(1) Assumes ERU growth and inflation rates per Table 9-5.
(2) Financial information for 2023 provided from City budget. Future years are projected based on inflation and population growth rates.
(3) Base Rates and Water Sales line items are combined in City actuals and budgets, but separated for projecting future water service revenues. Projected water service revenues are based on an average consumption of 190 gpd per ERU.
(4) Misc. charges are not assumed for future years.
(5) Y Bar S revenues and project expenditures are not included in the financial analysis. Revenues are collected separately for Y Bar S system pipe replacement and are not available for other use.
(6) CIP projects are included based on the cost and year for each project noted in Chapter 8 and in Table 9-8. Costs are escalated using the inflation rate noted in Table 9-5 for the planned year of construction, with the starting year of 2023.

TABLE 9-8

High-Priority CIP Projects

Project	Planned Year	Cost (2023 Dollars)
D-7 Boise Springs Transmission Main	2025	$3,222,000
D-11 Lafromboise Street Alley from Elmont Avenue to Montgomery Avenue	2030	$693,000
D-13 Harding Street from Kibler Avenue to Griffin Avenue	2027	$1,176,000
D-14 McHugh Avenue from Garfield Street to Caleb Road	2025	$1,202,000
D-16 Steel Main Replacements	Annually	$150,000 (annual)
Z-1 New Pressure Zone	2026	$1,146,000
ST-4 Reduce Dead Storage in Crews Reservoir	2024	$2,000
G-1 Comprehensive Water System Plan Update	2033	$150,000
G-3 PC Johnson Automatic Transmission Main Control Valve	2031	$448,000
G-4 PC Johnson Wellfield Chlorine Analyzer	2031	$10,000
G-5 PC Johnson Wells 2 and 3 Rehabilitation	2029	$250,000
G-6 Automated Flushing Devices	2027	$15,000
G-9 Misc. Water Improvements (annual)	Annually	$75,000 (annual)

WATER RATE EVALUATION

Table 9-9 provides a comparison of the current water utility rates for Enumclaw, as well as other water purveyors in the area and/or of similar size as a point of comparison. The City's rates are highlighted. The City's three-tiered water rate structure for residential customers appears to have improved demand-side conservation, as the per-ERU consumption has steadily fallen over the past two decades. The City will complete a detailed rate study in 2024 to evaluate the need for water rate adjustments.

TABLE 9-9

Other Water Utility Rates

Purveyor	Base Monthly Rate	Consumption Charge	Typical Monthly Fee (assuming 189 gpd, or 7.58 CCF/mo Usage)
Puyallup[(1)]	$21.73	$2.27 per CCF (up to 10 CCF) $3.21 per CCF (10 to 24 CCF)	$30.49
Enumclaw (in-City)	**$15.07**	**$2.13 per CCF (up to 7.5 CCF) $2.82 per CCF (7.5 to 20 CCF)**	**$31.21**
DuPont	$33.37 (includes 500 cubic feet)	$2.33 per CCF	$39.38
Sumner (in-City)	$25.40	$2.22 per CCF	$42.23
Tacoma (in-City)	$25.83	$2.21 per CCF	$42.56
Auburn (in-City)	$18.24	$3.62 per CCF (up to 7 CCF) $4.42 per CCF (7 to 15 CCF)	$46.14
Enumclaw (outside of City)	**$22.61**	**$3.21 per CCF (up to 8 CCF) $4.25 per CCF (8 to 20 CCF)**	**$46.94**
Sumner (outside of City)	$29.21	$2.55 per CCF	$48.56
Fife	$37.00 (includes 300 cubic feet)	$4.70 per CCF, Additional 25 percent surcharge in summer	$48.75
Snohomish (in City)[(1)]	$49.68 (includes 400 cubic feet)	$4.58 per CCF	$50.39
Milton	$28.91	$2.86 per CCF	$50.59
Tacoma (outside of City)	$31.28	$2.65 per CCF	$51.35
Pacific	$30.00	$4.20 per CCF (up to 7 CCF) $4.80 per CCF (7 to 14 CCF)	$62.18
Auburn (outside of City)	$27.36	$5.43 per CCF (up to 7 CCF) $6.63 per CCF (7 to 15 CCF)	$69.21

TABLE 9-9 – (continued)

Other Water Utility Rates

Purveyor	Base Monthly Rate	Consumption Charge	Typical Monthly Fee (assuming 189 gpd, or 7.58 CCF/mo Usage)
Snohomish (Outside of City)(1)	$74.52 (includes 400 cubic feet)	$6.87 per CCF	$75.59
Valley Water District(1)	$62.28	$3.62 per CCF (up to 7 CCF) $4.42 per CCF (7 to 15 CCF)	$81.17

(1) Bimonthly billing. Typical monthly fee is based on the bimonthly fee divided by 2.

AVAILABLE CAPITAL PROJECT FUNDING SOURCES

The City completes capital improvement projects (CIP) from a variety of sources. These sources include; cash resources, revenues, government grants or low interest loans, and publicly issued debt (tax-exempt or taxable). This section describes several funding sources available to the City without reference to any specific project.

PUBLIC WORKS TRUST FUND

The Public Works Trust Fund (PWTF) is a revolving loan fund designed to help local governments finance needed public works projects through low-interest loans and technical assistance. The PWTF, established in 1985 by legislative action, offers loans substantially below market rates, payable over periods ranging up to 20 years.

Interest rates typically range from 0.5 percent to 2 percent, with the lower interest rates providing an incentive for a higher financial share. The useful life of the project determines the loan term, with a maximum term of 20 years.

To be eligible, an applicant must be a local government such as a city, town, county, or special purpose utility district, and have a long-term plan for financing its public work needs. If the applicant is a city, town, or county it must adopt 1/4-percent real estate excise tax dedicated to capital purposes. Eligible public works systems include streets and roads, bridges, storm sewers, sanitary sewers, and domestic water. Loans are presently offered only for purposes of repair, replacement, rehabilitation, reconstruction or improvement of existing service users. A recent change has now made projects intended to meet reasonable growth (as detailed in a 20-year growth management plan) eligible for PWTF funding.

An applicant can apply to the construction program for up to $10,000,000 per biennium. Applications for the construction program are due in July of each year, with funds available the following year. Preconstruction loans are limited to $1,000,000 per biennium and can be submitted throughout the year. A preconstruction application must be submitted to the Public Works Board on or before the 15th of each month. The Board meets on a monthly basis and makes the award decisions at that time. Preconstruction funds are available as soon as the contracts can be issued.

DRINKING WATER STATE REVOLVING FUND

Drinking Water State Revolving Fund (DWSRF) provides loan funding for water system projects. Health and Safety projects will receive the highest rankings for funding. Water main projects, even those projects that improve fire flow typically do not receive a ranking high enough to receive funding.

COMMUNITY ECONOMIC REVITALIZATION BOARD (CERB)

The Community Economic Revitalization Board's prime mission is to partner with business and industry and local governments to maintain and create jobs. Established by the Legislature in 1982, CERB provides low-interest loans or, in unique circumstances, grants to help finance local public infrastructure necessary to develop or retain stable business and industrial activities. Projects eligible for funding include domestic and industrial water systems, sanitary and storm sewers, port facilities, and telecommunications.

Typically, CERB provides loans in the amount of $1 million and, where applicable, grants in the amount of $300,000. The interest rate is tied to the current cost of a 10-year bond and a local match of 10 percent is required.

Eligible applicants include Washington State subdivisions in partnership with private enterprise. If there is no economic partner, a local government can produce a feasibility study that documents realistic job retention or creation. Applications must be submitted 45 days prior to a regularly scheduled CERB Meeting, which typically meet in January, March, July, and November.

REVENUE BONDS

The most common source of funds for construction of major utility improvements is the sale of revenue bonds. These tax-free bonds are issued by a city or town. The major source of funds for debt service on revenue bonds is from monthly water or sewer service charges. In order to qualify to sell revenue bonds marketable to investors, the bonds typically have contractual provisions for the city or town to meet debt coverage requirements. The city or town must show that its annual net operating income (gross income less operation and maintenance expenses) must be equal to or greater than a factor, typically 1.2 to 1.4 times the annual debt service on all par debt. If a coverage factor has not been specified it will be determined at the time of any future bond issues.

APPENDIX A

DOH PROJECT APPROVAL APPLICATION AND SUBMITTAL FORMS

Drinking Water

Project Approval Application (PAA) Form

331-149 F • Revised 1/10/2022

Please complete all appropriate sections of this application form and include it with your project.

WATER SYSTEM Information

Enumclaw Water Department	236001
Water System Name	PWS ID #
Water System Plan	King
Submittal Description	County
A-Communinty	1,000 - 9,000
Classification	# of Service Connections

OWNER Information

City of Enumclaw	236001
Name	Owner ID #
swoodbury@ci.enumclaw.wa.us	3606155728
E-mail address	Phone

1309 Myrtle Ave	Enumclaw		
Mailing address	City	State	Zip

PROJECT CONTACT Information

Scott Woodbury / Assistant PW Director	
Name/Position	
swoodbury@ci.enumclaw.wa.us	3606155728
E-mail address	Phone

1309 Myrtle Ave	Enumclaw	WA	98022
Mailing address	City	State	Zip

CONSULTING/DESIGN ENGINEER Information

Gray & Osborne, Inc	
Name/Firm	
ksidebottom@g-o.com	2062840860
E-mail address	Phone

1130 Rainier Ave S	#300, Seattle	WA	98144
Mailing address	City	State	Zip

SMA Information

NA	
Name/SMA	SMA #
E-mail address	Phone

Mailing address	City	State	Zip

BILLING Information*

City of Enumclaw	
Name	
swoodbury@ci.enumclaw.wa.us	3606155728
E-mail address	Phone

1309 Myrtle Ave	Enumclaw	WA	98022
Mailing address	City	State	Zip

GENERAL Submittal Information

☒ Check here if you need a Box.com folder set up for transferring your project to us electronically. (You will receive an invite by email after we have received the PAA form.)

Do you have projects currently under review by us? ☐ Yes ☒ No

☐ This is a new water system (if so, include a completed Water Facilities Inventory Report Form with your project).

☐ DWSRF Loan
Application # _____
Loan # _____

☐ Enforcement
Docket # _____
Type _____

☒ Water System Plan (complete Planning Information)

☐ Small Water System Management Program (complete Planning Information)

☐ Engineering (complete Engineering Information)

☐ Group B (complete Engineering Information)

☐ Satellite Management Agency Plan (complete SMA Information)

☐ Alternate Technology (complete Engineering Information)

ENGINEERING Information

Project Report Type	Special Report or Plans
Predesign Study	Existing System Approval
Construction Documents	Waiver
Other	

PLANNING Information

How many connections does system currently have?	6330
If system is private-for-profit, is it regulated by UTC?	☐ Yes ☒ No
Is system expanding?	☐ Yes ☒ No
Expanding service area?	☐ Yes ☒ No
Increasing number of approved connections?	☐ Yes ☒ No
If the number of connections is expected to increase, how many *new* connections are proposed in the next ten (10) years?	1025
Is your system pursuing additional water rights from Department of Ecology in the next 20 Years?	☐ Yes ☒ No
Is a new intertie proposed?	☐ Yes ☒ No
Is the system located in a Critical Water Supply Service Area (is there a Coordinated Water System Plan)?	☒ Yes ☐ No
If yes, have you sent a copy of the plan to the county or responsible agency for the CWSP?	☒ Yes ☐ No
Are you requesting distribution main project report and construction document submittal exception?	☒ Yes ☐ No
If so, does the WSP contain standard construction specifications for distribution mains?	☒ Yes ☐ No
The water system/purveyor is responsible for sending a copy of the plan to:	
• Adjacent utilities for review or a letter notifying them that a copy is available for their review and where it is located.	☒ Yes ☐ No
• All local governments within the service area.	☒ Yes ☐ No
• County and city planning departments, one or both if applicable, adjacent water systems, etc..	☒ Yes ☐ No
List who have you sent the WSP to for review other than ODW?	See attached list
Are you proposing a change in the place of use of your water right?	☐ Yes ☒ No
If "yes," the purveyor must send a copy of the WSP or SWSMP to all local governments within the service area (county and city planning departments) for a local consistency determination. Has this been completed?	☐ Yes ☐ No
What are the years of the requested plan approval period (for example 2022 to 2032)?	2023-2033
Does your plan follow your preplan checklist?	☒ Yes ☐ No

SMA Information

☐ Ownership only ☐ Management and Operations only ☐ Ownership, Management & Operations

Where can we find the *SMA Notice of Intent* 331-590, in your plan.....

Please submit all documents electronically. We request one paper copy of planning documents be submitted to the address for your regional office below.

☐ **Eastern Regional Office**
Department of Health
eroadmin@doh.wa.gov
Phone: 509-329-2100

☐ **Northwest Regional Office**
Department of Health
dw.nwro.wsprojects@doh.wa.gov
Phone: 253-395-6750

☐ **Southwest Regional Office**
Department of Health
swro.admin@doh.wa.gov
Phone: 360-236-3030

Washington State Department of Health

To request this document in another format, call 1-800-525-0127. Deaf or hard of hearing customers, please call 711 (Washington Relay) or email civil.rights@doh.wa.gov.

Jessica Knickerbocker
City of Tacoma
3628 South 35th Street
Tacoma, WA 98409-3192

Chief Randy Fehr
Fire District 28
1330 Wells St
Enumclaw, WA 98022

Chief Dawn Judkins
Mt View Fire & Rescue
32316 148th Ave SE
Auburn, WA 98092

Krongthip Sangkapreecha
Muckleshoot Indian Tribe
39015-A 172nd Ave SE
Auburn, WA 98092

Randy Carroll
Remolif Water System
PO Box 1012
Enumclaw, WA 98022

John G. Weidenfeller
Walczak Water System
PUD #1 of Thurston Co
1230 Ruddell Rd SE
Lacey, WA 98503

Daniel Cardwell
King County UTRC
919 SW Grady Way, Suite 300
Renton, WA 98057

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
NORTHWEST DRINKING WATER REGIONAL OPERATIONS
PO BOX 47800 ATTN: MS K17-12 OLYMPIA, WA 98504-7800

August 3, 2023

Scott Woodbury
swoodbury@ci.enumclaw.wa.us

Subject: Enumclaw Water Department, ID #23600
Seattle-King County Health Department
Water System Plan
Submittal #**23-0707**

Dear Scott Woodbury:

On July 27, 2023, we received documents submitted for review and approval per WAC 246-290-990.

This project has been assigned the unique identification number #23-0707. Please include this number on all future correspondence or additional submittals pertaining to this project.

ODW will review your submittal and respond to you within 90 days. We may extend this time limitation for new submittals up to an additional ninety days if we need more time to adequately review your plan. If additional time is needed, you will be notified in writing.

According to our information, you are the owner or authorized representative of the water system described in the planning submittal. You will receive an invoice requesting payment for the review fee. Payment is due at that time. The base fee includes two reviews of the project. Additional reviews, if required, will be invoiced separately. Please forward the invoice to your Accounts Payable department to ensure prompt payment.

The department's review of your design will not confer or guarantee any right to a specific quantity of water. Our review will be based on your representation of available water quantity. If the Washington Department of Ecology, a local planning agency, or other authority responsible for determining water rights and water system adequacy determines that you have use of less water than you represent, the number of approved connections may be reduced commensurate with the actual amount of water and your legal right to use it.

If you have any questions, please contact Regional Planner Krista Chavez at 253-395-6772 or by email at Krista.Chavez@doh.wa.gov.

Northwest Regional Operations Admin
EPH, Northwest Drinking Water Regional Operations
Washington State Department of Health
DW.NWRO.WSProjects@doh.wa.gov
253-395-6750 | www.doh.wa.gov
253-395-6760 (fax)

ecc: Kerri Sidebottom, PE, Gray & Osborne, Inc.
Seattle-King County Health Department
Brietta Carter, PE, Northwest Office of Drinking Water

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
NORTHWEST DRINKING WATER REGIONAL OPERATIONS
PO BOX 47800 MS:47822 OLYMPIA, WA 98504-7800

January 23, 2024

SCOTT WOODBURY
ENUMCLAW WATER DEPARTMENT
SWOODBURY@CI.ENUMCLAW.WA.US

Subject: Enumclaw Water Department (ID# 23600)
King County
Submittal #23-0707 Water System Plan
Review Comments

Dear Scott Woodbury:

The Enumclaw Water Department (the City) water system plan (WSP) was received in this office for review and approval per WAC 246-290 on July 27, 2023 and processed on August 3, 2023. Thank you for your patience. We have reviewed the plan and offer the following comments. These comments must be adequately addressed prior to approval of the WSP.

Description of Water System

1. This plan indicates that the Weyerhaeuser Booster Pump Station does not have standby power. The department recommends providing standby power for pumps stations serving closed pressure zones. Please consider.

Basic Planning Data

2. Table 2-12: Please also show the DSL expressed in ERUs.

System Analysis

3. Kudos on the robust asset management program. If you plan to apply for DWSRF funding for any of your CIP projects, please know that you will need to show an asset inventory that includes at least 5 of the following: a list of system assets, age of assets, expected life, replacement costs, level of service and criticality. Please include a screenshot of your asset management inventory in an appendix.

Water Quality

No comments.

Operations & Maintenance

4. Record Keeping and Reporting. Lead and Copper Rule Revisions require documentation of service line material type as part of routine operations (meter replacement for

example). Has the City developed a process for collecting material type during routine operations? Please include in this section.

5. The DOH regional engineer listed in Table 3 of your Emergency Response Plan is out of date. Please replace Paige Igoe with Brietta Carter at 564-999-3355. Please also include the DOH after-hours emergency response phone number 877-481-4901 in this table.

6. E.coli Response Plan: Your Coliform Monitoring Plan is well done. Do you have an estimated timeframe for setting up a reverse 9-1-1 system or other fast communication plan?

Water Use Efficiency Program

7. Please provide proof of proper public notice for your WUE goal setting meeting and the meeting minutes that show the goals were discussed, Please also include the adoption of your WUE program by your governing body. These can be included in an appendix.

8. Based on your water system size, you must evaluate 6 WUE measures per WAC 246-290-810(4). Supply-side measures such as installing meters and performing leak detection surveys do not count towards the minimum number of measures required for your WUE program. Please include two more measures in your WUE program.

Source Water Protection Program

No comments.

Distribution Facilities Design and Construction Standards

No comments.

Improvement Program

No comments.

Financial Program

9. Does the City plan to pursue any funding for the CIP projects?

Miscellaneous Documents

10. Department of Ecology provided comments regarding your Water Rights Self-Assessment on September 9, 2023. Please address these comments in the revised and final copy of the plan. Please also include email or letter confirmation from Ecology that they are satisfied with your response.

11. Have the neighboring water systems and Muckleshoot tribe reviewed the plan and provided comments?

12. Provide an adoption ordinance from the King County Council.

13. Please ensure the final plan includes a signed SEPA checklist and signed threshold determination.

14. Please include the Meeting of the Consumers meeting minutes that shows this plan was presented.

15. Include signed adoption of the final plan by your governing body.

We hope that you have found these comments to be clear, constructive and helpful in the development of your final WSP submittal. **We ask that you submit the revised WSP on or before April 22, 2024.** In order to expedite the review of your revised submittal, please include a cover letter summarizing how each of the above comments was addressed in the revised WSP and where each response is located (i.e., page numbers, Appendices, etc.)

Regulations establishing a schedule of fees for review of planning, engineering, and construction documents have been adopted (WAC 246-290-990). The total cost is **$3,705.00.** An itemized invoice for the review of this project has been sent to the DOH primary contact on file for your water system. Please note that this fee covers our current review and one more submittal for this project. If additional submittals are required, then an invoice for additional fees will be included with our final approval letter. Please remit complete payment in the form of a check or money order within thirty days of the date of this letter by following the instructions on the invoice.

DOH recognizes the significant effort and resource commitment involved in the preparation of your Planning document. Thank you for your cooperation. If you have any questions or wish to check our records, please contact us at the numbers listed below.

Sincerely,

Krista Chavez
DOH Regional Planner
(564) 669-0757

Brietta Carter, P.E.
DOH Regional Engineer
(564) 999-3355

Enclosure

ecc: Kerri Sidebottom, Gray & Osborne
Dept. of Ecology, NWRO
Dan Cardwell, King Co UTRC
Lynn Schneider, SK Co Health Department
Wes Lovin, SK Co Health Department

STATE OF WASHINGTON
Department of Health
OFFICE OF DRINKING WATER
Project And Plan Review

INVOICE

ENUMCLAW WATER DEPARTMENT, CITY OF
ENUMCLAW WATER DEPARTMENT
1309 MYRTLE AVE
ENUMCLAW, WA 98022

WS ID: 23600
Invoice No: 54890
Invoice Date: 01/23/2024
Due Date: 02/22/2024

WS NAME: ENUMCLAW WATER DEPARTMENT

PROJECT AND PLAN REVIEW SUBMITAL#: 23-0707

DESCRIPTION	QTY	COST	AMOUNT
Water System Plan	1	x $3705.00	$3705.00
		Total Amount Due	**$3705.00**

Comments:

1. ***Pay online*** with a credit card, debit card, or electronic check (ACH) using the Environmental Health Payment System at https://secureaccess.wa.gov/.
2. For billing questions, please contact Northwest Drinking Water Regional Operations at (253) 395-6750 or via email DW.NWRO.WSProjects@doh.wa.gov.
3. This invoice is issued in accordance with WAC 246-290-990(3)(c)(iii).
4. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 711 Washington Relay Service.
5. If paying by check:

   Make checks payable to Department of Health, Federal ID #91-1444603.

Please return the bottom portion of this invoice with your check.

Invoice Number: 54890
Invoice Amount: $3705.00
Owner Number: 001780
WS Name: ENUMCLAW WATER DEPARTMENT

Invoice Date: 01/23/2024
Invoice Due Date: 02/22/2024
Region: NW
WS ID: 23600

Reference: PROJECT AND PLAN REVIEW FEES

Please remit to:
ACCOUNTS RECEIVABLE
DOH PROJECT AND PLAN REVIEW FEES
PO BOX 1099
OLYMPIA, WA 98507-1099

7DWA10597240100 PP00023600X02222400370500

CITY OF ENUMCLAW

DEPARTMENT OF PUBLIC WORKS

February 27, 2024

Krista Chavez, Regional Planner
Brietta Carter, PE, Regional Engineer
WA State Dept of Health
NW Drinking Water Regional Operations
PO Box 47800 MS: 47822
Olympia, WA 98504-7800

RE: Response to Comments on Draft Enumclaw Water System Plan

Dear Krista Chavez and Brietta Carter:

The comments provided in your January 23, 2024, letter review on the draft Enumclaw Water System Plan are reproduced below. Responses follow each comment in bold font.

1) This plan indicates that the Weyerhaeuser Booster Pump Station does not have standby power. The department recommends providing standby power for pumps stations serving closed pressure zones. Please consider.

   A Retail Water Service Agreement was executed on June 12, 2023, with Lisa Inc, the owner of the properties served by the Weyerhaeuser BPS. The agreement documents that Lisa owns and is responsible for the booster station, its power supply, and the Lisa system. A copy of the agreement has been added to Appendix H. The booster station will be removed from the plan as a City facility in the next plan update. Removing it from the current plan would entail a significant effort that we hope to avoid.

   The City replaced its standby generator for the adjacent Boise Spring chlorination building in 2023 and gave Lisa the option to join with the City to install a generator large enough to also serve their booster pump station and they declined the offer.

2) Table 2-12: Please also show the DSL expressed in ERUs.

   Table 2-12 has been revised as requested.

3) Kudos on the robust asset management program. If you plan to apply for DWSRF funding for any of your CIP projects, please know that you will need to show an asset inventory that includes at least 5 of the following: a list of system assets, age of assets, expected life, replacement costs, level of service and criticality. Please include a screenshot of your asset management inventory in an appendix.

   We currently have two DWSRF loans with debt service payments that end in 2036. We plan to continue to utilize DWSRF funding as part of our CIP financing and appreciate knowing the required asset inventory elements. We won't have all the necessary elements added prior to the

final plan approval deadline but will do so before applying for DWSRF funding. A printout of the current asset management inventory has been added to the end of Appendix G.

4) Record Keeping and Reporting. Lead and Copper Rule Revisions require documentation of service line material type as part of routine operations (meter replacement for example). Has the City developed a process for collecting material type during routine operations? Please include in this section.

   In response to the Lead and Copper Rule Revisions requirement to document service line material, operations staff started in mid-2023 documenting service line material type on the customer side of the water meter when conducting a service line replacement. That process has been expanded to include confirming material type during routine operations as well.

   The text of the above paragraph has been added to the referenced section on Page 7-35.

5) The DOH regional engineer listed in Table 3 of your Emergency Response Plan is out of date. Please replace Paige Igoe with Brietta Carter at 564-999-3355. Please also include the DOH after-hours emergency response phone number 877-481-4901 in this table.

   The table has been updated as requested.

6) E.coli Response Plan: Your Coliform Monitoring Plan is well done. Do you have an estimated timeframe for setting up a reverse 9-1-1 system or other fast communication plan?

   A reverse 911 notification process will be set up through King County EMS in 2024.

7) Please provide proof of proper public notice for your WUE goal setting meeting and the meeting minutes that show the goals were discussed, Please also include the adoption of your WUE program by your governing body. These can be included in an appendix.

   The requested documentation has been added to a new Appendix R – Water System Plan and WUE Goal Adoption.

8) Based on your water system size, you must evaluate 6 WUE measures per WAC 246-290-810(4). Supply-side measures such as installing meters and performing leak detection surveys do not count towards the minimum number of measures required for your WUE program. Please include two more measures in your WUE program.

   The City's WUE measures have been clarified in Chapter 5 to account for the applicability of measures to various customer classes. A summary of the City's WUE measures is included in Table 5-5

9) Does the City plan to pursue any funding for the CIP projects?

   Yes, higher cost projects such as a new reservoir typically require outside financing to spread out the cost impact.

10) Department of Ecology provided comments regarding your Water Rights Self-Assessment on September 9, 2023. Please address these comments in the revised and final copy of the plan. Please also include email or letter confirmation from Ecology that they are satisfied with your response.

    The Department of Ecology comments and the Enumclaw response have been added in a new Appendix S – Department of Ecology and City of Tacoma Comments. No other comments were received except from the Department of Health and King County, which are included in Appendices A and C respectively.

11) Have the neighboring water systems and Muckleshoot tribe reviewed the plan and provided comments?

    Comments were received only from the City of Tacoma via email. A copy of the email and the Enumclaw response have been added to Appendix S. The Muckleshoot Tribe and the owner of the Walczak Water System acknowledged receipt of the plan but did not submit any comments.

12) Provide an adoption ordinance from the King County Council.

    The King County adoption ordinance will be included in Appendix C following King County approval of the final WSP. The revised WSP was sent to the County for review at the same time as the final WSP and response letter was sent to DOH for final review.

13) Please ensure the final plan includes a signed SEPA checklist and signed threshold determination.

    The requested documentation has been added to Appendix F.

14) Please include the Meeting of the Consumers meeting minutes that shows this plan was presented.

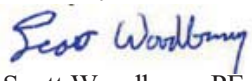
    The requested documentation has been added to Appendix R.

15) Include signed adoption of the final plan by your governing body.

    The final plan adoption document has been added to Appendix R.

I appreciate your assistance. If you have any questions, please contact me at 360-615-5728.

Sincerely,



Scott Woodbury, PE
Assistant Public Works Director

APPENDIX B

WATER FACILITIES INVENTORY FORM

WATER FACILITIES INVENTORY (WFI) FORM

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

ONE FORM PER SYSTEM

Quarter: 1
Updated: 01/11/2023

Printed: 5/9/2023
WFI Printed For: On-Demand
Submission Reason: Pop/Connect Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822 or email wfi@doh.wa.gov

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
23600 1	ENUMCLAW WATER DEPARTMENT	KING	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS

KYTE RAMBERG [WATER SUPERVISOR]
2041 RAILROAD ST
ENUMCLAW, WA 98022

7. OWNER NAME & MAILING ADDRESS

ENUMCLAW WATER DEPARTMENT, CITY OF
S SCOTT WOODBURY
1309 MYRTLE AVE
ENUMCLAW, WA 98022

ASSIT. PUBLIC WD

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION	
Primary Contact Daytime Phone:	(360) 825-5541	Owner Daytime Phone:	(360) 615-5728
Primary Contact Mobile/Cell Phone:	(253) 797-2712	Owner Mobile/Cell Phone:	(253) 261-1937
Primary Contact Evening Phone:	(xxx)-xxx-xxxx	Owner Evening Phone:	(xxx)-xxx-xxxx
Fax:	E-mail: kxxxxxxg@ci.enumclaw.wa.us	Fax:	E-mail: sxxxxxxxy@ci.enumclaw.wa.us

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

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed
- [ ] Managed Only
- [ ] Owned Only

SMA NAME: _____ SMA Number:

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

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

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [x] City / Town
- [ ] County
- [ ] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons)

5,740,000

- 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
23600 1	ENUMCLAW WATER DEPARTMENT	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	Boise Spring					X							X			Y		X				X		898	SE NW	29	20N	07E
S02	Watercress Spring #1					X							X			Y		X				X		1735	NW NW	19	20N	07E
S03	86800N/TACOMA	86800 N													X	Y	X							1000	SE NE	26	20N	06E
S05	PCII JOHNSON WELL #2				X									X		Y		X					229	1200	NE SW	18	20N	07E
S06	PCIII JOHNSON WELL #3 (AKA #1R)				X									X		Y		X					225	800	NE SW	18	20N	07E
S07	PC JOHNSON WELLS 2 & 3			X										X		Y		X					225	1500	NE SW	18	20N	07E
S08	Watercress Spring #2 ALK139		X										X			Y		X				X	20	2289	NE NW	19	20N	07E
S09	Zone 888/983 Well AFT336		X											X		Y		X					80	676	NW SE	30	20N	07E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
23600 1	ENUMCLAW WATER DEPARTMENT	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?)		7334	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	6082		
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	238		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	1252		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	551	551	
28. TOTAL SERVICE CONNECTIONS		7885	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 17100

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?	1550	1400	1550	1550	1550	1500	1550	1550	1500	1550	1500	1550
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 that are NOT already included in the residential population?												
B. How many days per month are they present?												

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	15	15	15	15	15	15	15	15	15	15	15	15

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: _____

Intentionally left blank

WS ID	WS Name
23600	ENUMCLAW WATER DEPARTMENT

Total WFI Printed: 1

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

Water Facilities Inventory (WFI)

Report Create Date:	5/9/2023		
Water System Id(s):	236001		
Print Data on Distribution Page:	ALL		
Print Copies For:	DOH Copy		
Water System Name:	ALL		
County:	-- Any --		
Region:	ALL		
Group:	ALL		
Type:	ALL		
Permit Renewal Quarter:	ALL		
Water System Is New:	ALL		
Water System Status:	ALL		
Water Status Date From:	ALL	**To**	ALL
Water System Update Date	ALL	**To**	ALL
Owner Number:	ALL		
SMA Number:	ALL		
SMA Name:	ALL		
Active Connection Count From:	ALL	**To:**	ALL
Approved Connection Count	ALL	**To:**	ALL
Full-Time Population From:	ALL	**To:**	ALL
Water System Expanding	ALL		
Source Type:	ALL		
Source Use:	ALL		
WFI Printed For:	On-Demand		

APPENDIX C

CONSISTENCY DETERMINATIONS

King County
Utilities Technical Review Committee
Department of Local Services
201 S Jackson Street
KSC-LS-0815
Seattle, WA 98104
www.kingcounty.gov

City of Enumclaw, 2023 Water System Plan (DRAFT)

The City of Enumclaw submitted a draft Water System Plan ("Plan") for review by the King County Utilities Technical Review Committee (UTRC) on August 1, 2023.

Staff has reviewed the Plan for local statutory requirements and impacts on service to residents in the unincorporated county.

On September 20, 2023, the UTRC held a meeting to review the plan and provide comments to the applicant on the draft Plan. The UTRC requests the following changes and/or clarifications:

General Comments

1) It is not clear if the City allows for permit exempt wells within its Retail Service Area. King County Code 13.24.140 Water facilities in urban areas-interim alternative water service, allows for a permit exempt well if connection to the respective Group A system is not timely or reasonable conditioned upon a requirement for a certificate of future connection. While the City may not expect a situation where the timely and reasonable service provisions would not be met, it would be appropriate to reflect the County's requirement in the Plan document.

2) Has the City considered the impacts of climate change on both water demand and supply? It would be appropriate to include a discussion of how climate change may affect water demand and supply. An example in another water purveyor's plan referenced the change in rainfall and impact on surface water source.

3) Figure 1.5 identifies several Future Service Area "islands" within the City's Retail Service Area; however, the text infers that these areas may not meet Timely and Reasonable Service. How are these "islands" logical? Also, it should be noted that Timely and Reasonable Service provisions don't apply to a Future Service Area. Please clarify.

Comments on Specific Sections of the Draft Plan

4) Chapter 1 – Overview of Existing System – Page 1-2. The draft plan states that there are 7,785 customer connections within the City's existing retail service area. How many of these connections are in unincorporated King County to estimate the unincorporated population served as 4,070?

5) Chapter 1 – Water Service Area – Page 1-6. The 1st paragraph identifies the size of the City's corporate limits but does not provide a total area of unincorporated King County that is within both the City's retail and future service area. Please identify the size of the unincorporated area served.

6) Chapter 1 – Water Service Area Agreement – Page 1-8. The text states that if another Group A water purveyor expands into the City's defined boundary, a written agreement will be prepared. Would this be in a situation where a neighboring purveyor may be able to provide temporary service until the City's system is expanded to the area? If not, why wouldn't the City's designated service area be reduced? What would this type of agreement address? Please clarify.

7) Chapter 1 – Service Area Policies and Conditions of Service – Page 1-13. Under the Dispute Resolution – Retail Service Area, it identifies the local appeal process if a property owner contends the City's conditions of water service is not timely and reasonable. For properties in unincorporated King County, the if appellant is not satisfied with the City's decision, per the South King County CWSP, and King County Code, the property owner can appeal the City's decision to the King County Utilities Technical Review Committee. Please incorporate this additional appeal opportunity into the plan document.

8) Chapter 1 – Service Area Policies and Conditions of Service – Page 1-13. Under the Dispute Resolution – Future Service Area, it states that complaints such as "timely and reasonable" service may be brought to King County per RCW 70.116.060(3)b). Please note that the referenced RCW has been recodified as RCW 70A.100.060. As the Municipal Water Law does not require a duty of serve in a purveyor's future service area, it is unclear as to when a timely and reasonable service appeal would be applicable. Please clarify.

9) Chapter 1 – Service Area Policies – Page 1-13. In review of the Service Area Policies, it is not clear if the City allows for permit exempt wells within its retail service area. If yes, are the wells conditioned upon a future water connection when water service become available in unincorporated King County per King County Code? How many recorded future water connection agreements currently exist? How many private wells exist within the City's service area? Please clarify.

10) Chapter 1 – Applications for New Service – Page 1-13. The text reads as if a property owner only requests a Certificate for Water Availability (CWA) if they want to connect to the City's water system; however, it should be acknowledged that King County requires property owners applying for development in unincorporated King County to obtain a CWA if their property is within a designated service area. Furthermore, the purveyor can require connection if all criteria of Municipal Water Law are met . Also note, in instances that the City does not require connection to its system, King County Code allows a private well only conditioned upon a future connection when water service becomes available to the subject property.

11) Chapter 1 – Land Use and Zoning – Table 1 -4 Zoning Classifications for Enumclaw's Water Service Area – Page 1-18. As the City has a different obligation to provide service in its Retail Service Area versus its Future Service Area, it would be appropriate provide the zoning for each of these areas separately.

12) Chapter 1 – Land Use and Zoning – Figure 1-9 King County Zoning. Please identify the Retail Service Area and Future Service Area within the City's Water Service Area.

13) Chapter 2 – Existing Population, Services, and Water Demand – Population - Page 2-2. The last paragraph states, "The population projections used in this Plan will assume a slight increase in population in the areas beyond City limits in order to not underestimate potential demand." Please clarify the source of the projection for unincorporated King County.

14) Chapter 2 – Existing Population, Services, and Water Demand – Service Connections Page 2-2. Table 2.2 provides the number of service connections by customer classification. Can these statistics be separated by those within the City limits and those in unincorporated King County? Or, as an alternative, can the text in plan note the number of service connection by classification?

15) Chapter 2 – Future Water Demands – Projected Growth – Population – Page 2-13. The draft plan notes the City's 2023 population projection are based on the County's growth and housing targets established in 2009. It further states that the population projection is the minimum that the City must plan to accommodate, and the actual population growth may be different. The text further

acknowledges that the City is updating its Comprehensive Plan and housing targets are not currently established. It is not clear what data source the draft Plan uses for its projections. Please clarify. It should be acknowledged that it is the King County Countywide Planning Policies, not King County that establishes growth and housing targets. Furthermore, the draft plan states the growth and housing targets are the minimum growth that City must accommodate; this statement is not consistent with King County Countywide Planning Policies (CPPs). CPP-DP 14a states that jurisdictions shall accommodate housing and employment by using adopted targets as land use assumptions in comprehensive plans.

16) Chapter 2 – Future Water Demands – Projected Growth – Population – Page 2-14. The 1st paragraph converts the housing growth into population growth. What was the person per household figure used for this conversation?

17) Chapter 2 – Future Water Demands – Projected Growth – Population – Page 2-14. The 2nd paragraph notes PSRC population projection data was used in developing the population projections in the draft plan. What year is the TAZ data from? The most recent PSRC data should be reflected in the plan.

18) Chapter 4 – Available Fire Flow Analysis – Page 4-9. The last sentence of the first paragraph notes that fire flow was assigned based on zoning in each part of the City. Were the areas in unincorporated King County also assigned fire flow based on zoning? Why is there a range between 500 and 1,000 for unincorporated areas? Please clarify.

19) Chapter 6 – Source Water Protection – Introduction – Page 6 – 1. While DOH has determined that Watercress and Boise Springs are not considered surface water sources and are not required to prepare a Watershed Control Plan, these two sources have a "high" susceptibility for contamination. How is the City addressing the "high" susceptibility for contamination?

20) Chapter 7 – Operation and Maintenance Program – Booster Pump Stations – Page 7-15. Does the Capital Improvement Plan include a project for the Weyerhaeuser Booster Pump Station to provide standby power or a power receptacle to allow for connection of a portable generator? Note, if the Weyerhaeuser Booster Pump Station ownership has been transferred to Miles Sand and Gravel, the plan text should acknowledge this transfer.

21) Chapter 9 - Financial Program. As stated in text on page 9-1, single family residential customers have been subject to an increasing block volume charge rate structure since 2007 and rates are adjusted for inflation annually. It appears that the City's water fund balance continues to grow. While the draft plan acknowledges other funding sources are available, it doesn't appear that the City will be pursuing any grants or loans. Please clarify.

22) Chapter 9 – Financial Program. The financial program does not include a water rate evaluation per WAC 246-290-100(4)(j)(iv). Please include.

23) Appendix X – SEPA Documentation. The appendix includes an unsigned SEPA checklist. The SEPA checklist/determination is required to be submitted with the final plan.

The King County UTRC thanks you for the opportunity to review and comment. Please contact me at (206)263-3733 or dcardwell@kingcounty.gov if you have any questions.

Dan Cardwell 9/22/23

Dan Cardwell, Chair of the King County Utility Technical Review Committee Date

CITY OF ENUMCLAW

DEPARTMENT OF PUBLIC WORKS

February 27, 2024

Dan Cardwell
King County UTRC Chair
201 S Jackson St, Rm 503
KSC-NR-0503
Seattle, WA 98104-3855

RE: Response to King County Comments on Draft Enumclaw Water System Plan

Dear Mr. Cardwell:

The comments received in late September from the King County Utilities Technical Review Committee (UTRC) on the draft Enumclaw Water System Plan are reproduced below. Responses follow each comment in bold font.

General Comments

1) It is not clear if the City allows for permit exempt wells within its Retail Service Area. King County Code 13.24.140 Water facilities in urban areas-interim alternative water service, allows for a permit exempt well if connection to the respective Group A system is not timely or reasonable conditioned upon a requirement for a certificate of future connection. While the City may not expect a situation where the timely and reasonable service provisions would not be met, it would be appropriate to reflect the County's requirement in the Plan document.

   Permit exempt wells are allowed in the City Retail Service Area for non-domestic usage. New permit exempt wells are also allowed temporarily for domestic usage in the Retail Service Area should service from the City be determined not to be timely or reasonable, subject to entering into an agreement with the City to connect and pay all costs of connection once service is available. Except when specifically required by the City as a condition of service, exempt wells will not be required to be decommissioned provided they are not interconnected with the City service or the City service is protected by an approved backflow device.

   A policy has been added to Table 1-3 incorporating the above paragraph.

2) Has the City considered the impacts of climate change on both water demand and supply? It would be appropriate to include a discussion of how climate change may affect water demand and supply. An example in another water purveyor's plan referenced the change in rainfall and impact on surface water source.

   A paragraph regarding climate change impacts on demand and supply has been added to the

Water Use projection section at the end of Chapter 2, on Page 2-17.

3) Figure 1.3 identifies several Future Service Area "islands" within the City's Retail Service Area; however, the text infers that these areas may not meet Timely and Reasonable Service. How are these "islands" logical? Also, it should be noted that Timely and Reasonable Service provisions don't apply to a Future Service Area. Please clarify.

   The City service area islands are a consequence of the City acquiring 21 small water systems outside of the City limits over the years. These prior water systems had gaps between them where properties developed on exempt wells. Since many of the properties within the islands are already developed there is no interest in connecting to City water. If a vacant parcel in an island were to develop, extending a City water main would likely be too costly for the proponent due to the distance required. Even if the proponent could afford the extension and deeded the asset to the City, the future renewal and replacement costs would never be recovered from the customers connected to the extended line, requiring the rest of the City customer base to subsidize the added asset.

   The final policy in Table 1-3 has been revised to remove reference to Timely and Reasonable being applicable in the Future Service Area.

<u>Comments on Specific Sections of the Draft Plan</u>

4) Chapter 1 – Overview of Existing System – Page 1-2. The draft plan states that there are 7,785 customer connections within the City's existing retail service area. How many of these connections are in unincorporated King County to estimate the unincorporated population served as 4,070?

   In 2021 there were 6,252 connections per Table 2-2 with 4,460 inside the City and 1,792 outside. The number on page 1-2 has been corrected.

5) Chapter 1 – Water Service Area – Page 1-6. The 1st paragraph identifies the size of the City's corporate limits but does not provide a total area of unincorporated King County that is within both the City's retail and future service area. Please identify the size of the unincorporated area served.

   The total water service area is 37.3 square miles with 32.0 lying within unincorporated King County. The text on page 1-6 has been modified to include the size of the unincorporated area served.

6) Chapter 1 – Water Service Area Agreement – Page 1-8. The text states that if another Group A water purveyor expands into the City's defined boundary, a written agreement will be prepared. Would this be in a situation where a neighboring purveyor may be able to provide temporary service until the City's system is expanded to the area? If not, why wouldn't the City's designated service area be reduced? What would this type of agreement address? Please clarify.

   The sentence regarding the written agreement refers to another purveyor expanding to the Enumclaw boundary, not into the City service area. Regardless, this sentence has been deleted.

7) Chapter 1 – Service Area Policies and Conditions of Service – Page 1-13. Under the Dispute

Resolution Retail Service Area, it identifies the local appeal process if a property owner contends the City's conditions of water service is not timely and reasonable. For properties in unincorporated King County, if appellant is not satisfied with the City's decision, per the South King County CWSP, and King County Code, the property owner can appeal the City's decision to the King County Utilities Technical Review Committee. Please incorporate this additional appeal opportunity into the plan document.

The final policy in Table 1-3 has been revised to address this comment.

8) Chapter 1 – Service Area Policies and Conditions of Service – Page 1-13. Under the Dispute Resolution - Future Service Area, it states that complaints such as "timely and reasonable" service may be brought to King County per RCW 70.116.060(3)b). Please note that the referenced RCW has been recodified as RCW 70A.100.060. As the Municipal Water Law does not require a duty to serve in a purveyor's future service area, it is unclear as to when a timely and reasonable service appeal would be applicable. Please clarify.

The final policy in Table 1-3 has been revised to address this comment.

9) Chapter 1 – Service Area Policies – Page 1-13. In review of the Service Area Policies, it is not clear if the City allows for permit exempt wells within its retail service area. If yes, are the wells conditioned upon a future water connection when water service become available in unincorporated King County per King County Code? How many recorded future water connection agreements currently exist? How many private wells exist within the City's service area? Please clarify.

Please see the response to Comment 1. There is currently only one future water connection agreement.

The number of private wells is difficult to sort out as the Ecology well log database includes much more than just exempt wells. Appendix D does highlight where there are existing Group B wells within the City service area, with many located in the islands of future service area discussed in Comment 3.

10) Chapter 1 – Applications for New Service – Page 1-13. The text reads as if a property owner only requests a Certificate for Water Availability (CWA) if they want to connect to the City's water system; however, it should be acknowledged that King County requires property owners applying for development in unincorporated King County to obtain a CWA if their property is within a designated service area. Furthermore, the purveyor can require connection if all criteria of Municipal Water Law are met. Also note, in instances that the City does not require connection to its system, King County Code allows a private well only conditioned upon a future connection when water service becomes available to the subject property.

The City does not issue CWAs for developments within the City limits except for plat developments that require review through the City Hearing Examiner process. The City has issued an average of 12 CWAs per year for unincorporated King County since 2012 with an average of only 3 new connections per year. The last sentence of the comment above has been added to the end of the 2nd paragraph on page 1-14.

11) Chapter 1 – Land Use and Zoning – Table 1-4 Zoning Classifications for Enumclaw's Water Service Area – Page 1-18. As the City has a different obligation to provide service in its Retail Service Area versus its Future Service Area, it would be appropriate provide the zoning for each of these areas separately.

Table 1-4 was updated to distinguish the zoning of the areas outside of the City limits within the Retail Service Area and Future Service Area separately.

12) Chapter 1 – Land Use and Zoning – Figure 1-9 King County Zoning. Please identify the Retail Service Area and Future Service Area within the City's Water Service Area.

The future services area boundaries have been added as requested with the retail areas comprising the balance of the service area.

13) Chapter 2 – Existing Population, Services, and Water Demand – Population - Page 2-2. The last paragraph states, "The population projections used in this Plan will assume a slight increase in population in the areas beyond City limits in order to not underestimate potential demand." Please clarify the source of the projection for unincorporated King County.

A conservative population growth rate of 0.3% for unincorporated King County was used as shown in Table 2-14 on page 2-17. This assumes more growth than the City's average of 3 connections per year.

14) Chapter 2 – Existing Population, Services, and Water Demand – Service Connections Page 2-2. Table 2.2 provides the number of service connections by customer classification. Can these statistics be separated by those within the City limits and those in unincorporated King County? Or, as an alternative, can the text in plan note the number of service connection by classification?

Table 2.2 has been changed to Table 2.2a and the table below added as Table 2.2b.

Customer Classification	Connections Inside Vs Outside in 2021				
	In	Out	Total	% In	% Out
Single-family	3,801	1,670	5,471	69.5%	30.5%
Multi-family	232	3	235	98.7%	1.3%
Commercial	356	27	383	93.0%	7.0%
School	21	1	22	95.5%	4.5%
City	35	0	35	100.0%	0.0%
Agricultural	2	104	106	1.9%	98.1%
Total	4447	1805	6252	71.1%	28.9%

15) Chapter 2 – Future Water Demands – Projected Growth – Population – Page 2-13. The draft plan notes the City's 2023 population projection are based on the County's growth and housing targets established in 2009. It further states that the population projection is the minimum that the City must plan to accommodate, and the actual population growth may be different. The text further

acknowledges that the City is updating its Comprehensive Plan and housing targets are not currently established. It is not clear what data source the draft Plan uses for its projections. Please clarify. It should be acknowledged that it is the King County Countywide Planning Policies, not King County that establishes growth and housing targets. Furthermore, the draft plan states the growth and housing targets are the minimum growth that City must accommodate; this statement is not consistent with King County Countywide Planning Policies (CPPs). CPP-DP 14a states that jurisdictions shall accommodate housing and employment by using adopted targets as land use assumptions in comprehensive plans.

The population projection was determined by the housing targets converted back to population which estimated 15,864 population in the next 20 years ending in 2044 based on 2.39 persons per household with 1,057 housing target and 989 jobs. This is from table DP-1 of the Countywide Planning Policies. The first paragraph in the Projected Growth section on Page 2-14 has been modified to correct the source and clarify the text.

16) Chapter 2 – Future Water Demands – Projected Growth – Population – Page 2-14. The 1st paragraph converts the housing growth into population growth. What was the person per household figure used for this conversation?

2.39 persons per household.

17) Chapter 2 – Future Water Demands – Projected Growth – Population – Page 2-14. The 2nd paragraph notes PSRC population projection data was used in developing the population projections in the draft plan. What year is the TAZ data from? The most recent PSRC data should be reflected in the plan.

The analysis uses data provided by PSRC from the Vision 2050 update in June 2022. This has been clarified on Page 2-15.

18) Chapter 4 – Available Fire Flow Analysis – Page 4-9. The last sentence of the first paragraph notes that fire flow was assigned based on zoning in each part of the City. Were the areas in unincorporated King County also assigned fire flow based on zoning? Why is there a range between 500 and 1,000 for unincorporated areas? Please clarify.

Fire flow is not required in unincorporated King County where the lot size is greater than 35,000 square feet. As noted in Table 3-1 on page 3-5 the City goal is to provide at least 500 gpm fire flow for 30 minutes in these areas.

19) Chapter 6 – Source Water Protection – Introduction – Page 6 – 1. While DOH has determined that Watercress and Boise Springs are not considered surface water sources and are not required to prepare a Watershed Control Plan, these two sources have a "high" susceptibility for contamination. How is the City addressing the "high" susceptibility for contamination?

In 2002 the City completed transmission main projects for the spring sources that provided the required minimum of 6 mg/l-min chlorine contact time prior to entering the distribution system.

20) Chapter 7 – Operation and Maintenance Program – Booster Pump Stations – Page 7-15. Does the

Capital Improvement Plan include a project for the Weyerhaeuser Booster Pump Station to provide standby power or a power receptacle to allow for connection of a portable generator? Note, if the Weyerhaeuser Booster Pump Station ownership has been transferred to Miles Sand and Gravel, the plan text should acknowledge this transfer.

An agreement that recognizes Lisa Inc as the owner of the booster pump station has been added to Appendix H, Retail Agreements, and the text on Page 7-15 modified to highlight the agreement. Lisa has elected to not add standby power or a receptacle at this time.

21) Chapter 9 - Financial Program. As stated in text on page 9-1, single family residential customers have been subject to an increasing block volume charge rate structure since 2007 and rates are adjusted for inflation annually. It appears that the City's water fund balance continues to grow. While the draft plan acknowledges other funding sources are available, it doesn't appear that the City will be pursuing any grants or loans. Please clarify.

The City will be spending over $2M out of the fund balance for capital projects planned for 2024. Loans will be pursued for higher cost projects such as the new reservoir. The City has the capacity to take on more debt and will use a combination of debt and reserves to accomplish its capital program.

22) Chapter 9 – Financial Program. The financial program does not include a water rate evaluation per WAC 246-290-100(4)(j)(iv). Please include.

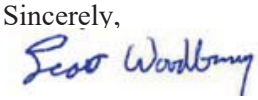
The City's last full rate study was completed in 2017. An updated rate study will be conducted in 2024 that will address affordability of water rates and a rate structure that encourages water demand efficiency as required by the cited WAC. Regardless, a water rate evaluation section has been added to Chapter 9 on Page 9-10.

23) Appendix F – SEPA Documentation. The appendix includes an unsigned SEPA checklist. The SEPA checklist/determination is required to be submitted with the final plan.

SEPA review was done as part of the 2023 Comprehensive Plan Amendment process. The SEPA checklist for the comprehensive plan process and the DNS that was subsequently issued have been included in Appendix F.

I appreciate your assistance. If you have any questions, please contact me at 360-615-5728.

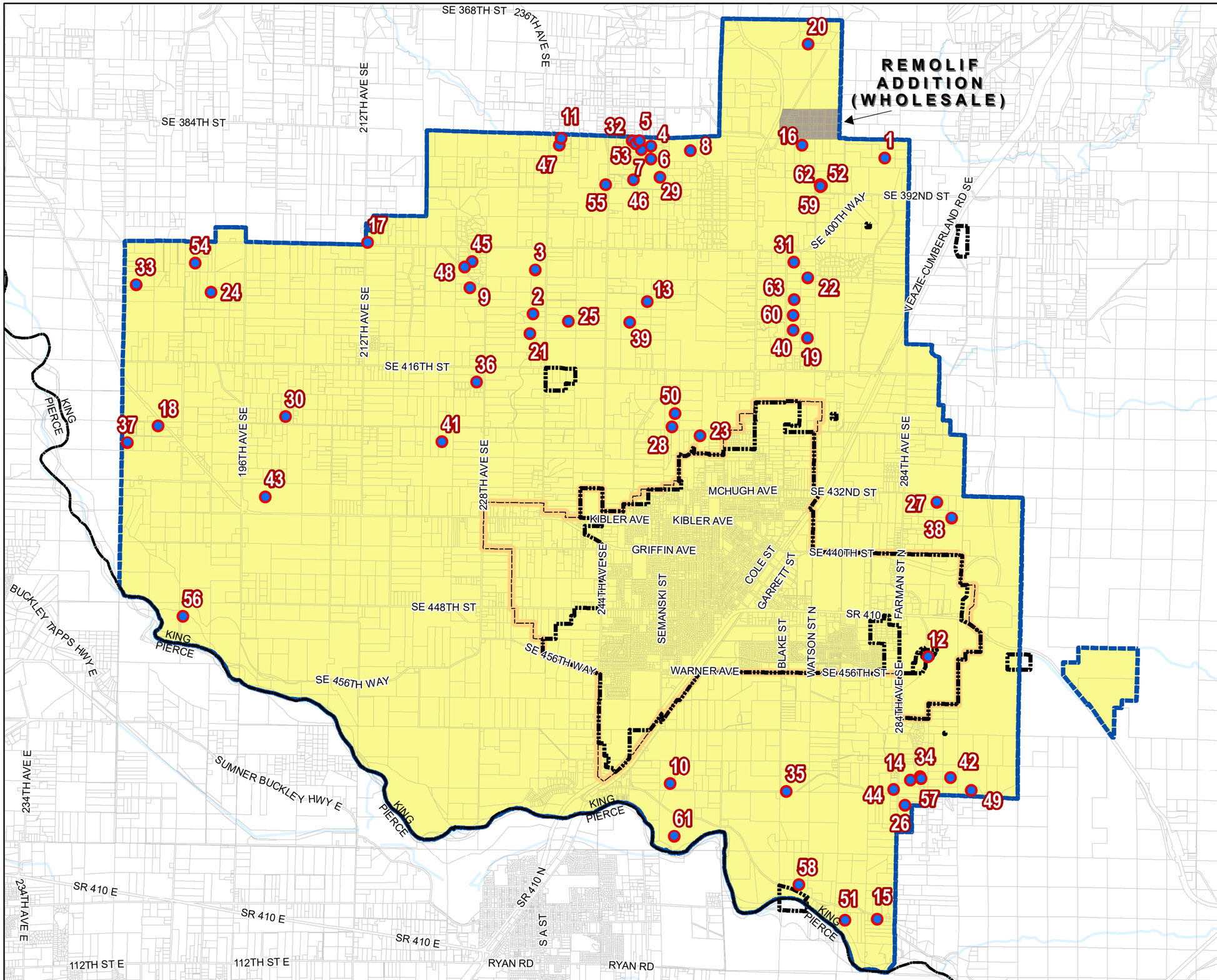
Sincerely,



Scott Woodbury, P.E.
Assistant Public Works Director

APPENDIX D

GROUP B WATER SYSTEMS



LEGEND

- GROUP B SYSTEMS (CORRESPONDING MAP ID FROM TABLE 1)
- ENUMCLAW WATER SERVICE AREA
- CITY LIMITS
- URBAN GROWTH AREA
- KING - PIERCE COUNTY LINE
- PARCELS

Source: City of Enumclaw GIS Data, King County GIS Data, Washington Geospacial Open Data

N

0 2,500 5,000 10,000 Feet

CITY OF ENUMCLAW
WATER SYSTEM PLAN
FIGURE 1
GROUP B SYSTEMS

Gray & Osborne, Inc.
CONSULTING ENGINEERS

L:\Enumclaw\22501 - Water Comp Plan\GIS\MXDs\Project MXDs\APPENDIX D FIGURE 1 GROUP B SYSTEMS.mxd

TABLE 1

GROUP B WATER SYSTEMS WITHIN ENUMCLAW'S SERVICE AREA

Map ID[1]	DOH WSID	System Name	Type	Population[2]	Connections	Source Name	Status[3]
1	AB15101	ALDER CREEK WATER SYSTEM	B	8	3	WELL #1	A
2	01787M	ASHLEY HOUSE	B	15	1	WELL #1	A
3	052625	BACKHAUS WATER SYSTEM	B	5	2	WELL	A
4	523438	BASS LAKE #1	B	21	8	WELL	A
5	61344Q	BASS LAKE #2	B	22	9	WELL #1	A
6	01494Y	BASS LAKE #3	B	5	2	WELL #1	A
7	022305	BASS LAKE #3	B	24	9	WELL	I
8	046109	BASS LAKE VIEW TRACTS	B	5	2	WELL #1	I
9	78420R	BAUR/BERNARDONI WATER	B	5	2	WELL #1	A
10	285384	BAXTER, R	B	8	3	WELL	I
11	522244	BERTRAND, J WATER	B	5	2	WELL	A
12	32214T	BREMER-STROM	B	5	2	WELL #1	A
13	08245C	BREVIK, D	B	5	2	WELL 01	A
14	25768Y	BROWN, G	B	15	5	WELL NO 1	A
15	05388W	BRUHN/BOYER WATER SYSTEM	B	5	2	WELL	A
16	245442	CCR WATER SYSTEM	B	23	9	TODNEM WELL	A
17	25251E	CLARK, W.	B	5	2	WELL NO 1	A
18	19913K	DOYLE, R	B	9	3	DOYLE R.	A
19	152816	ELMENDORF - BUCKINGHAM	B	5	2	WELL #1	A
20	052580	ENGEN, E. WATER SYSTEM	B	5	2	WELL	A
21	24709V	FARRELL-SWEENEY WATER	B	21	7	WELL #1	A
22	16729F	FLINT, J	B	20	8	WELL #1	A
23	131515	FORTIN, A	B	8	3	WELL #1	A
24	30583B	FOUR HUNDRED EIGHT WATER	B	5	5	WELL #1	A
25	073314	GARRITY, J	B	5	2	WELL #1	I
26	AA410	GILL WATER SYSTEM	B	5	2	WELL #1	A
27	21547D	GRADDON – KELLER SUPPLY	B	15	6	WELL	A
28	380961	GUNTER. F. WATER SYSTEM	B	10	4	SPRING #1	A
29	32904E	HIGH VIEW ESTATES	B	10	4	WELL 01	I

TABLE 1

GROUP B WATER SYSTEMS WITHIN ENUMCLAW'S SERVICE AREA

30	05579D	HUND WATER SYSTEM	B	10	4	WELL #1	A
31	017041	HUNT MILL	B	12	4	WELL	A
32	55401H	J W S	B	8	3	WELL #1	A
33	38314A	JOHNSON, GARY	B	5	2	WELL #1	A
34	26575F	KLEMPEL	B	5	2	WELL	A
35	126549	LIEBENTRITT, C.	B	5	2	SPRING #1	A
36	03868W	LOCKEN WATER SYSTEM	B	10	4	WELL	A
37	42835M	LORENZ, B	B	16	4	WELL	A
38	01438F	MARRAPODI	B	8	2	WELL	A
39	01071C	MATHISON (COMM.) WATER SYSTEM	B	5	2	WELL	A
40	21451E	MC KIM/HARSTON	B	5	2	WELL #1	A
41	64477C	MIMIS	B	5	2	MIMIS	A
42	56165T	MORGAN, H	B	5	2	WELL 01	A
43	AA009J	MPD WATER SYSTEM	B	15	6	WELL 1	A
44	56315R	MT. PEAK WATER ASSOCIATION	B	4	3	WELL #1	A
45	025987	NORMAN WATER SYSTEM	B	6	2	WELL	A
46	055020	PLATEAU HIGHLANDS	B	10	5	WELL #1	A
47	00609D	PLUMMER-KENNEDY WATER	B	5	2	WELL #1	A
48	68445U	POPE, S	B	5	2	WELL 01	I
49	592319	PRENOVOST	B	8	4	WELL #1	A
50	70215A	QUALEY, B	B	5	2	WELL 01	A
51	263145	REITEER-GOHM	B	5	2	WELL	A
52	643947	ROWLEY/GAMBLIN	B	5	2	ROWLEY/GAMBLIN	A
53	02165C	SAVARD WATER SYSTEM	B	9	3	WELL	I
54	64908Q	SCHILZ WATER SYSTEM	B	8	3	SCHILZ	A
55	26236K	SHOAL WATER SYSTEM	B	23	9	WELL	A
56	01321F	SNOOPY	B	12	5	WELL	A
57	17027L	SUTHERLAND, F.	B	8	3	SPRING #1	A
58	03789T	TINA S WATER SYSTEM	B	6	2	TINA S WELL	A

TABLE 1

GROUP B WATER SYSTEMS WITHIN ENUMCLAW'S SERVICE AREA

59	06119D	VALLEY VIEW COMM WATER SUPPLY	B	15	6	WELL #1	A
60	10486P	WASICEK/GRADDON COMM. SYSTEM	B	20	8	GRADDON WASICEK WELL	A
61	04822U	WHITE RIVER HATCHERY	B	7	3	WELL	I
62	843379	WHITTINGTON WATER SYSTEM	B	5	2	WELL 01	A
63	99420W	YOUNG, D S	B	5	2	WELL	A
Totals Excluding Inactive Systems				**511**	**196**		

(1) Map IDs correspond to Figure 1 of Appendix D of the Plan.
(2) Population is noted as the sum of the residential and non-residential populations according to the DOH Sentry Database.
(3) Status indicates whether a source is active (A) or inactive (I).

APPENDIX E

WATER SYSTEM CONSTRUCTION STANDARDS

WATER LINE SPECIFICATIONS

Work shall be in accordance with Sections 7-09 to 7.15 of the latest edition of the WSDOT Standard Specification except these specifications shall prevail where they conflict with the Standard Specification.

Materials

Ductile-Iron Pipe (DIP)

A. Pipe:

1. Ductile iron pipe shall conform to the requirements of AWWA C-151, with cement mortar lining and seal coat conforming to the requirements of AWWA C-104 and Section 7-09 of the Standard Specifications. Pipe class shall be 52 or greater. Pipe shall bear Underwriters' Laboratories (UL) and National Sanitation Foundation (NSF) labels.

2. Pipe plain ends: Beveled.

3. Bell ends: AWWA/ANSI C110/A21.10 bell and spigot dimensions modified for AWWA/ANSI C111/A21.11 push-on joint.

B. Fittings:

1. Fittings shall be flanged, mechanical joint or push-on as specified herein or as shown on the Plans and in accordance with Section 7-09 of the Standard Specifications.

a. Fittings shall be Ductile Iron or Class 250 grey iron conforming to AWWA C110 and C111 and shall be cement-mortar lined and seal coated conforming to AWWA C104. Short body ductile iron fittings conform to AWWA C153 and cement-mortar lined and seal coated per AWWA C104 are also acceptable. Rubber gasket joints for ductile iron pipe and fittings shall conform to the requirements of AWWA C-111.

2. Gaskets and lubricants: AWWA/ANSI C111/A21.11.

C. Joint Restraining Glands

1. Joint restraining glands called MEGALUG as manufactured by EBAA Iron Sales, Inc. of Eastland, TX, or approved equal, can be used in lieu of thrust blocks or tie rods where prior approval by Engineer is obtained.

2. Joint restraining shall not be allowed in lieu of thrust blocks on 6-inch diameter fittings or smaller.

High Density Polyethylene Pipe (HDPE) and Service Lines

A. Pipe and Service Lines

1. High density polyethylene pipe (not tubing) shall be used for the 2-in pipe and 1" service lines from the main to the meter and from the new meter to existing meter or water service line.

2. Polyethylene pipe shall be Driscoplex 5100 Ultra-Line iron pipe size polyethylene pipe or equal, DR11, pressure class 160 psi, conforming with AWWA C901 and having standard PE code designation PE 3408.

B. Corporation Stop

1. The Contractor shall install corporation stops on the main for each service connection.

C. Fittings shall be as shown on the Plans. Insert fittings shall be used on all compression couplings.

D. Traffic Bearing Meter Box:

1. Where called for on the Plans, the traffic bearing box shall be Fogtite 1-D with steel cover plate, or an approved equal.

Locate Wire

A. The following materials, or an approved equal, shall be used to provide continuous locate wire along all main and service lines:

1. Bare magnesium anodes, 1 lb. weight.

2. Copper "C" tap connectors manufactured by Thomas Betts, Memphis, TN.

3. Tack tape manufactured by Royston Laboratories, Pittsburg, PA.

4. Commercially available electrical and "duct" tape.

5. DBR direct bury splice kits manufactured by 3M.

6. Single strand locating wire, 12 gauge, heavy coated, blue color.

Fire Hydrants

A. Fire hydrants shall be center stem compression style and conform to the latest revision of AWWA Specifications C 502, except as herein modified, minimum 5-1/4-inch main valve opening, 6-inch mechanical joint pipe spool with 6-inch auxiliary resilient wedge gate valve flanged to main tee, and shackle rod, MEGALUG or other approved restraint from gate valve to fire hydrant. Hydrant shall be furnished with break off flange on barrel and break off coupling for stem, two 2-1/2-inch hose connections, one 4-1/2-inch NST thread steamer port with 4-inch STORZ quick connect fitting (NST thread). Nozzles shall be fitted with renewable bronze nipples locked in place.

B. Auxiliary Gate Valve and Valve Box

1. Auxiliary gate valves and valve boxes shall be furnished and installed in accordance with this section.

Valves

A. Gate valves shall be AWWA C515 resilient seated gate valves. End connections may be flanged, mechanical joint or push-on as shown on the Plans. Valve stem extensions with plate welded to operating nut shall be required where cover is greater than 3 feet. Valve shall open when stem is rotated counterclockwise. Valves shall be certified by supplier to withstand system test pressures of 200 psi minimum without leaking.

B. Tapping sleeves shall be dual compression, full body, stainless steel tapping sleeves. Tapping sleeve shall have a service rating of 250 psi. Flange outlet shall be Class 250 and comply with ANSI B16.1 Standard. Bolts shall be corrosion resistant, high strength stainless steel 18-8 Type 304. Tapping valves shall be flanged by mechanical joint ends.

C. Valve Boxes:

1. Valve boxes shall be cast iron of sliding, adjustable height type with round or oval bottom hood sections to fit over the top of the valve. The top section shall be recessed to receive a close fitting "eared" lid with the word "WATER" cast into it. Internal diameter of the smallest section shall be not less than 5 inches. Minimum thickness of the metal shall be not less than 5/16-inch. Castings shall be smooth and the workmanship shall be first class. Valve boxes shall be provided with dust covers.

2. Valve boxes shall be supplied with valve operator extension rods such that the maximum depth from the ground surface to the operator nut does not exceed 3 feet.

Related Materials

A. Meter setter, meter box and fittings shall be as shown on the Plans.

B. Thrust blocking shall be concrete as shown on the WSDOT Standard Details or as shown on the Plans. Commercial concrete shall be used. At no time shall the contractor be allowed to mix concrete in the trench or on-site.

C. Water line detector tape shall be Alertline detectable underground utility marking tape, or equal, color blue per “APWA Uniform Color Code,” 2-inch minimum width.

Meters

A. Meters will be furnished and installed by the City.

Construction Requirements

Materials Handling and Delivery

A. Pipe and appurtenances shall be handled in such a manner as to insure delivery to the trench in a sound, undamaged condition. Particular care shall be taken to not damage the pipe, pipe coating or lining. The City or the Engineer shall be present when materials are unloaded. Before installation, the pipe and appurtenances shall be examined by the Engineer for defects.

B. The amount of pipe strung at the job site shall be limited to the amount that can be installed in one day.

C. Rubber gaskets shall be stored in a cool, dark place to prevent damage from the direct rays of the sun.

D. Cut pipe squarely avoiding sharp, ragged, or unbeveled plain ends and do not damage lining by cutting.

E. The Contractor shall exercise special care during the unloading, handling, and storage of all HDPE pipe to ensure that the pipe is not cut, gouged, scored or otherwise damaged. Any pipe segment which has cuts in the pipe wall exceeding 10 percent of the wall thickness shall be cut out and removed from the site at the Contractor's cost. The pipe shall be stored so that it is not deformed axially or circumferentially which may hinder pipe installation.

F. Remove damaged or rejected materials from Project site.

Installation

A. Installation shall be in accordance with the requirements of AWWA C-600. The interior of the pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench. The pipe shall be kept clean during laying operation by plugging. Depth of cover shall be 36" below proposed finish grade except as shown on the plans.

B. Pipe and appurtenances shall be carefully lowered into the trench by means of derrick, ropes, belt slings or other suitable equipment. Under no circumstances shall any of the pipe or appurtenances be dropped or dumped into the trench. Care shall be taken to avoid abrasion of the pipe coating. Poles used as levers or skids shall be of wood and shall have broad, flat faces to prevent damage to the pipe and coating. Broken or otherwise defective pipe shall be removed and replaced. Repair bands or clamps shall not be used to repair broken pipe, on new construction.

C. The trench bottom shall be graded to provide uniform support for the pipe barrel. Water shall be kept out of the trench by pumping, if necessary, until the jointing is completed. When work is not in progress, open ends of the pipe, fittings, and valves shall be securely plugged so that no trench water, earth or other substances will enter the pipes or fittings. Where any part of the coating of lining is damaged, the repair shall be made by the Contractor at his expense and in a manner satisfactory to the Engineer. At a sufficient distance, prior to encountering a known obstacle or tie into an existing pipe, the Contractor shall expose and verify the exact location, size, and type of obstacle or pipe and verify available fittings so that proper alignment and/or grade may be determined, and connections can be made before the pipe sections are laid in the trench and backfilled. The connections shall be made by using special parts and/or fittings to suit actual conditions. All connections made under pressure shall be witnessed by City of Enumclaw Public Works personnel.

D. Pipe ends left for future connections shall be plugged, or capped, and anchored as shown on the Plans or as directed by the Engineer. The Contractor shall install vertically an 8-foot wood post, directly over the end of the pipe. This post shall be painted blue and the word "WATER" stenciled neatly upon it.

E. Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe.

F. Poured in place concrete thrust blocks or joint restraining glands such as MEGALUG shall be installed where the pipe line terminates or changes alignment, utilizing a tee, cross, bend or similar fitting. It is the Contractor's responsibility to determine the amount of restraint required, unless otherwise shown.

G. All pipe and fittings exposed to concrete shall be double wrapped with 4 mil polyethylene film prior to placement of the concrete.

H. Detector tape shall be placed approximately 12 inches above all watermains.

Alignment and Grade

A. The pipe shall be so laid in the trench that after the line is completed, the bottom of the pipe conforms accurately to the depth and alignment shown on the Plans and confirmed in the field prior to construction. The pipe shall be generally straight to visual observation as determined by the Engineer.

B. Both line and grade shall be periodically checked and recorded in a field book for each piece of pipe and appurtenances laid. The Contractor shall furnish to the Engineer a copy of as-built drawings for the newly-installed pipe and appurtenances.

C. Deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets shall not exceed half the manufacturer's recommendations for the type of pipe being installed.

D. If the alignment requires deflection in excess of the above limitations, the Contractor shall furnish special bends to provide angular deflections within the limits allowable.

Jointing of Ductile Iron Pipe

A. The Contractor has the option of using either mechanical or push-on joints unless otherwise specified or shown. All joints shall conform to the requirements of AWWA C-600.

B. Whenever flange connections are shown on the Plans, called for in the Specifications, or required in the Work, the flange and fittings shall conform to the requirements of AWWA C-110 for 250 pound pressure ratings.

Installation and Joining of HDPE Pipe

A. The Contractor shall exercise special care during the unloading, handling, and storage of all HDPE pipe to ensure that the pipe is not cut, gouged, scored, or otherwise damaged. Any pipe segment which has cuts in the pipe wall exceeding 10 percent of the wall thickness shall be cut out and removed from the site at the Contractor's cost. The pipe shall be stored so that it is not deformed axially or circumferentially which may hinder pipe installation.

B. The Contractor shall notify the Engineer prior to pipe joining. HDPE pipe segments and fittings shall be joined by heat fusion welding and shall be joined in strict accordance with the pipe manufacturer's requirements. Fusion equipment used in the joining procedure shall be

capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, fusion temperature, alignment, and fusion pressure. Pipe segments and fittings joining methods shall meet the requirements of AWWA C901, as applicable based on pipe size.

C. Heat fusion welding to join pipe segments or fittings shall be conducted solely outside the trench. The pipe and fittings may be moved while the welding machine remains stationary provided that the pipe or fittings are not overstressed by pulling across the ground. The Contractor shall obtain maximum pulling distance recommendations from the manufacturer for pipe and stay within 80 percent of the maximum allowable distance. Fittings shall be moved in a manner such that they travel with the pipe without inducing any pulling stress across the fitting. The Contractor shall not scrape, gouge, or damage the pipe in any manner due to pulling to the next joint.

D. All other manufacturer and AWWA C901 requirements as applicable on pipe size shall be followed.

Valves

A. Valves and valve boxes shall be installed where shown on the Plans or as directed by the Engineer.

1. Valves shall have the interiors cleaned of all foreign matter before installation. If the valve is at the end of the line, it shall be plugged prior to backfilling. The valve shall be inspected by the Engineer in the open and closed positions to insure that all parts are in working condition.

2. In areas where running sand is encountered, provisions shall be made to restrict the sand from entering the bottom section of the valve box.

3. The Contractor shall expose all valve boxes for pre-final and final inspection. After final inspection of the valves located in unpaved areas, florescent surveying flagging shall be placed directly over the valve box lid and covered with gravel to facilitate location in the future.

4. Install “eared” valve box lid such that the “ears” are aligned parallel to pipe.

B. All valve box adjustments will be accomplished as directed by the Engineer. Any damage to a mainline valve or valve box resulting from construction under this item shall be repaired or the damaged portion replaced at the Contractor's expense.

1. Valve operator extension rods shall be installed whenever the depth to the valve operating nut exceeds 36 inches. The costs of furnishing and installing the extension rods shall be considered incidental to the price of the valve.

Fire Hydrants

A. The Contractor shall install the hydrant assemblies in accordance with the Details.

B. Hydrants installed but not available for use shall be covered with burlap and securely tied.

C. In lieu of valve box markers for the auxiliary gate valves, the Contractor shall paint in two 2-inch black lettered stencils, the direction and distances to the nearest 1/10-foot the distance to the valve box on the face of the fire hydrant directly below the bonnet flange.

Service Connections

A. A corporation stop or main valve shall be installed at a point in the service line as close to the main water supply as possible. There shall be line pressure in the main at all times connections are being made. Service connections shall be made following testing, disinfecting and flushing. Service connection shall be defined as the connection between the watermain and meter setter, including the meter setter.

1. The Contractor shall make the connection to the City of Enumclaw's main water supply in a manner consistent with the Standard Specifications and Standard Details. A water service shall not cross property lines or adjoining lots, unless shown otherwise on the Plans.

2. Contractor shall provide 72 hours notice to Engineer prior to shutdown of any existing water main.

3. A water service connection shall not have more than one union every 100 feet.

4. HDPE service tubing sections shall be joined by heat fusion welding only. Heat fusion welders shall be certified by the manufacturer.

B. The Contractor shall excavate whatever substances that are encountered to the depth required for the connections. The Contractor shall excavate for water connections in such a manner that the excavation is 90 degrees to the street line, whenever possible.

1. Trenches shall be of sufficient width at the bottom to allow for laying of the particular service.

2. The Contractor shall expose the mains to be tapped for distances of 4 feet in length. Excavation on both sides of the pipe shall be carried to the bottom of the pipe. Excess excavation below the required level shall be backfilled and compacted with bedding material at the Contractor's expense as directed by the Engineer.

3. No water service shall be installed within a distance of 10 feet from a sewer service.

4. The Contractor shall be responsible for and shall bear the expenses incurred, in the event that a main should be damaged during excavation or backfilling. The City of Enumclaw's Public Works Department will repair all City owned damaged mains; however, the Contractor shall bear the cost of all materials, labor and other expenses incurred by the City in repairing the damaged main.

C. Trench backfill shall commence only after the water service lines and appurtenances have been properly completed and inspected.

1. The Contractor shall exercise due care in excavating and backfilling to keep the meter box vertical and in place.

D. At the Contractor's option, they may install the water service up to the meter setter, but not including the meter setter prior to testing, disinfecting, and flushing the main.

Locating Wire Installation

A. Locate wire shall be installed to provide a continuous, interconnected wire along all water main and service lines. A separate continuous wire shall be installed on all service lines on the customer side of the water meter.

B. Wire shall be installed on top of all water main lines in a series of narrow "S" curves to provide for slack in the wire and shall be fastened with "duct" tape at minimum 9-foot intervals. Loop the wire in each main line valve box with sufficient wire to allow the wire to be pulled to just below the valve cover.

C. Locate wire for service lines must have minimum 1-foot length of wire coiled and accessible in the meter box. Locate wire shall be fastened to the top of service lines with "duct" tape at minimum 15-foot intervals.

D. Separate lengths of wire shall be connected using DBR splice kits.

E. Service line wire shall be connected to the main line wire by striping a short length of insulation from the main line wire and the end of the service line wire. The service line wire shall be tightly crimped to the main line wire using a tap connector. The entire area of exposed wire shall then be covered with tack tape and wrapped securely with electrical tape.

F. Anodes shall be installed on the main line wire at each end of the new main. The anode wire connection to the main line wire shall be made similar to the connection for service line wire.

G. The wire will be tested by the City using locating equipment for continuity of the signal after the installation is complete.

Hydrostatic Testing, Disinfection, and Flushing/ Connection to Existing

A. No new water main shall be directly connected to the City's water supply until all hydrostatic testing, disinfection, and flushing is accomplished by the Contractor and approved by the City. A temporary connection is allowed with appropriate cross-connection control devices and measures in place. These devices and measures shall be used to eliminate any potential health hazard associated with water main or service line installation. Operation, maintenance, testing and repair of cross-connection control facilities shall be the responsibility of the Contractor and shall be approved by the City prior to connection. The contractor shall provide a copy of a recent test report on the cross connection device. The City will test the device after it has been installed and prior to its use. The device must pass testing to be used.

B. The Contractor shall perform an initial flush prior to hydrostatic testing. Following a satisfactory hydrostatic test, the Contractor shall disinfect the facilities and lastly complete a final flushing. The new fire hydrant called for on the plans shall be pretested and have a satisfactory bacteriological sample in accordance with 7.09.3(23)C. The contractor is responsible for providing temporary end cap with fill port on the end of the hydrant spool for testing purposes.

1. Hydrostatic Testing

a. A hydrostatic test shall be conducted on all newly constructed water mains, fire hydrant leads and stub-outs after flushing in the presence of City of Enumclaw representatives. Ductile iron water mains and fire hydrants shall be pressure tested in accordance with Section 7-09.3 of the Standard Specifications. Testing of HDPE pipe shall be in accordance with Performance Pipe Technical Publication PP-802.

2. Disinfection

a. Disinfection of water mains prior to being placed in operation shall be in accordance with Section 7-09.3 of the Standard Specifications and AWWA Specification C651 and shall be by the solution feed method. Bacteriological test samples will be taken by the City from the completed and disinfected water main to health authorities for testing for contamination.

Samples are picked up on Tuesdays and the Contractor shall coordinate its operations accordingly. The Contractor shall provide a flow meter on the chlorine injector for the solution feed. The solution feed shall be continuous to ensure uniform distribution of chlorine.

b. The Contractor shall be responsible for dechlorination prior to discharging any water from the pipeline.

3. Flushing/Connection to Existing

a. Flushing of water mains shall be in accordance with Section 7-09.3 of the Standard Specifications. Water for the initial flushing may be obtained from a hydrant or temporary blowoff piping provided with a double check valve backflow prevention assembly and flow meter. The temporary piping to and from the backflow prevention assembly can be a hose or pipe at the Contractor’s option. Size of backflow device, temporary piping, and size and number of taps to water source shall be determined by the Contractor to achieve adequate flushing velocities. Disinfection of the hose or connecting pipe shall be witnessed by the City.

c. It shall be the Contractor's responsibility to notify the Engineer and the City of Enumclaw's Public Works Department 48 hours in advance of any flushing operations. All flushing of newly-constructed mains shall be done between the hours of 8:00 AM and 4:00 PM weekdays, unless otherwise authorized by the City of Enumclaw. The City of Enumclaw will not be responsible for any flushing costs caused by the Contractor's negligence, through faulty workmanship, or erosion from the flushing waters.

d. After disinfection and receipt of acceptable tests, the Contractor shall connect the new line to the existing system and perform final flushing. Connection to the existing system and final flushing procedures shall be coordinated with the City. The distance between the existing pipe and the new pipe shall not be greater than 18 feet.

e. It shall be the responsibility of the Contractor to provide 72 hours notice to the Engineer prior to the shutdown of any existing water main so that affected

water customers can be notified by the City. If more than one notice has to be given due to delay by the Contractor, then the cost to serve additional notices will be charged to the Contractor.

f. Contractor shall provide 24 hours notice, given no later than 3:00 PM, to the Engineer prior to any tie-ins to the City's water supply to ensure the Contractor has procured and assembled proper fittings. Tie-ins shall be scheduled on Tuesday, Wednesday, or Thursday only. No tie-ins shall be scheduled Monday or Friday unless approved by the City.

4. Test and Air Vent Pipe Removal

a. After completion of testing, all test and air vent pipe shall be removed, the corporation cock closed at the main, and a brass cap shall be installed on the closed corporation in the presence of Public Works personnel.

C. Abandonment of Existing Water Line

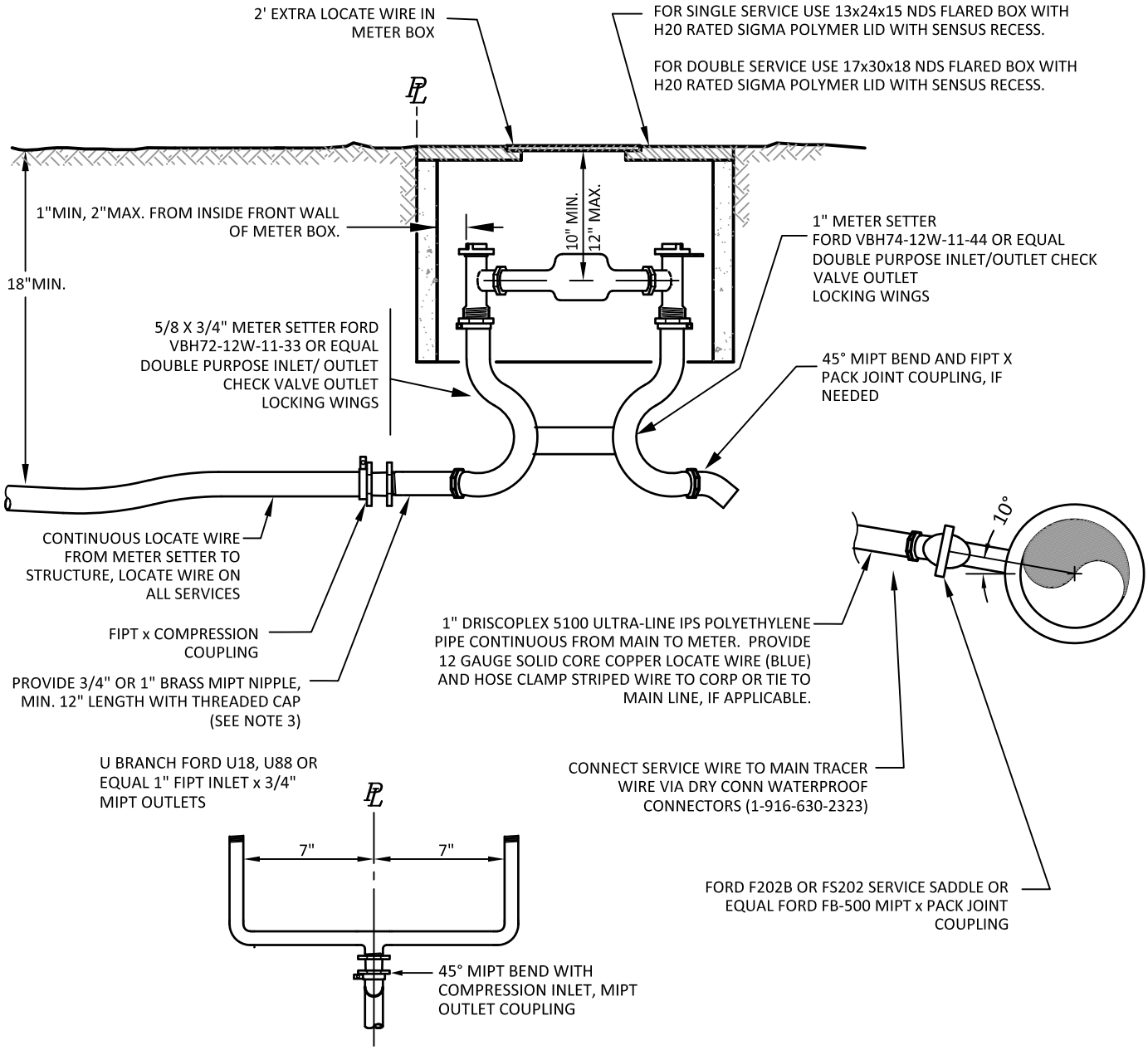
1. Ends of existing water lines that are to be abandoned shall be drained then capped, plugged, or crimped to form a watertight seal.

2. Coordinate abandonment of existing water lines with City and only abandon after new water line is in operation and all services have been transferred to the new main.

3. Unless otherwise noted, remove all existing fire hydrant assemblies, valves, and valve boxes from water lines that are to be abandoned and existing meter setters from meters that are to be replaced and deliver them to the City of Enumclaw maintenance yard. Provide 24 hours notice to City shops prior to delivery.

4. Items deemed unsuitable for salvage by the City shall be properly disposed of by the Contractor.

END OF WATER LINE SPECIFICATION



DOUBLE SERVICE

NOTES:

1. DO NOT BACKFILL UNTIL ALL FITTINGS HAVE BEEN INSPECTED. METER TO BE SUPPLIED AND INSTALLED BY CITY AT CUSTOMER EXPENSE.
2. ALL MATERIAL SHALL BE BEDDED IN 5/8" MINUS CRUSHED ROCK OR SAND.
3. FOR METER LOCATED IN LANDSCAPE STRIP THE SERVICE LINE SHALL EXTEND ACROSS SIDEWALK AND JOINT UTILITY TRENCH WHERE APPLICABLE. ALL FITTINGS SHALL BE BRASS. COMPRESSION FITTINGS SHALL HAVE INSERT STIFFENERS. DO NOT OVERTIGHTEN THREADED FITTINGS.
4. METER BOXES SHALL BE OUTSIDE OF VEHICLE TRAFFIC AREAS UNLESS SPECIAL APPROVAL IS GRANTED BY THE CITY.
5. NO TREE OR SHRUB SHALL BE PLANTED WITHIN 4' OF A WATER METER BOX.
6. SCARE TAPE 1 FOOT ABOVE WATER SERVICES

REVISIONS	DATE:
UPDATES	12/20/2018
UPDATES	10/09/2019
UPDATES	09/18/2020
UPDATES	03/26/2021

DRAWN BY: KW CHECKED BY: SW

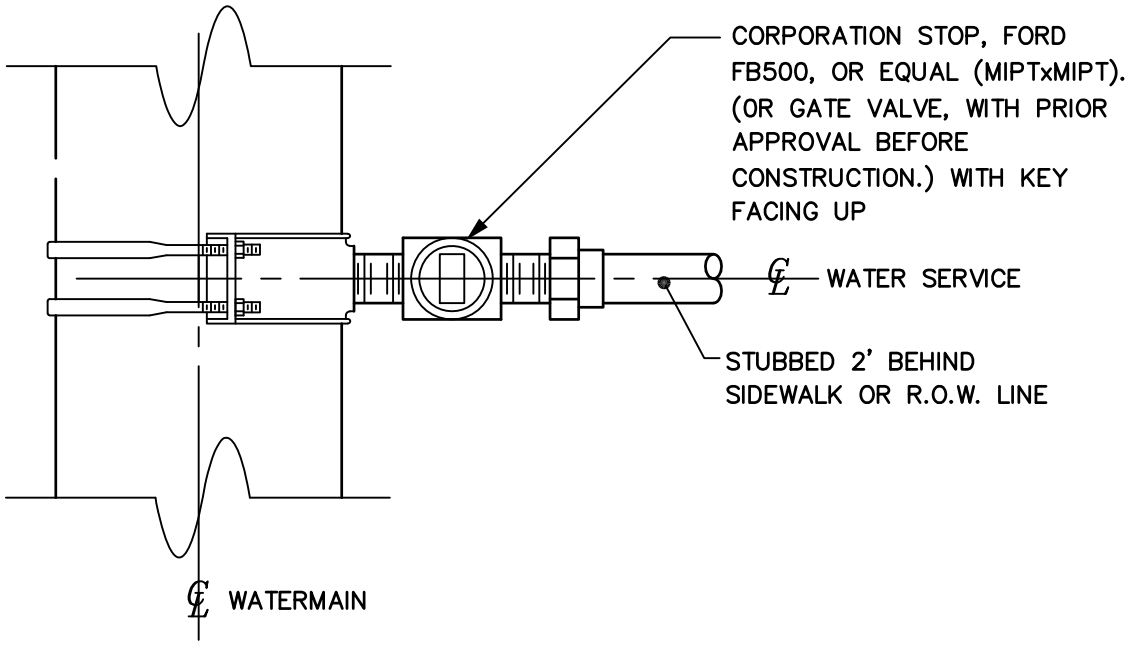
City of Enumclaw

SINGLE OR DOUBLE WATER SERVICE

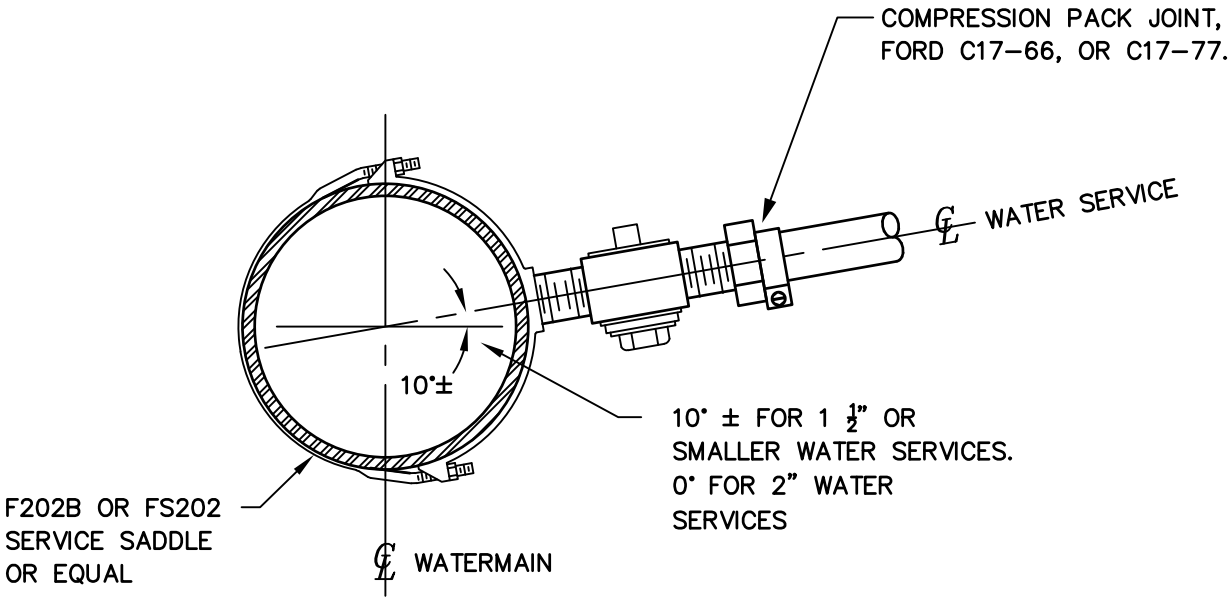
DWG. NO.

WA

01



PLAN



ELEVATION

NOTES:

1. ALL METAL PARTS SHALL BE BRASS.
2. SERVICE PIPE SHALL BE IPS SDR 11 POLYETHYLENE PIPE IN ACCORDANCE WITH AWWA C-901 AND ASTM D3035 AND SHALL BE FREE OF JOINTS BETWEEN THE MAIN AND METER SETTER.
3. ALL PET JOINTS SHALL BE COMPRESSION WITH INSERT STIFFENERS, FORD OR EQUAL.
4. PROVIDE 12 ga VINYL COATED COPPER LOCATE WIRE FROM CORP STOP TO METER.
5. SERVICE LINE SHALL BE BEDDED IN SAND, 3" MINIMUM TO 6" MAXIMUM AROUND PIPE.
6. SERVICE SADDLE, CORP STOP AND BRASS FITTINGS SHALL BE BEDDED IN 5/8" MINUS CRUSHED ROCK, 6" MINIMUM ALL AROUND.
7. SCARE TAPE 1 FOOT ABOVE WATER MAIN AND SERVICES

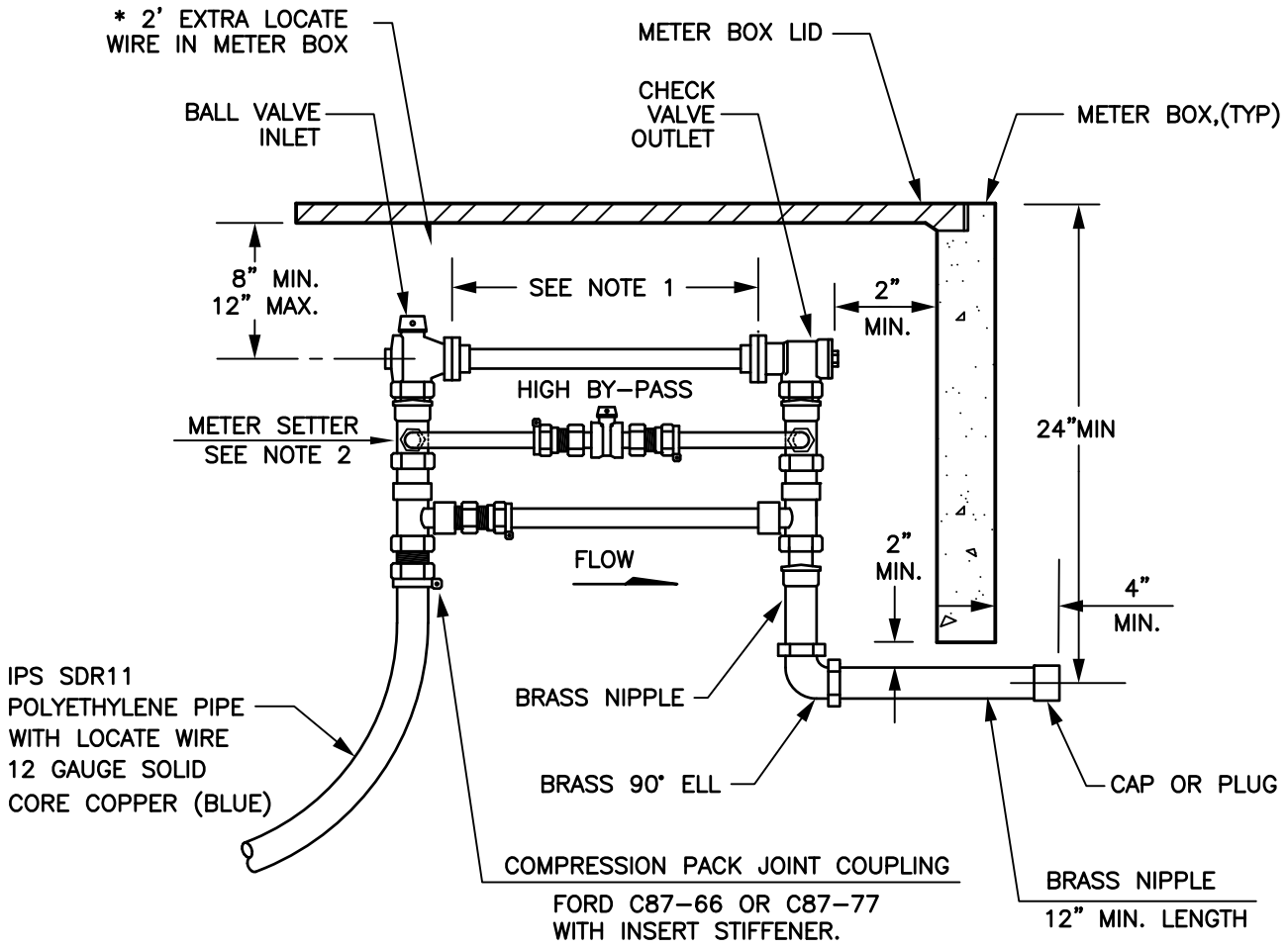
REVISIONS	DATE:
checkprint	10/16/1997
UPDATES	07/15/2019
UPDATES	10/09/2019

DRAWN BY: CCS CHECKED BY: SW

City of Enumclaw

1-1/2" AND 2"
SERVICE CONNECTION

DWG. NO.
WA
02



ELEVATION

NOTE 1:

1-1/2" METER = 13"
2" METER = 17"
** INSTALL IDLER WITHOUT GASKETS AND WITH HOLE IF METER WILL BE SET AT A LATER DATE.

NOTE 2:

1-1/2" DIA-USE FORD #VBH 86-15HB-11-66 (PACK END IPS), OR EQUAL.
2" DIA-USE FORD #VBH 87-15HB-11-77 (PACK END IPS), OR EQUAL.

GENERAL NOTES

1. METERS TO BE SUPPLIED AND SET BY THE CITY AT CUSTOMER'S EXPENSE.
2. ABOVE REFERENCED PART NUMBERS REFER TO ITEMS MANUFACTURED BY FORD METER BOX CO, INC. THESE OR EQUIVALENT FITTINGS SHOULD BE USED.
3. METER SETTER TO BE APPROVED BY THE CITY PRIOR TO BACKFILL.
4. OLDCASTLE 1730-12 TRAFFIC BEARING BOX WITH OLDCASTLE FL36 TRAFFIC BEARING SOLID LID WITH 4" AMR HOLE METER BOX SHALL BE CENTERED OVER SETTER. METER BOX SHALL BE OUTSIDE OF VEHICLE TRAFFIC AREAS UNLESS SPECIAL APPROVAL IS GRANTED BY THE CITY.

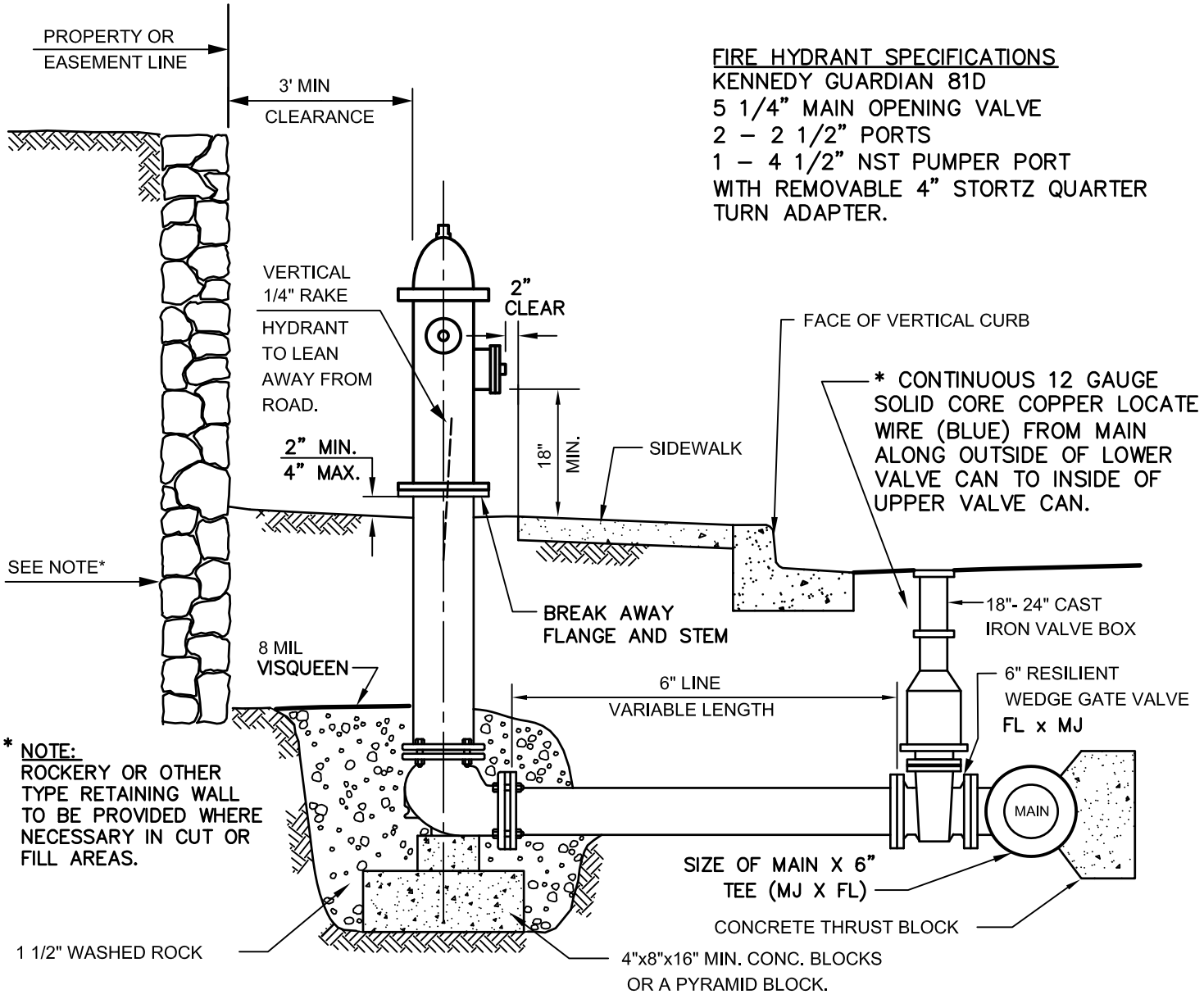
REVISIONS	DATE:
checkplot	10/17/1997
UPDATES	07/09/2004
UPDATES	07/15/2019
UPDATES	10/09/2019
UPDATES	07/01/2020

DRAWN BY: CCS CHECKED BY: SW

City of Enumclaw

1-1/2" AND 2" METER SETTERS

DWG. NO. WA 03



HYDRANT RUN:

1. MAXIMUM LENGTH OF 50 FEET UNLESS APPROVED BY ENGINEER.
   A. USE 6" D.I. PIPE WITH MJ MEGALUG RETAINER GLANDS.
   B. DRAIN ROCK TO BE 8" ABOVE DRAIN HOLE.

HYDRANT:

1. SHALL BE CLEANED & PRIME COATED WITH HEAVY DUTY BRUSH TYPE OR APPROVED EQUAL. ALL HYDRANTS SHALL BE PAINTED WITH TWO COATS KRYLON RUST TOUGH #00431, SAFETY YELLOW OR APPROVED EQUAL.

2. STENCIL ON FACE OF HYDRANT BARREL WITH MINIMUM 2" BLACK LETTERS, THE DISTANCE FROM HYDRANT TO GV.IN FEET.

3. SURFACE TO BE GRADED UNIFORMLY AROUND HYD.(3' RAD.)

4. PROVIDE A TYPE 2 BLUE RAISED PAVEMENT MARKER IN CENTER OF ROADWAY ADJACENT TO EACH HYDRANT LOCATION.

REVISIONS	DATE:
CHECKPRINT	10/17/1997
UPDATED	06/11/2007
UPDATES	10/09/2019

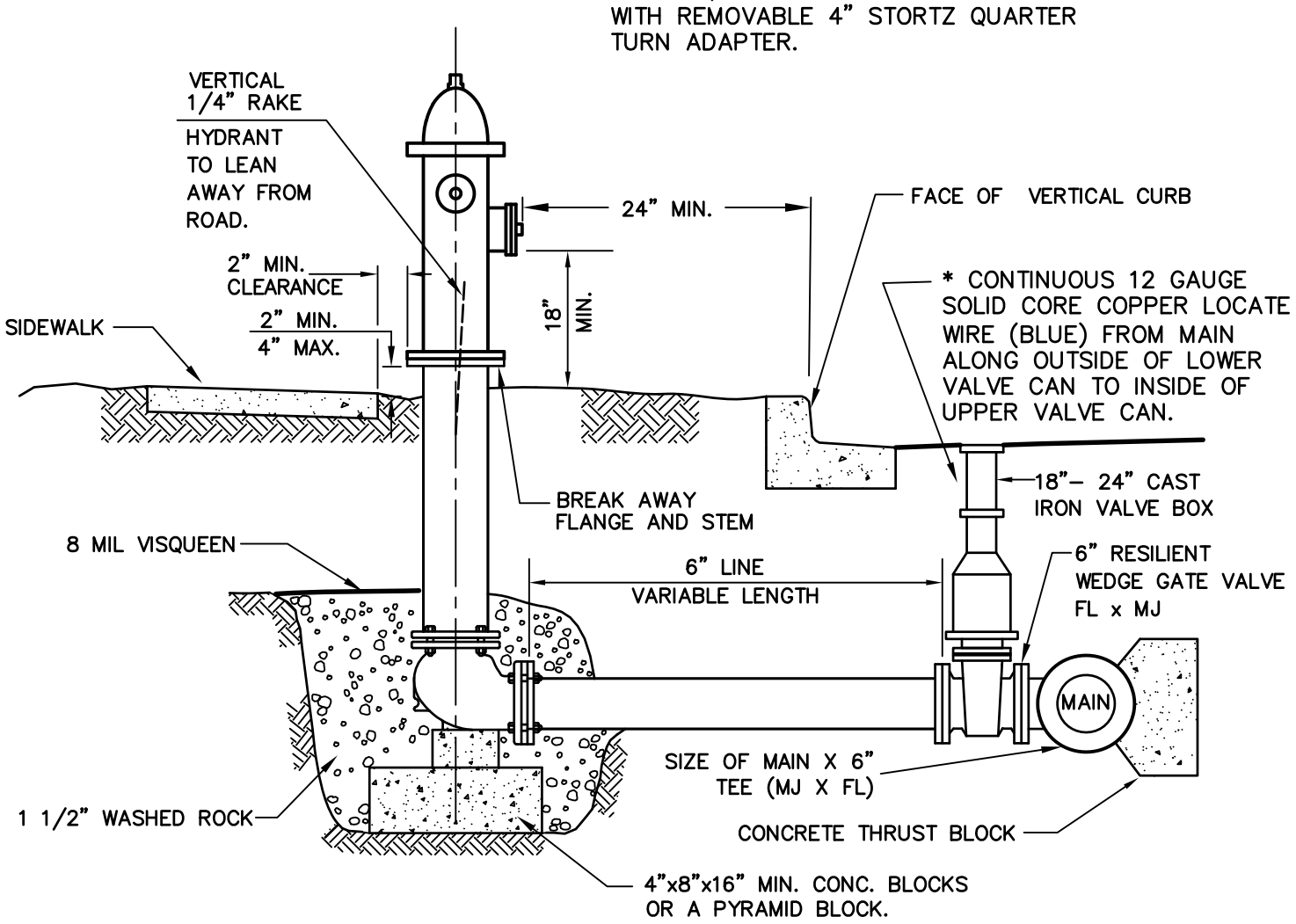
DRAWN BY: MRB CHECKED BY: LCW

City of Enumclaw

FIRE HYDRANT
WITH ATTACHED CURB

DWG. NO.
WA
04

FIRE HYDRANT SPECIFICATIONS
KENNEDY GUARDIAN 81D
5 1/4" MAIN OPENING VALVE
2 – 2 1/2" PORTS
1 – 4 1/2" NST PUMPER PORT
WITH REMOVABLE 4" STORTZ QUARTER TURN ADAPTER.



HYDRANT RUN:
1. MAXIMUM LENGTH OF 50 FEET UNLESS APPROVED BY ENGINEER.
   A. USE 6" D.I. PIPE WITH MJ MEGALUG RETAINER GLANDS.
   B. DRAIN ROCK TO BE 8" ABOVE DRAIN HOLE.

HYDRANT:
1. SHALL BE CLEANED & PRIME COATED WITH HEAVY DUTY BRUSH TYPE OR APPROVED EQUAL. ALL HYDRANTS SHALL BE PAINTED WITH TWO COATS KRYLON RUST TOUGH #00431, SAFETY YELLOW OR APPROVED EQUAL.

2. STENCIL ON FACE OF HYDRANT BARREL WITH 2" BLACK LETTERS, THE DISTANCE FROM HYDRANT TO GV.IN FEET.

3. SURFACE TO BE GRADED UNIFORMLY AROUND HYD.(3' RAD.)

4. PROVIDE A TYPE 2 BLUE RAISED PAVEMENT MARKER IN CENTER OF ROADWAY ADJACENT TO EACH HYDRANT LOCATION.

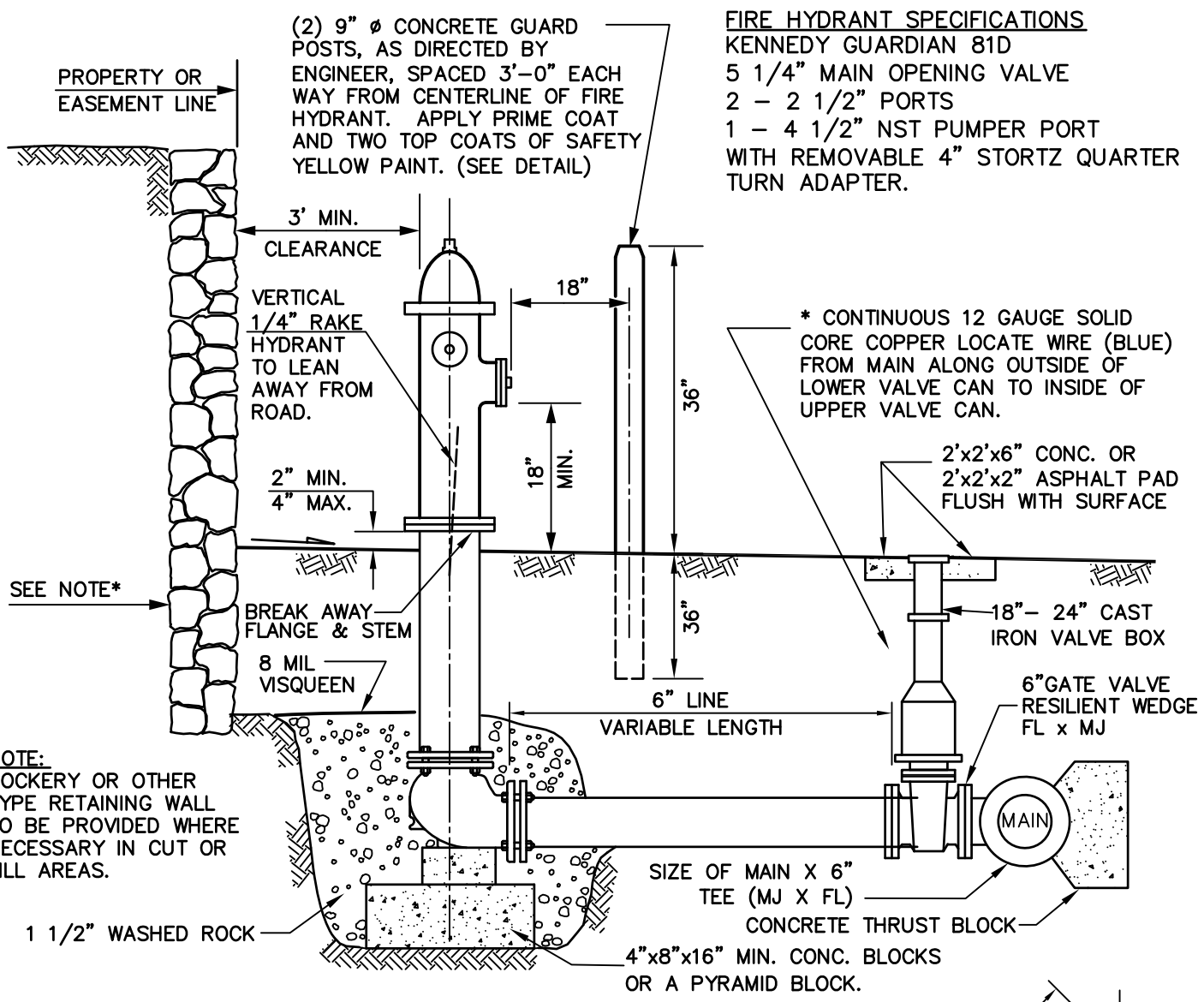
REVISIONS	DATE:
CHECKPRINT	06/14/1998
UPDATED	10/09/2019

DRAWN BY: MRB CHECKED BY: LCW

City of Enumclaw

FIRE HYDRANT WITH DETACHED CURB

DWG. NO.
WA
05



* NOTE:
ROCKERY OR OTHER TYPE RETAINING WALL TO BE PROVIDED WHERE NECESSARY IN CUT OR FILL AREAS.

HYDRANT RUN:
1. MAXIMUM LENGTH OF 50 FEET UNLESS APPROVED BY ENGINEER.
   A. USE 6" D.I. PIPE WITH MJ MEGALUG RETAINER GLANDS.
   B. DRAIN ROCK TO BE 8" ABOVE DRAIN HOLE.

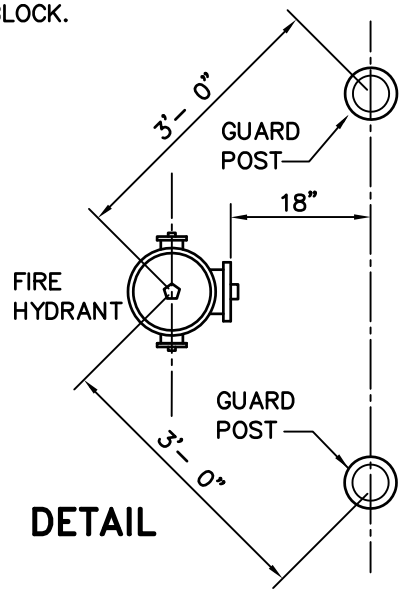
HYDRANT:
1. SHALL BE CLEANED & PRIME COATED WITH HEAVY DUTY BRUSH TYPE OR APPROVED EQUAL. ALL HYDRANTS SHALL BE PAINTED WITH TWO COATS KRYLON RUST TOUGH #00431, SAFETY YELLOW OR APPROVED EQUAL.

2. STENCIL ON FACE OF HYDRANT BARREL WITH 2" BLACK LETTERS, THE DISTANCE FROM HYDRANT TO GV.IN FEET.

3. SURFACE TO BE GRADED UNIFORMLY AROUND HYD.(3' RAD.)

4. PROVIDE A TYPE 2 BLUE RAISED PAVEMENT MARKER IN CENTER OF ROADWAY ADJACENT TO EACH HYDRANT LOCATION.

5. GUARD POSTS SHALL BE INSTALLED WHERE SHOWN ON THE PLANS. GUARD POSTS SHALL BE REINFORCED CONCRETE HAVING A COMPRESSION STRENGTH OF 3,500 PSI AND SHALL BE 6 FEET IN LENGTH AND 9 INCHES IN DIAMETER. REINFORCING SHALL CONSIST OF A MINIMUM OF FIVE (5) #3 DEFORMED STEEL BARS.



DETAIL

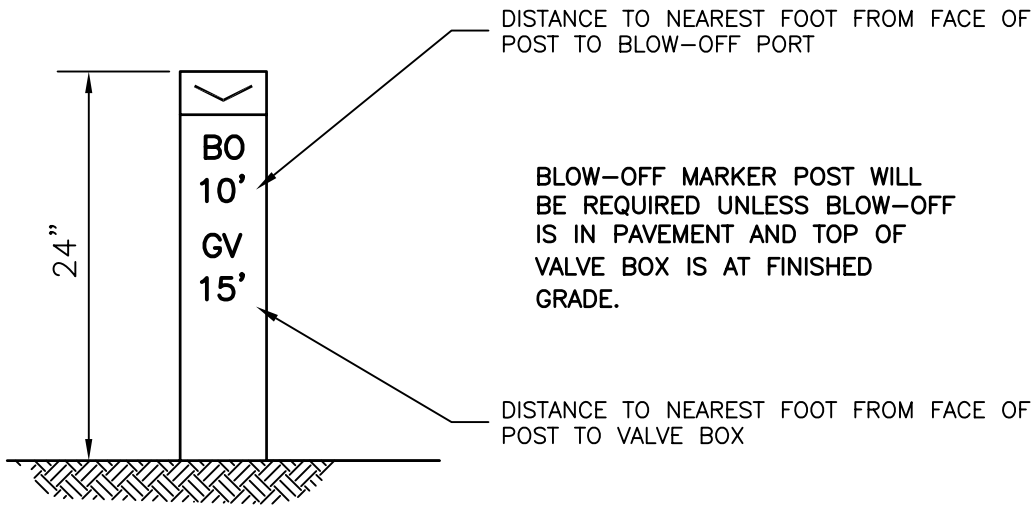
REVISIONS	DATE:
CHECKPRINT	08/14/1998
UPDATES	10/09/2019

DRAWN BY: MRB CHECKED BY: LCW

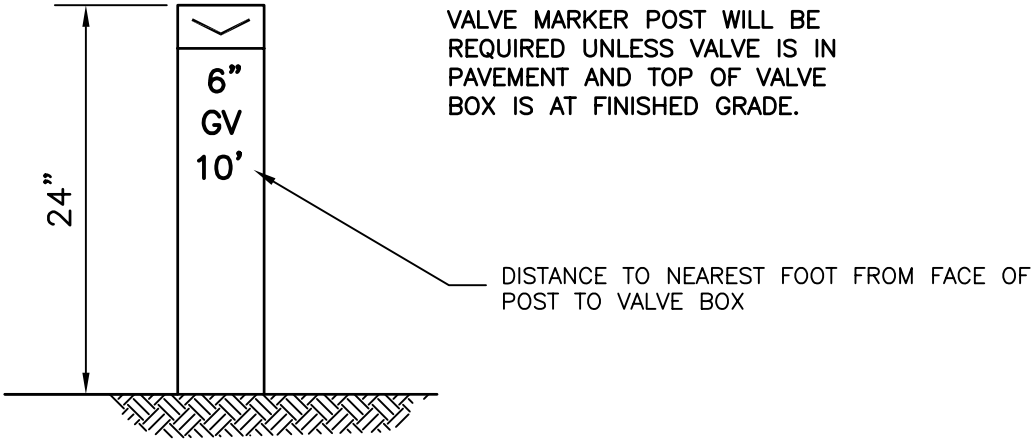
City of Enumclaw

FIRE HYDRANT WITHOUT CURB

DWG. NO.
WA
06



2" BLOW-OFF ASSEMBLY MARKER POST



VALVE MARKER POST

NOTES:

1. MARKER POSTS SHALL BE PAINTED WITH TWO (2) COATS OF SAFETY YELLOW PAINT AND LETTERS SHALL BE 2" HIGH AND STENCILED IN BLACK PAINT.

2. MARKER POSTS SHALL BE CONSTRUCTED AS CONCRETE WITH 4" MIN. SQUARE SECTION AND 42" LENGHT REINFORCED WITH ONE 3/8" X 39" REINFORCING BAR.

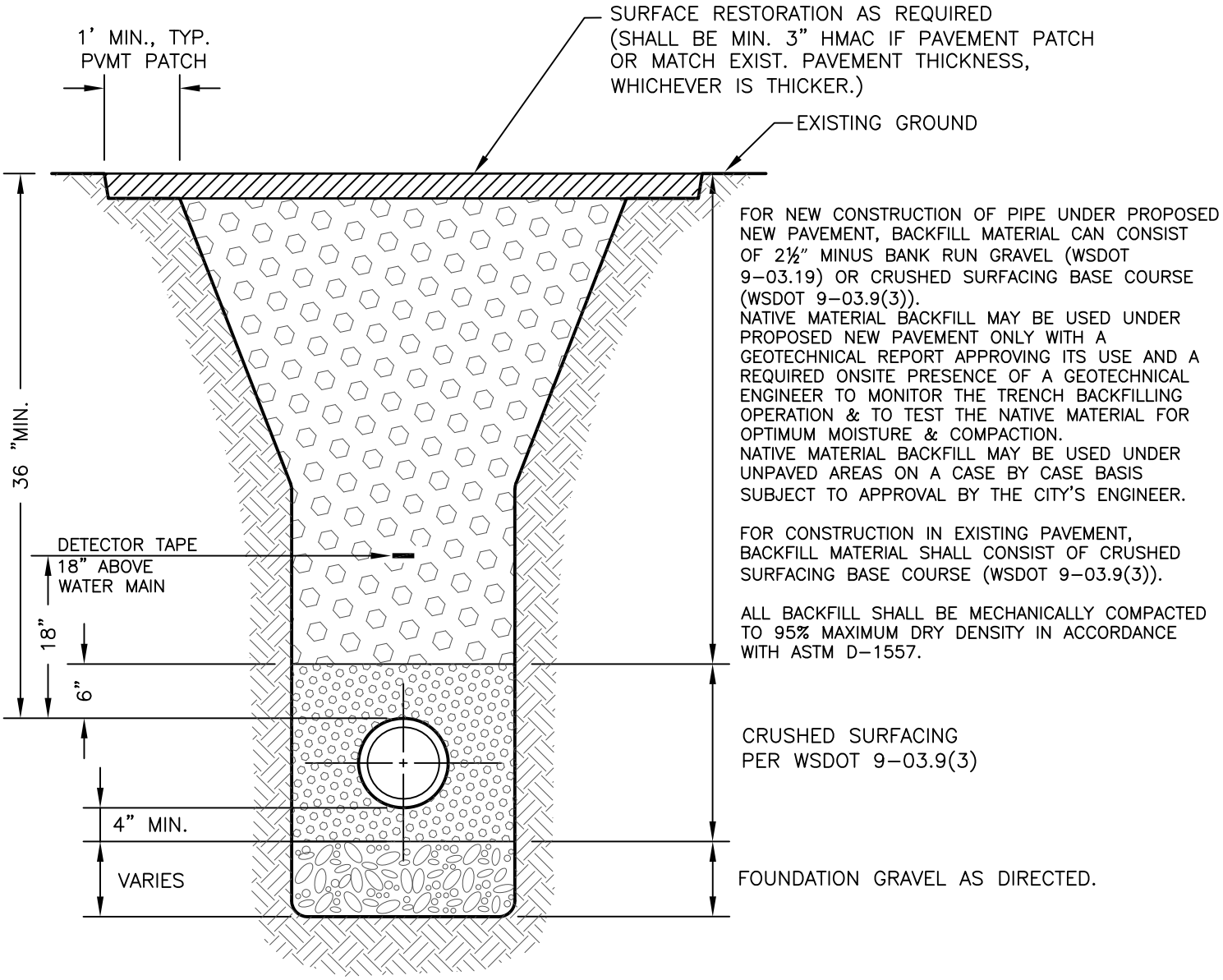
REVISIONS	DATE:
checkprint	10/17/1997
UPDATES	07/09/2004

DRAWN BY: CCS CHECKED BY: LCW

City of Enumclaw

VALVE MARKER POST

DWG. NO. WA 07



NOTES:

1. MINIMUM TRENCH WIDTH SHALL BE THE PIPE O.D. + 12" (6" EACH SIDE OF PIPE).
2. MAXIMUM TRENCH WIDTH SHALL BE THE PIPE O.D. + 18".
3. SHORING SHALL BE PROVIDED IN ACCORDANCE WITH O.S.H.A. & W.I.S.H.A. REQUIREMENTS WHEN NECESSARY.

REVISIONS	DATE:
CHECKPRINT	03/12/1998
UPDATES	10/02/2015
UPDATES	07/18/2017
UPDATES	10/09/2019
UPDATES	03/30/2022

DRAWN BY: KW CHECKED BY: LW

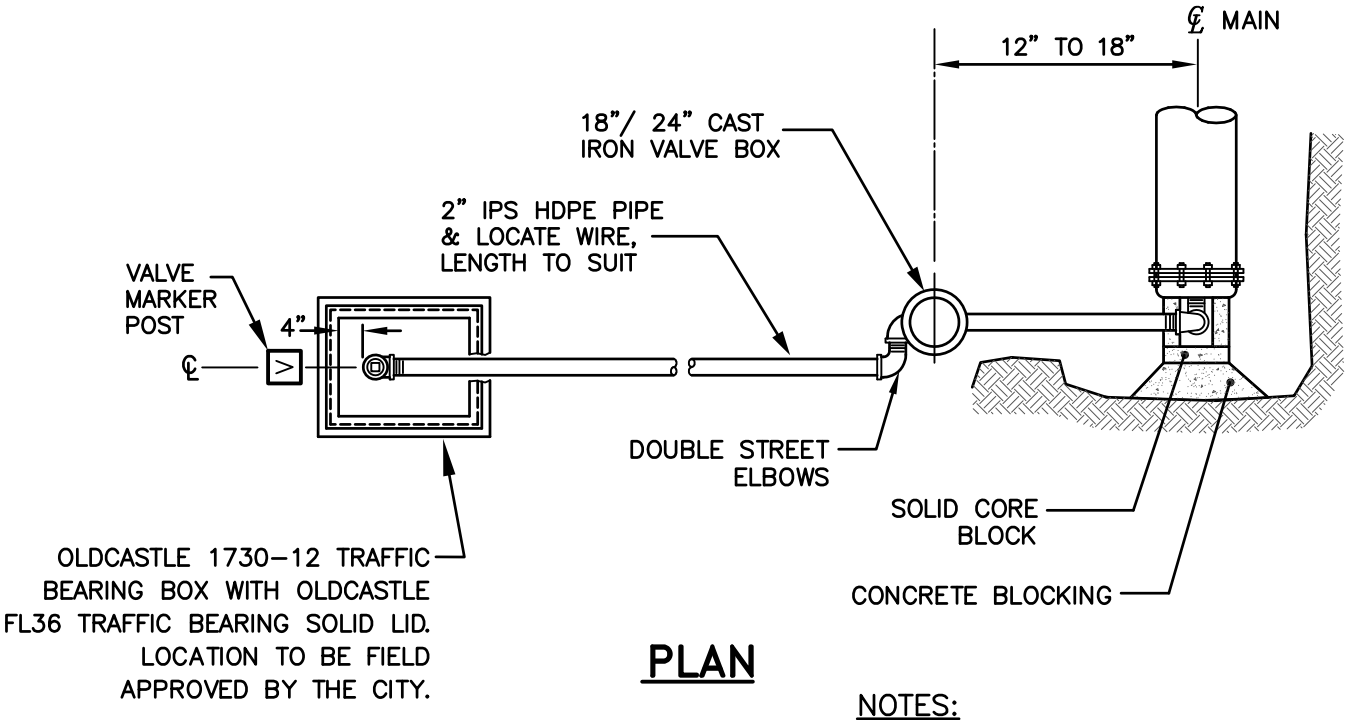
City of Enumclaw

WATER LINE TRENCH DETAIL

DWG. NO.

WA

08



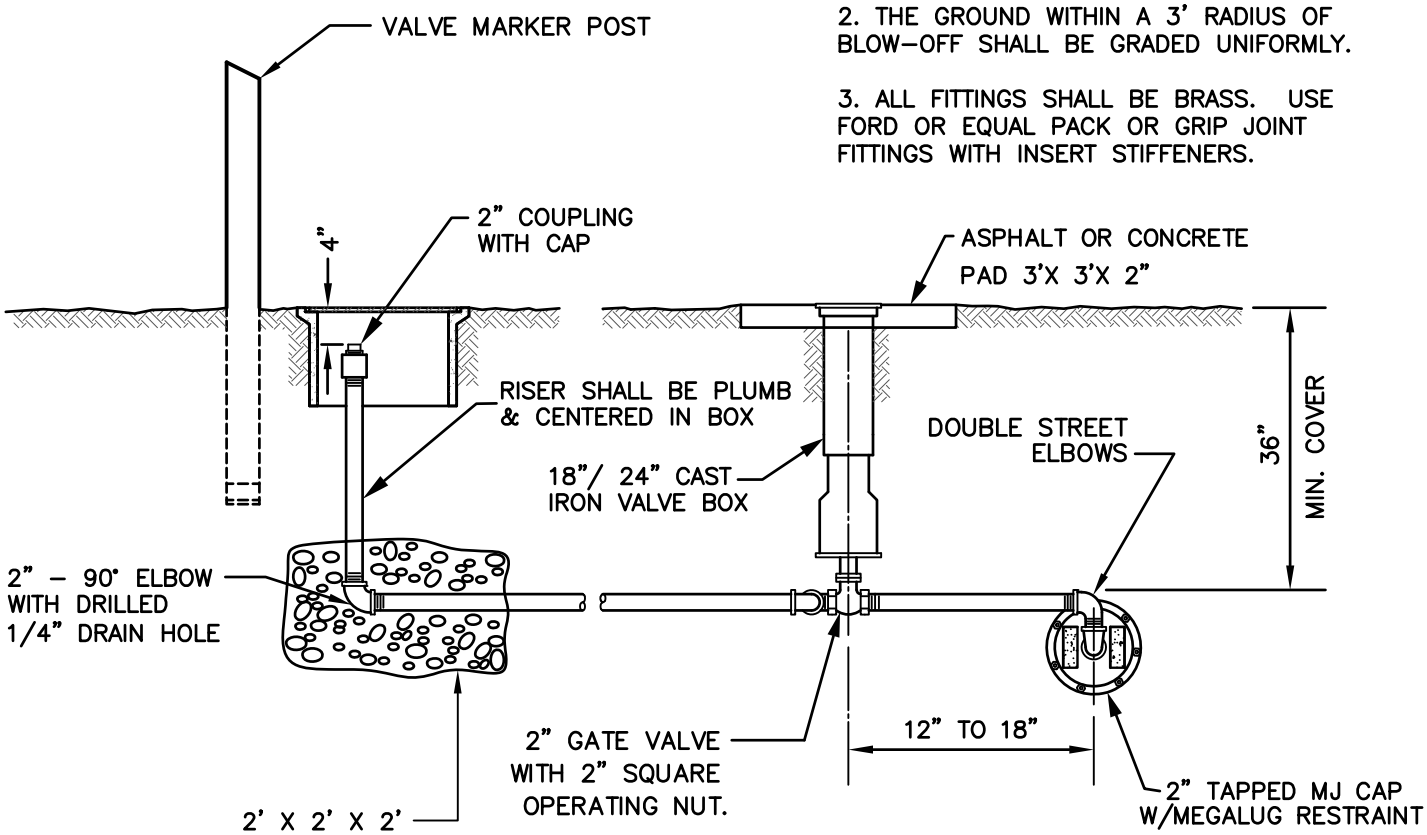
PLAN

NOTES:

1. LOCATE BLOW-OFF AS CLOSE AS POSSIBLE TO MAIN, OR AS DIRECTED THE THE CITY.

2. THE GROUND WITHIN A 3' RADIUS OF BLOW-OFF SHALL BE GRADED UNIFORMLY.

3. ALL FITTINGS SHALL BE BRASS. USE FORD OR EQUAL PACK OR GRIP JOINT FITTINGS WITH INSERT STIFFENERS.



ELEVATION

REVISIONS	DATE:
CHECK PRINT	03/09/1998
UPDATED	06/29/2004
UPDATED	02/01/2006
UPDATED	11/28/2006
UPDATED	07/01/2020
DRAWN BY: KW	CHECKED BY: SW

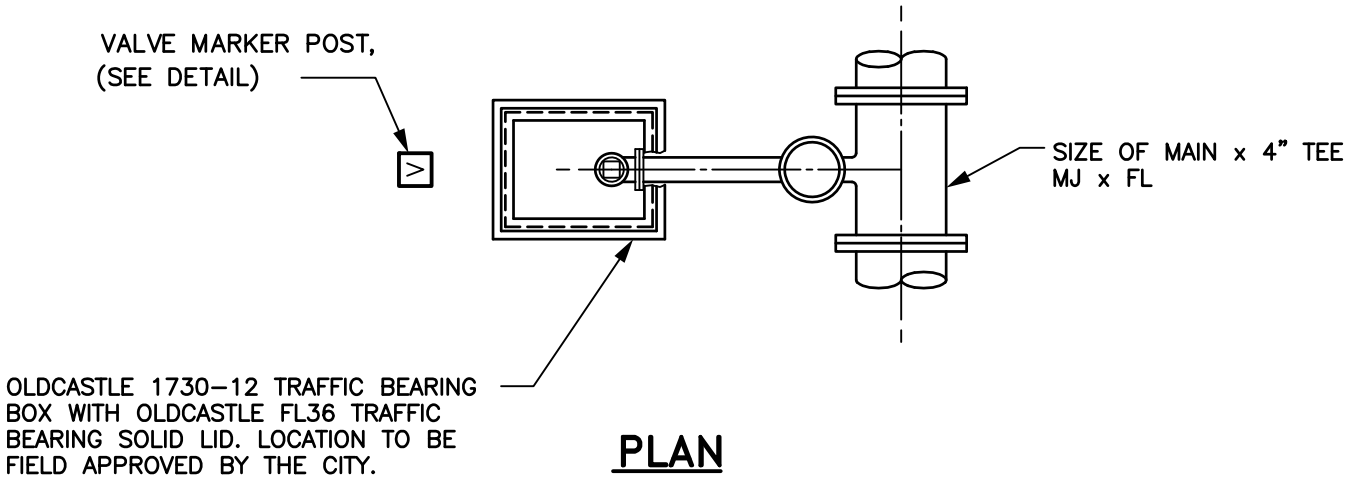
City of Enumclaw

2" BLOW-OFF ASSY. OUTSIDE PAVEMENT

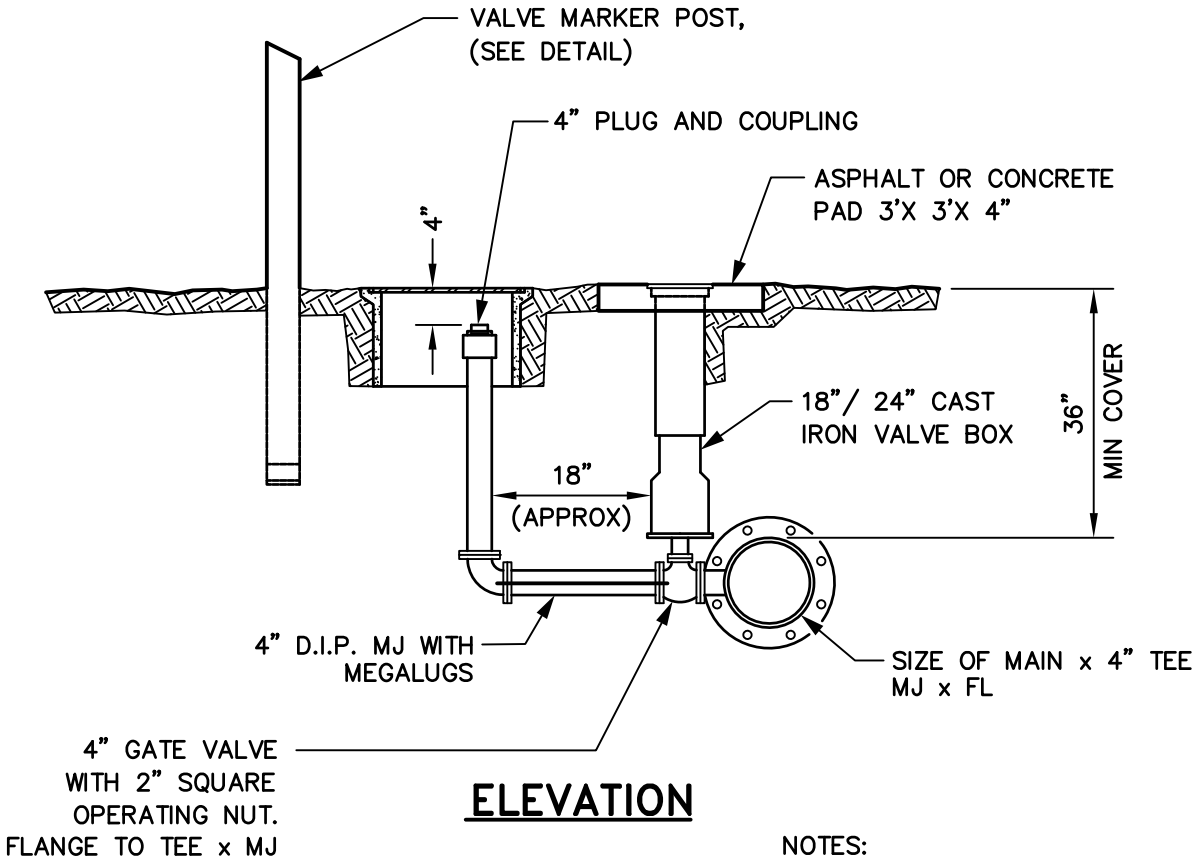
DWG. NO.

WA

09



PLAN



ELEVATION

NOTES:

1. LOCATE BLOW-OFF AS CLOSE AS POSSIBLE TO MAIN, OR AS DIRECTED BY CITY.
2. THE GROUND WITHIN 3' RADIUS OF BLOW-OFF SHALL BE GRADED UNIFORMLY.
3. 4" DIP SHALL BE PRESSURE CLASS 350 OR GREATER WALL THICKNESS.

REVISIONS	DATE:
CHECKPRINT	10/17/1997
UPDATES	07/09/2004
UPDATES	02/01/2006
UPDATES	07/01/2020

DRAWN BY: CCS CHECKED BY: LCW

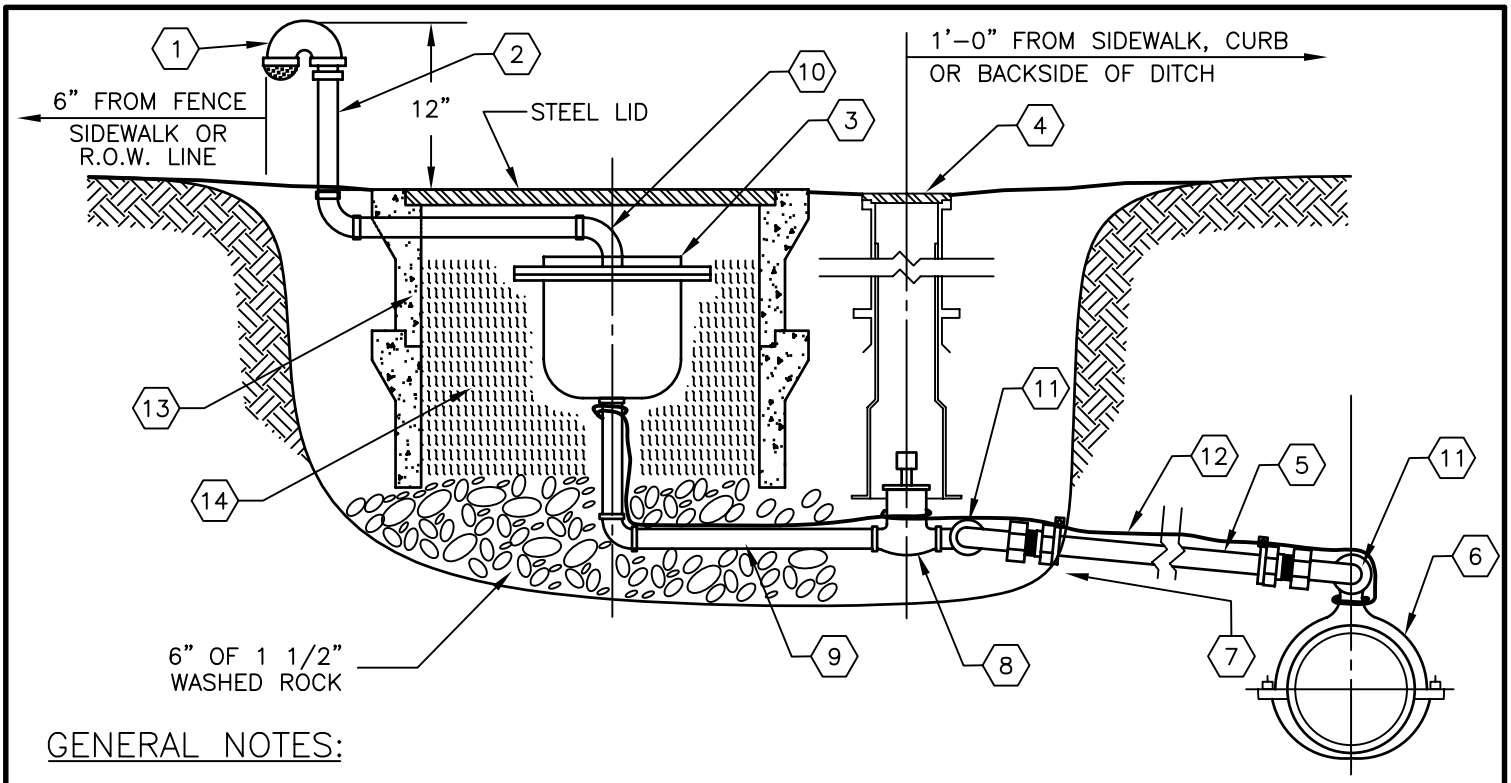
City of Enumclaw

4" BLOW-OFF ASSY. OUTSIDE PAVEMENT

DWG. NO.

WA

10



GENERAL NOTES:

ALL PIPE AND FITTINGS FROM THE MAIN TO THE AIR & VACUUM VALVE SHALL BE POLYETHYLENE AND BRASS. AIR AND VACUUM VALVE ASSEMBLY MUST BE INSTALLED AT HIGHEST POINT IN LINE. IF HIGH POINT FALLS IN LOCATION WHERE ASSEMBLY CANNOT BE INSTALLED, PROVIDE ADDITIONAL DEPTH OF LINE TO CREATE HIGH POINT AT A LOCATION WHERE ASSEMBLY CAN BE INSTALLED. FIELD LOCATION IS TO BE APPROVED BY THE CITY INSPECTOR.

KEYED NOTES:

1. 2" BRONZE BEEHIVE STRAINER, 2" RETURN BEND, PAINTED SAFETY YELLOW.
2. 2" GALV. PIPE. EXTEND HORIZONTALLY THROUGH BACK OF BOX. USE LENGTH AS NECESSARY.
3. 2" COMBINATION AIR VALVE, APCO OR EQUAL WITH DRAIN VALVE AND STRAINER.
4. CAST IRON 2 PIECE VALVE BOX W/ LID.
5. CONTINUOUS LENGTH AS NECESSARY TO PROVIDE SAFE TRAFFIC FREE LOCATION.
6. 2" DOUBLE STRAP SADDLE (FORD F202 OR EQUAL) WITH IP BALL CORP STOP (FORD FB500 OR EQUAL.
7. MAINTAIN POSITIVE SLOPE FROM MAIN TO AIR RELEASE VALVE.
8. 2" R/S GATE VALVE, CAST IRON BODY, SCREWED, NON-RISING STEM, 2" SQUARE OPERATING NUT.
9. 2" PE TUBING WITH 90° ELL COUPLING (MIP x PJ) FORD L84-77 OR EQUAL.
10. 2" STREET 90° BENDS.
11. SWIVEL ELBOWS AS SHOWN.
12. TRACER WIRE, 12 GA. INSULATED COPPER FROM CORP TO GATE VALVE TO AIR/VAC.
13. #2 FOGTITE CONCRETE BOX W/ STEEL TRAFFIC BEARING LID.
14. INSTALL BOX PERPENDICULAR TO PAVING. INSULATE W/ FIBERGLASS INSULATION TO TOP OF AIR/VACUUM VALVE.

REVISIONS	DATE:
CHECKPRINT	11/03/1997
UPDATES	07/09/2004
UPDATES	02/01/2006

DRAWN BY: MRB CHECKED BY: LCW

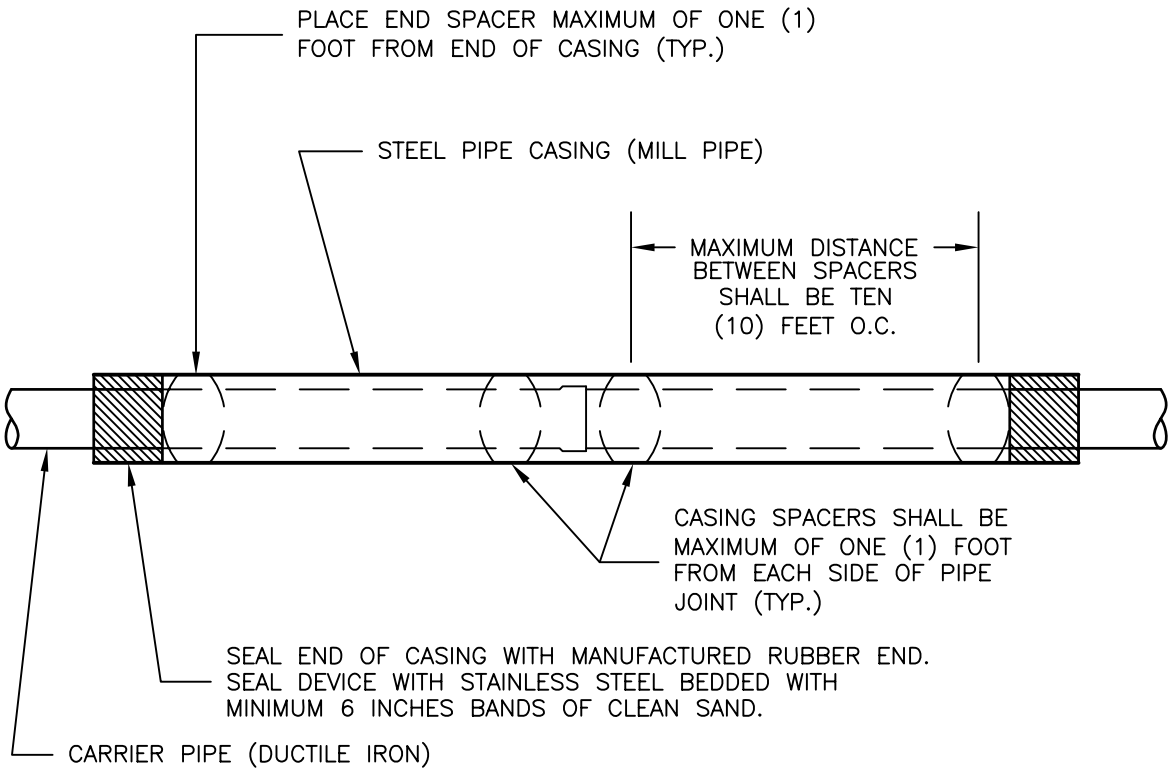
City of Enumclaw

2" AIR/VACUUM RELIEF VALVE ASSEMBLY

DWG. NO.

WA

11



CASING SPACERS (SEE APPROVED MATERIALS LIST)

CARRIER PIPE DIAMETER	4"	6"	8"	10"	12"
CASING DIAMETER (PUSH–ON JOINT CARRIER PIPE)	10"	12"	14"	16"	20"
CASING DIAMETER (MECHANICAL JOINT CARRIER PIPE)	14"	16"	18"	20"	22"
STEEL CASING THICKNESS	0.25"	0.25"	0.25"	0.25"	0.25"
SPACER BAND WIDTH	8"	8"	12"	12"	12"

ANTICORROSIVE COATING THICKNESS:
CARRIER – 8 MILLS DFT
CASING – 8 MILLS DFT

NOTES:

1. CASING SPACERS SHALL BE "CENTER POSITIONING" TYPE.
2. MINIMUM RUNNER WIDTH SHALL BE 2 INCHES
3. RUNNER HEIGHT SHALL BE SIZED TO PROVIDE:
   A. MINIMUM 0.75" BETWEEN CARRIER PIPE BELL AND CASING PIPE WALL AT ALL TIMES.
   B. MINIMUM 1" CLEARANCE BETWEEN RUNNERS AND TOP OF CASING WALL TO PREVENT JAMMING DURING INSTALLATION.
4. STEEL CASING DIAMETERS ARE "OUTSIDE DIAMETER" FOR 16" AND LARGER.

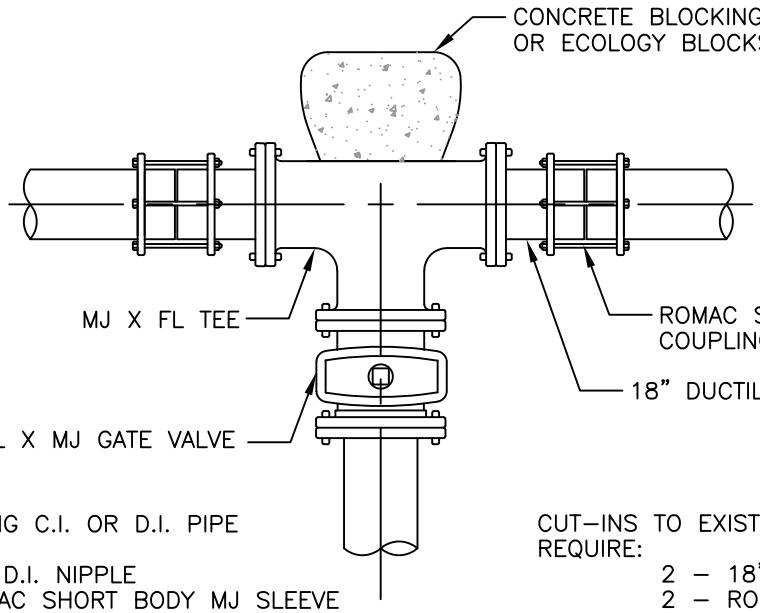
REVISIONS	DATE:
CHECKPRINT	11/03/1997
UPDATES	07/09/2004
UPDATES	02/01/2006

DRAWN BY: MRB CHECKED BY: LCW

City of Enumclaw

WATER MAIN CASING INSTALLATION

DWG. NO.
WA
12



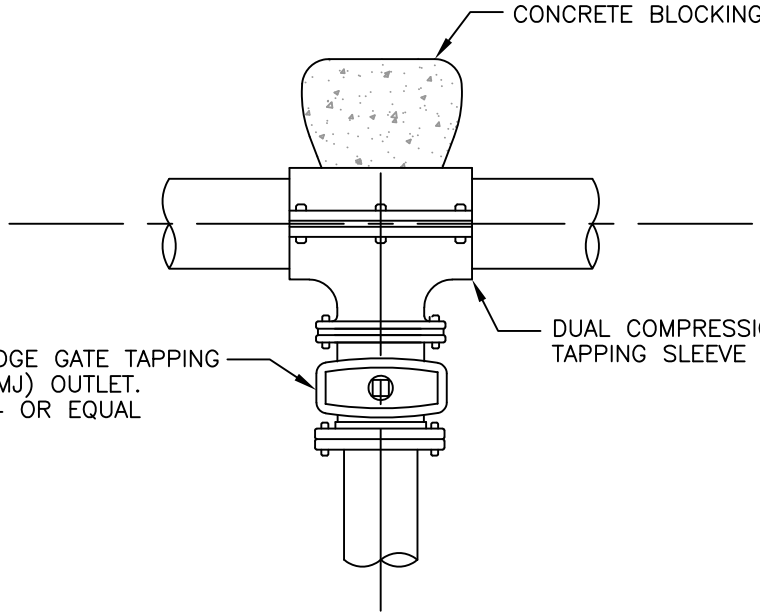
CUT–INS TO EXISTING C.I. OR D.I. PIPE REQUIRE:

- 2 – 18" D.I. NIPPLE
- 2 – ROMAC SHORT BODY MJ SLEEVE COUPLING OR FORD FC.

CUT–INS TO EXISTING A.C. OR STEEL PIPE REQUIRE:

- 2 – 18" D.I. NIPPLES
- 2 – ROMAC 501 OR FORD FC2A TRANSITION COUPLINGS

CUT–IN TO MAINS



WET TAP MAINS 6" OR LARGER

NOTES:

1. ALL CONNECTIONS TO EXISTING MAINS WILL BE MADE WITH THE CITY INSPECTOR PRESENT. BOLTS SHALL BE STAINLESS STEEL.
2. OPERATION OF VALVES SHALL ONLY BE PERFORMED BY CITY UTILITY CREWS.
3. ALL FITTINGS TO BE SWABBED WITH CL2 SOLUTION (1–5%).
4. SIZE ON SIZE WET TAPS MAY BE ALLOWED AT THE SOLE DISCRETION OF THE CITY ENGINEER.
5. STEEL PIPES SHALL BE RECOATED WHERE WRAPPING HAS BEEN DISTURBED.
6. ADDITIONAL VALVES MAY BE REQUIRED ON EACH LEG OF CUT–IN TEES.
7. WET–TAPS ON A.C. MAINS ARE NOT ALLOWED UNLESS SPECIFIC APPROVAL OF SUCH IS GIVEN BY THE CITY ENGINEER.

REVISIONS	DATE:
CHECKPRINT	02/05/1998
UPDATES	10/09/2019

DRAWN BY: KKW CHECKED BY: CCS

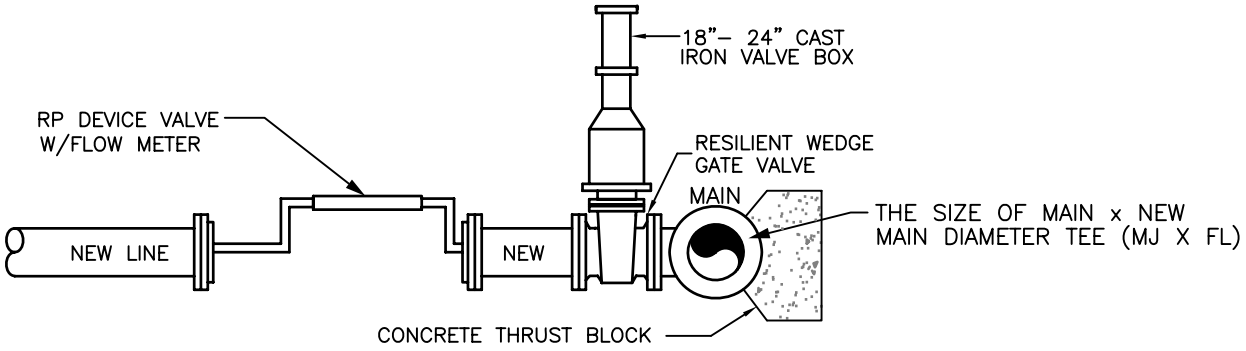
City of Enumclaw

WATER MAIN CUT-INS AND LIVE TAPS

DWG. NO.

WA

13



WATER MAIN ISOLATION
FOR NEW LINE TEST
NTS

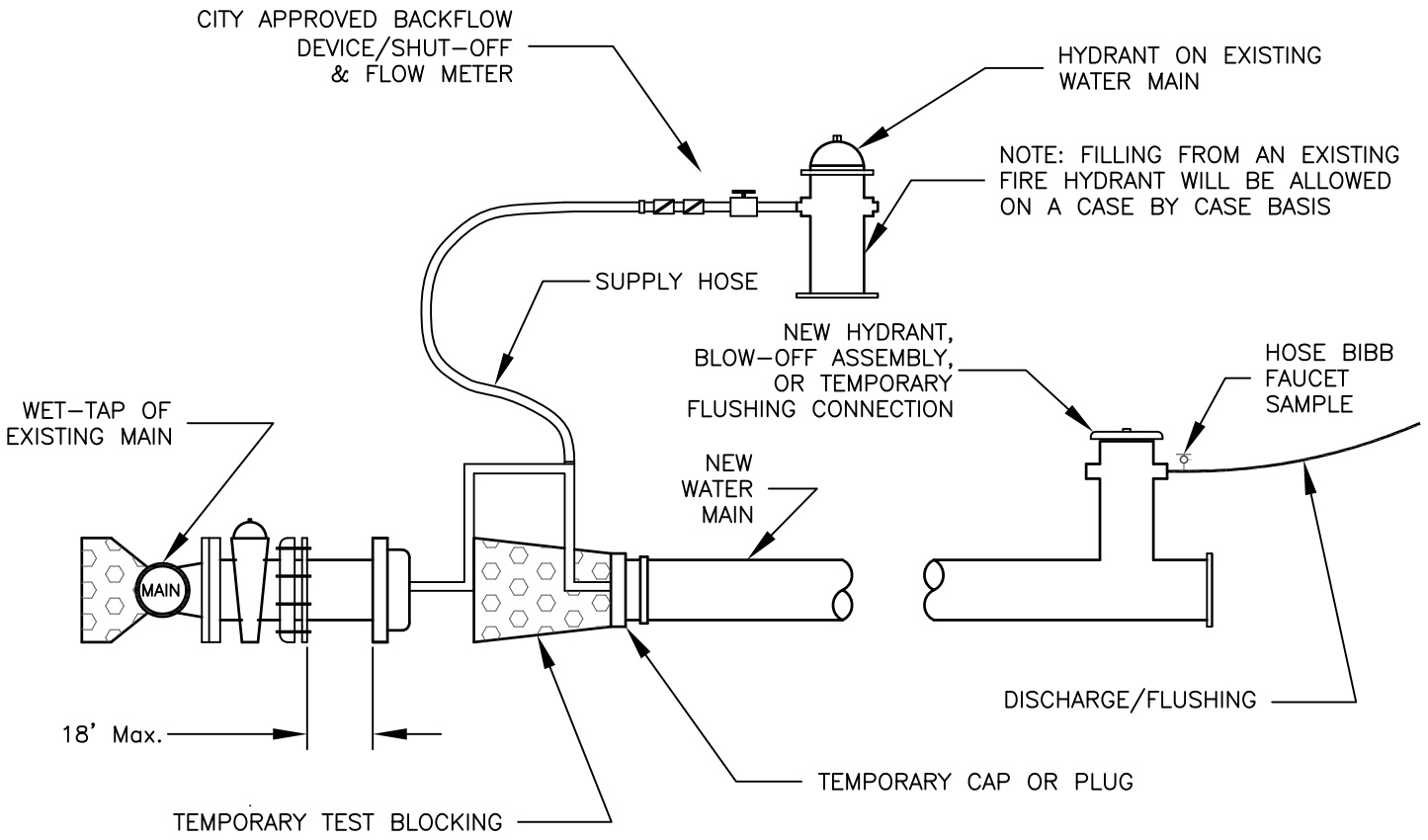
REVISIONS	DATE:
CHECKPRINT	10/16/1997
UPDATES	07/09/2004
UPDATES	02/01/2006

DRAWN BY: MRB CHECKED BY: LCW

City of Enumclaw

NEW WATER MAIN
ISOLATION TEST

DWG. NO.
WA
14



1. AN APPROVED BACKFLOW PREVENTION ASSEMBLY (BPA) SHALL BE INSTALLED BETWEEN THE EXISTING AND NEW WATER LINES DURING DISINFECTION AND FLUSHING OF WATER MAIN. CONTACT THE WATER UTILITY MANAGER AT (360)825-5541 TO ARRANGE AN INSPECTION OF THE PROPOSED BPA.

2. THE BACKFLOW 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 THE 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 SWABBED OR SPRAYED WITH A 1% AVAILABLE CHLORINE SOLUTION TO BE WITNESSED BY CITY INSPECTOR. LENGTH OF FINAL CONNECTION NOT TO EXCEED 18'.

REVISIONS	DATE:
CHECKPRINT	10/07/1998
UPDATES	07/09/2004
UPDATES	02/04/2008
UPDATES	07/18/2017

DRAWN BY: DD CHECKED BY: LCW

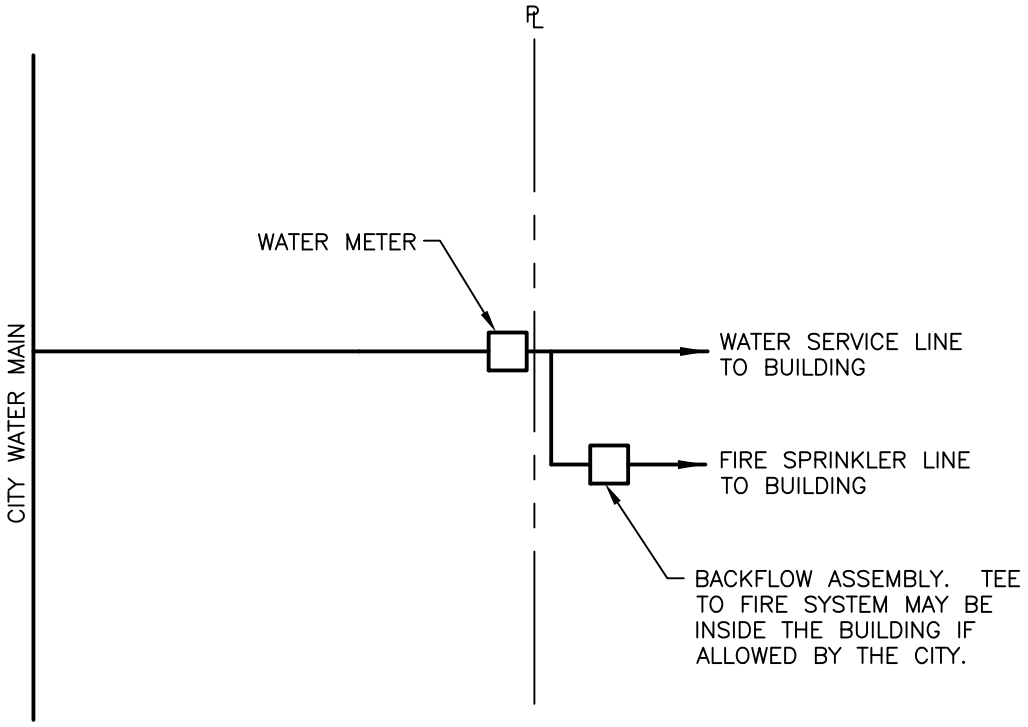
City of Enumclaw

FILLING NEW WATER MAINS

DWG. NO.

WA

15



NOTES:

1. ABOVE DESIGN APPLICABLE TO SINGLE FAMILY AND OTHER RESIDENTIAL DEVELOPMENT WHERE REQUIRED BY THE CITY.

2. CONNECTION TO CITY WATER MAIN PER CITY REQUIREMENTS.

3. PLANS AND CALCULATIONS FOR FIRE SPRINKLER SYSTEM MUST BE SUBMITTED AND APPROVED BY FIRE MARSHAL PRIOR TO INSTALLATION OF THE WATER SERVICE.

4. A BACKFLOW DEVICE WILL NOT BE REQUIRED IF A FLOW-THROUGH FIRE SYSTEM IS PROPOSED AND IS ALLOWED BY THE CITY. CITY APPROVAL WILL BE ON A CASE-BY-CASE BASIS. METER OVERSIZING UP TO A 1" METER WILL BE ALLOWED WITHOUT ADDITIONAL CONNECTION CHARGES. YEARLY FIRE SERVICE LINE FEES STILL APPLY.

REVISIONS	DATE:
APPROVED	11/14/2000
UPDATES	07/09/2004
UPDATES	09/26/2012
UPDATES	08/12/2013

DRAWN BY: KKW CHECKED BY: SW

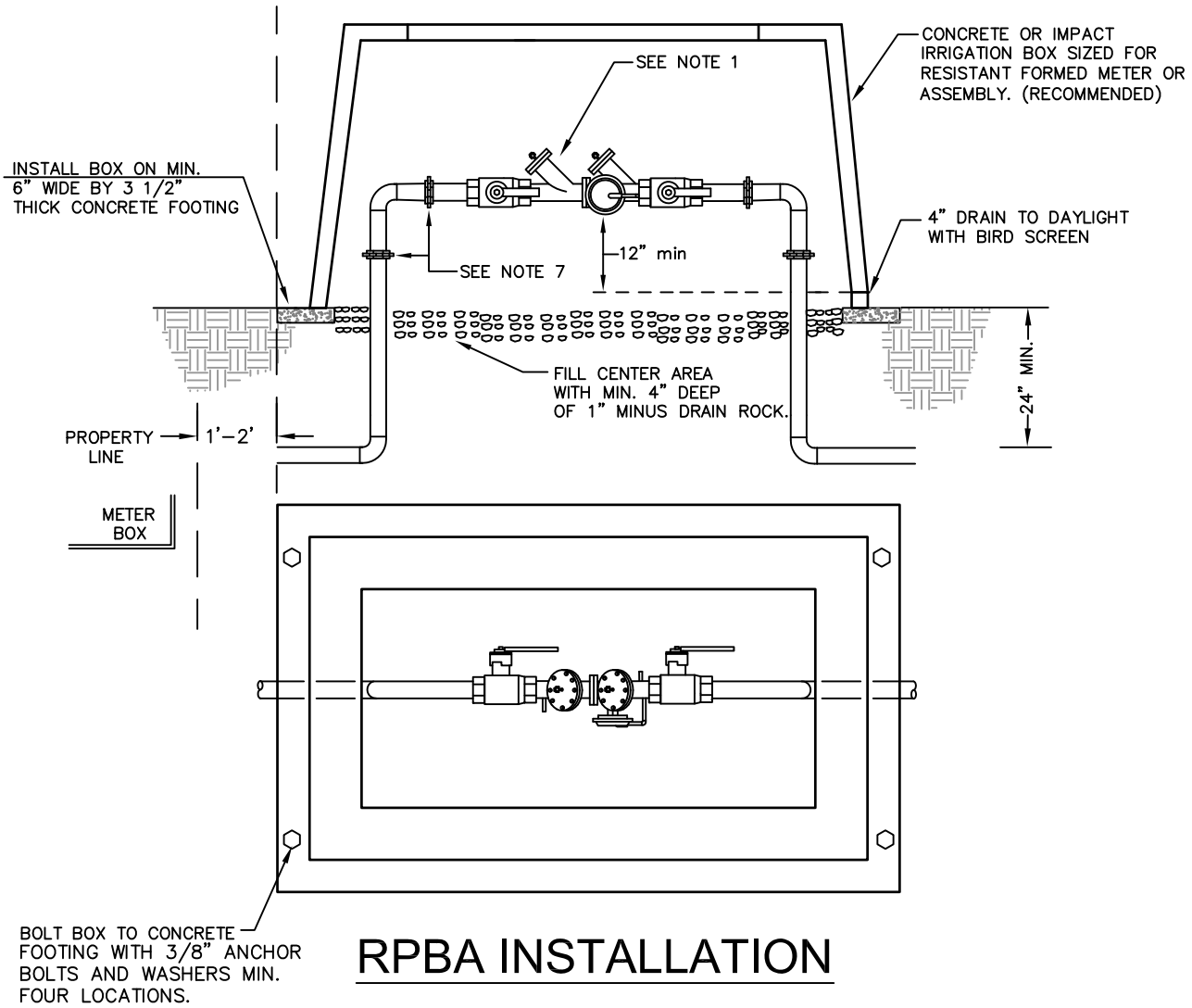
City of Enumclaw

RESIDENTIAL FIRE SERVICE DETAIL

DWG. NO.

WA

16



RPBA INSTALLATION

* RPBA-BOX SHALL BE LOCATED IMMEDIATELY DOWNSTREAM OF WATER METER BOX PRIOR TO ANY BRANCH CONNECTIONS, WITH NO MORE THAN 1'-2' BETWEEN BOXES.

1. Backflow assemblies must be selected from Washington State Department of Health list of Backflow assemblies approved for installation in Washington State.

2. After installation of the backflow assembly, the developer or installer will call the City of Enumclaw Water Department for an inspection by a Cross-Connection Control Specialist.

3. Following an Inspection Approval by the City of Enumclaw Water Department, The Backflow Assembly must be scheduled for an initial test by a Washington State Certified Backflow Assembly Tester. Meter must be installed prior to testing.

4. RPBA Must be purchased and installed as a unit. No modifications to any part of the assembly are allowed.

5. Freeze protection is the reponsibility of the owner and shall not interfere with operation or testing of the assembly.

6. From meter to RPBA shall be copper or brass.

7. Unions must be installed vertically or horizontally. Dielectric unions must be used to seperate dissimilar materials.

8. The installer/developer must provide test cock protection with plugs, caps or covers.

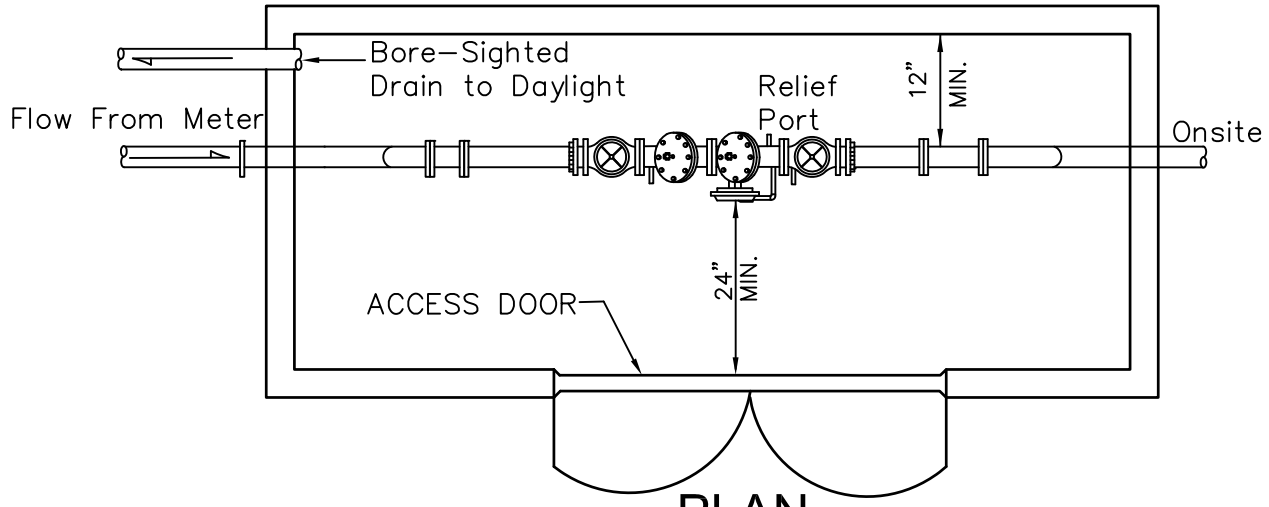
9. Minimum 12" gap from bottom of relief port to top of daylight drain.

REVISIONS	DATE:
DRAWN	11/19/2008
DRAWN BY: KKW CHECKED BY: SW	

City of Enumclaw

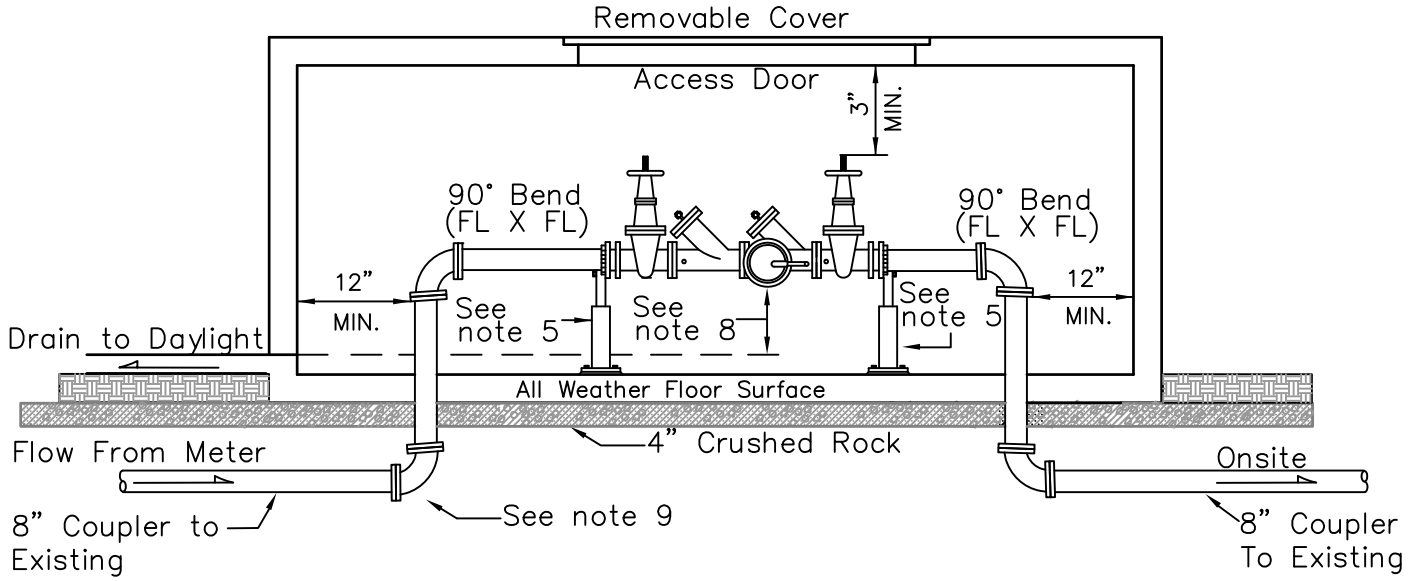
REDUCED PRESSURE BACKFLOW ASSEMBLY (3/4"-2" ASSEMBLIES)

DWG. NO. WA 17



PLAN

N.T.S.



1. Backflow assemblies must be selected from Washington State Department of Health list of Backflow assemblies approved for installation in Washington State.

2. After installation of the backflow assembly, the developer or installer will call the City of Enumclaw Water Department for an inspection by a Cross-Connection Control Specialist.

3. Following an Inspection Approval by the City of Enumclaw Water Department, The Backflow Assembly must be scheduled for an initial test by a Washington State Certified Backflow Assembly Tester. Meter must be installed prior to testing.

4. RPBA Must be purchased and installed as a unit. No modifications to any part of the assembly are allowed.

5. Adustable pipe support Standon Model S-89 or equal & shall be bolted to the valve flange.

6. Freeze protection is the reponsibility of the owner and shall not interfere with operation or testing of the assembly.

7. Using 90° elbows on both sides of RPBA is an approved option.

8. Must maintain a minimum 12" gap from bottom of relief port to top of daylight drain.

9. FEBCO 611 or equal.

REVISIONS	DATE:
DRAWN	11/19/2008
DRAWN BY: KKW CHECKED BY: SW	

City of Enumclaw

REDUCED PRESSURE BACKFLOW ASSEMBLY (3" AND LARGER)

DWG. NO.

WA

18

APPENDIX F

SEPA CHECKLIST

City of Enumclaw
Department of Community Development
1309 Myrtle Ave, Enumclaw, WA 98022
Phone: (360) 825-3593 Fax: (360) 825-7232

SEPA DETERMINATION OF NON-SIGNIFICANCE (DNS) FOR CITY OF ENUMCLAW 2023 COMPREHENSIVE PLAN AMENDMENTS AND NOTICE OF PUBLIC HEARING

PROJECT NUMBER: LUA2023-0027, 0007, 0014 & 0015
City of Enumclaw 2023 Comprehensive Plan Amendments

Proposal: 2023 Comprehensive Plan Amendments include minor updates to the City's Comprehensive Plan that was adopted in 2016. The proposed amendments are as follows:

1. Six-Year TIP – This is a routine amendment done every year. The amendment would include the six-year Transportation Improvement Plan which outlines roadway, pedestrian and maintenance projects for the city's transportation system. **Attachment 1**
2. School District Capital Facilities Plan – Routine adoption of the School District's Capital Plan. **Attachment 2**
3. City of Enumclaw Stormwater Comprehensive Plan Amendment. This amendment was prepared to incorporate the Department of Ecology mandated Stormwater Management Action Plan into the overall Comprehensive plan. **Attachment 3**
4. Water System Plan Amendment. This is an updated water system plan for the City of Enumclaw and includes a revised 20-year capital plan. **Attachment 4**
5. General Sewer Plan Amendments. Updates the 20-year sewer Capital Improvement Plan and Appendix G, Standards for Sanitary Sewer Systems. **Attachment 5**
6. Future Land Use and Zoning Map Amendment for 45015 244th Avenue SE, APN#2720069001 (Harkness). The request is to amend the Future Land Use map from Single Family Residential to Multifamily Residential and amend the Zoning Map from (R-2) Moderate Density Single-Family Residential District to (R-4) Multifamily Residential District. Also, the amendment would amend or remove Land Use Element Policy 14.1 which states: "Limit residential densities to R1 or R2 within ¼ mile of the airport to minimize conflicts between residential uses and airport operations (noise, safety)." **Attachment 6**
7. Zoning Map Amendment for 27921 Se 448th Street, APN #8141380880 (Holdener). The request is to amend the Zoning Map from (HCB) Highway Community Business zoning to (PUD) Planned Unit Development Zoning. Also, amend or remove City Policy Land Use Element 5.6 which states: "The Planning Unit Development designation has not resulted in enhanced development as originally anticipated and should be eliminated for undeveloped properties." **Attachment 7**
8. Zoning Map Amendment for APN 1320069022 (Levander). The request is to amend the zoning map from (R-1) Low Density Single-Family Residential to (R-2) Moderate Density Single-Family Residential and to amend the properties Comprehensive Plan's Future Land Use Map designates so it's removed from the "Urban/Rural Transition Overlay". **Attachment 8**

Dates: Issued DNS: September 6, 2023

Applicant: City of Enumclaw

Lead Agency: City of Enumclaw

Determination of Non-Significance: The lead agency has determined that this proposal will not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) 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 or online here: https://www.cityofenumclaw.net/556/2022-Planning-Commission-Work-PlanComp-P

Public Hearing: On September 28, at 7:00 p.m., the Planning Commission will hold a public hearing on these amendments at the City Hall Council Chambers located at 1339 Griffin Avenue. The Enumclaw City Council will hold a

public hearing on these amendments on October 9, 2023, at 6:00 p.m. at the City Hall Council Chambers located at 1339 Griffin Avenue.

Environmental Studies (Available upon request):

- SEPA Checklist prepared by Chris Pasinetti dated August 15, 2022
- SEPA Checklist prepared by Jason Harkness dated March 2, 2023 (LUA2023-0015)
    - Trip Generation Memo by Transpo Group dated April 7, 2023
- SEPA Checklist prepared by Jeff Potter dated February 21, 2023 (LUA2023-0007)
    - Critical Areas Report by Sewall Wetland Consulting, Inc dated October 27, 2022
    - Geotechnical Report by Earth Solutions NW dated February 14, 2023
    - Cultural Resources Assessment by Perteet dated April 12, 2023 (Not available for viewing)
    - Traffic Impact Assessment by Heath & Associates dated March 7, 2023
- SEPA Checklist prepared by Scott Clark dated April 12, 2023 (LUA2023-0014)
    - Trip Generation Assessment by Heath & Associates dated April 28, 2023
- SEPA Checklist prepared by Scoot Woodbury dated July 26, 2023

Comment Period: The lead agency will not act on this proposal for fifteen (15) days from the issued date identified above. Written comments on this SEPA determination must be received by the Community Development Department at 1309 Myrtle Avenue no later than, 4:00 p.m., **September 21, 2023**.

Comment Period for Other Agencies: This DNS is issued under WAC 197-11-340. Commenting agencies should submit any comments within the above-stated period. Upon request, the City will reconsider its lead agency status, the issuance of this DNS, or any mitigating measures.

Information or comments regarding this application may be requested at: City of Enumclaw Community Development Department, Attn: Chris Pasinetti, Community Development Director, 1309 Myrtle Avenue, Enumclaw, WA 98022, or by email to cpasinetti@ci.enumclaw.wa.us.

Appeal: There is no administrative appeal for this determination. Appeals must be filed in conjunction with appeals of the adopted amendments to the Growth Management Hearings Board (GMHB). Appeals shall be taken in accordance and limitations set forth in RCW 43.21C.075 and WAC 242-03. In addition to GMHB requirements, a copy of the appeal shall also be filed with the City Clerk, 1339 Griffin Avenue, Enumclaw, WA 98022.

Administrator of Development Regulations and Responsible SEPA Official

Digitally signed by Chris Pasinetti
DN: cn=Chris Pasinetti, o=City of Enumclaw, ou=Community Development, email=cpasinetti@ci.enumclaw.wa.us, c=US
Date: 2023.08.31 14:29:07 -07'00'

_____ _____ September 6, 2023_____

Chris Pasinetti, Community Development Director
1309 Myrtle Avenue
Enumclaw, WA 98022
Phone 360-825-3593 x.5726

Date

CITY OF ENUMCLAW
Community Development Department
1309 Myrtle Ave
Enumclaw, WA 98022
Tel: 360.825.3593
Permits@ci.enumclaw.wa.us
http://www.cityofenumclaw.net/

STATE ENVIRONMENTAL PROTECTION ACT (SEPA)

Revised 01/24/2023

SEPA SUBMITTAL – APPLICATION

APPLICANT: ☐ *Use mailing and email address for meeting notification.* ☐ *Check box if Primary Contact*

COMPANY: City of Enumclaw
ADDRESS: 1309 Myrtle Avenue
(CITY, STATE, ZIP) Enumclaw, WA 98022
PHONE:_____ FAX:_____ E-MAIL: cpasinetti@ci.enumclaw.wa.us

SIGNATURE:_____ **PRINTED NAME:** Chris Pasinetti
(Signature Required)

Digitally signed by Chris Pasinetti
DN: cn=Chris Pasinetti, o=City of Enumclaw, ou=Community Development, email=cpasinetti@ci.enumclaw.wa.us, c=US
Date: 2023.08.31 14:30:12 -07'00'

APPLICANT'S REPRESENTATIVE: ☐ *Check box if Primary Contact*

COMPANY: _____
ADDRESS: _____
(CITY, STATE, ZIP) _____
PHONE:_____ FAX:_____ E-MAIL: _____

SIGNATURE:_____ **PRINTED NAME:**_____
(Signature Required)

PROPERTY OWNER(S): ☐ *Attach separate sheet if needed.* ☐ *Check box if Primary Contact*

COMPANY: _____
ADDRESS: _____
(CITY, STATE, ZIP) _____
PHONE:_____ FAX:_____ E-MAIL: _____

SIGNATURE:_____ **PRINTED NAME:**_____
(Signature Required)

Note: Applicant or representative must have property owner's consent to file this application form in order for it to be accepted.

PROPERTY INFORMATION (REQUIRED)

SITE ADDRESS: _____

ASSESSOR'S PARCEL ID#	LOT SIZE	ZONING DISTRICT

AREA TO DEVELOPED (s.f.):_____

EXISTING USE OF SITE: _____

PROPOSED USE OF SITE: _____

SEPA SUBMITTAL – CONCURRENT APPLICATIONS

Please indicate whether you are submitting one or more concurrent applications with this application by checking one or more of the boxes below:

*Type I Applications (administrative decisions made by the city which are not subject to environmental review under the State Environmental Policy Act [SEPA])**:***

- ❑ Administrative Use Permit
- ❑ Boundary Line Adjustment/Lot Line Elimination
- ❑ Building Permit
- ❑ Final Plat
- ❑ Floodplain Development Permit
- ❑ Grading Permit
- ❑ Home Occupation Permit
- ❑ Land Disturbing Activity Permit (less than 100 cubic feet)
- ❑ Mechanical Permit
- ❑ Plumbing Permit
- ❑ Public Facility Extension Agreement
- ❑ Right-of-way Use Permit
- ❑ Short Subdivision
- ❑ Utility Permit

Type II Applications (administrative decisions made by the city which include threshold determinations under SEPA):

- ❑ Administrative Use Permit
- ❑ Binding Site Plan
- ❑ Building Permit-SEPA Non-exempt
- ❑ Critical Area Permit
- ❑ Floodplain Development Permit
- ❑ Grading Permit
- ❑ Land Disturbing Activity Permit (greater than 100 cubic feet)
- ❑ Public Facility Extension Agreement
- ❑ Reasonable Use Exception
- ❑ Short Subdivision

Type III Applications (quasi-judicial final decisions made by the hearing examiner following a recommendation by staff:

- ❑ Conditional Use Permit
- ❑ Variance

Type IV Applications (quasi-judicial decisions made by the city council following a recommendation by the hearing examiner):

- ❑ Rezone (site-specific)
- ❑ Preliminary Plat
- ❑ Planned Unit Development

OTHERS - as may apply:

- ❑ SHORELINE EXEMPT
- ✠ Comprehensive Plan Amendments
- ❑ _____

SEPA SUBMITTAL CHECKLIST

DIGITAL COPIES OF WRITTEN MATERIALS & GRAPHICS

☐ Please provide a labeled digital versions of all submitted written materials and plans and graphics for use by the City of Enumclaw during the SEPA review process. Staff will use this information in report preparation and public noticing so please be sure to provide current and accurate information. Plans and graphics should be submitted in *pdf* format.

APPLICATION FEES - Make checks payable to the City of Enumclaw

☐ All application fees, including, but not limited to: Environmental Review and public notification costs. Some fees will not be invoiced until actual costs are known. Link to current fee schedule can be found @ *http://www.cityofenumclaw.net/219/Planning-Permit-Applications-Information*

WRITTEN MATERIALS – One (1) copy and one (1) digital copy unless otherwise noted

☐ A. **APPLICATION FORM.** Provide a **completed** application form signed by the property owner(s) and/or applicant with the completed Application Submittal Checklist.

☐ B. **CONCURRENT APPLICATIONS FORM.** Identify applications that are being submitted concurrent with the SEPA review.

☐ C. **SEPA CHECKLIST.** Submit a **completed** environmental checklist and any supporting documentation, such as a critical areas report (see below), or information to address potential or known environmental impacts resulting from the proposal.

Submit the SEPA CHECKLIST with one (1) copy of each of the following:

1) Project Narrative- Include a *detailed* project narrative.
2) Vicinity map – clearly showing the location of the project with respect to public streets, other parcels, and adjacent development.
3) Site plan – drawn to engineering scale (ex: 1:20)-one full size, other copies no larger than 11” x 17” inch size
   Site plan must include:
   - North arrow and engineering scale;
   - Significant or natural features such as creeks, wetlands, steep slopes;
   - Dimensions and shape of parcel or lot;
   - Location and size of existing and proposed buildings and development;
   - Parking and landscape areas (as applicable);
   - Adjacent streets and points of ingress and egress and adjacent uses;
4) Conceptual building elevations (as applicable);
5) Conceptual vehicle maneuvering diagram (as applicable);

Submit one (1) copy of the following as applicable:

Wetland Delineation Report	Critical Areas Report
Geotechnical and geological report	Traffic Impact Analysis

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.

The City has provided the attached SEPA checklist as a fillable form to ensure consistent formatting throughout the document. **It is required that the attached SEPA checklist is used for all SEPA review applications** and if it is not used, the application will be deemed incomplete. If the provided space is not enough to fit your answer in, attach your full answer to the end of the SEPA checklist.

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 Find help answering background questions

1. Name of proposed project, if applicable:

   2023 Comprehensive Plan Amendments

2. Name of applicant:

   City of Enumclaw

3. Address and phone number of applicant and contact person:

   - Contact Person: Chris Pasinetti, Community Development Director
   - Address: 1309 Myrtle Ave Enumclaw, WA 98022
   - Phone #: 360-615-5726
   - Email: cpasinetti@ci.enumclaw.wa.us

4. Date checklist prepared:

   August 8, 2023

5. Agency requesting checklist:

   City of Enumclaw

6. Proposed timing or schedule (including phasing, if applicable):

   Planning Commission public hearing September 28, 2023
   City Council public hearing for October 9, 2023

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

   None at this time.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

   This SEPA Checklist and the related information below.
   Public Initiated Comprehensive Plan Amendments:

   Holdener Rezone (LUA2023-0007): Critical Areas Report, Sewall Wetland Consulting dated October 27, 2022, Traffic Impact Assessment dated March 7, 2023, Cultural Resources Assessment dated April 12, 2023. SEPA Checklist

   Levander (LUA2023-0014): Traffic Impact Assessment dated April 28, 2023, SEPA Checklist (revised), Conceptual Sewer Plan

   Harkness (LUA2023-0015): Traffic Impact Assessment dated April 7, 2023, SEPA Checklist (revised).

   Individual SEPA Checklists have been provided by the applicants and are attached. This is a consolidated checklist to include all of the years' comprehensive plan amendments.

- SEPA Checklist prepared by Chris Pasinetti dated September 15, 2022
- SEPA Checklist prepared by Jason Harkness dated March 2, 2023
- SEPA Checklist prepared by Jeff Potter dated February 21, 2023
- SEPA Checklist prepared by Scott Clark dated April 12, 2023
- SEPA Checklist prepared by Scoot Woodbury dated July 26, 2023
- Trip Generation Memo by Transpo Group dated April 7, 2023
- Trip Generation Assessment by Heath & Associates dated April 28, 2023
- Traffic Impact Assessment by Heath & Associates dated March 7, 2023
- Geotechnical Report by Earth Solutions NW dated February 14, 2023
- Critical Areas Report by Sewall Wetland Consulting, Inc dated October 27, 2022
- Cultural Resources Assessment by Perteet dated April 12, 2023 (Not available for viewing)

These are available upon request and are uploaded to the SEPA Register.

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.

   The City Council will deliberate on the proposed amendments in October 9, 2023. Department of Health and Department of Ecology will review and approve the amendments to the proposed General Sewer Plan and Water System plan.

10. List any government approvals or permits that will be needed for your proposal, if known.

    Same as above

11. Give a 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.)

    The year's Comprehensive Plan Amendments include 3 public initiated amendments and 5 amendments initiated by the City. Descriptions below:

1. Six-Year TIP – This is a routine amendment done every year. The amendment would include the six-year Transportation Improvement Plan which outlines roadway, pedestrian and maintenance projects for the city's transportation system. Attachment 1
2. School District Capital Facilities Plan – Routine adoption of the School District's Capital Plan. Attachment 2
3. City of Enumclaw Stormwater Comprehensive Plan Amendment. This amendment was prepared to incorporate the Department of Ecology mandated Stormwater Management Action Plan into the overall Comprehensive plan. Attachment 3
4. Water System Plan Amendment. This is an updated water system plan for the City of Enumclaw and includes a revised 20-year capital plan. Attachment 4
5. General Sewer Plan Amendments. Updates the 20-year sewer Capital Improvement Plan and Appendix G, Standards for Sanitary Sewer Systems. Attachment 5
6. Future Land Use and Zoning Map Amendment for 45015 244th Avenue SE, APN#2720069001 (Harkness). The request to amend the Future Land Use map from Single Family Residential to Multifamily Residential and amend the Zoning Map from (R-2) Moderate Density Single-Family Residential District to (R-4) Multifamily Residential District. Also, amend or remove Land Use Element Policy 14.1 which states: "Limit residential densities to R1 or R2 within ¼ mile of the airport to minimize conflicts between residential uses and airport operations (noise, safety)." Attachment 6
7. Zoning Map Amendment for 27921 Se 448th Street, APN #8141380880 (Holdener). The request is to amend the Zoning Map from (HCB) Highway Community Business zoning to (PUD) Planned Unit Development Zoning. Also, amend or remove City Policy 5.6 which states: "The Planning Unit Development designation has not resulted in

enhanced development as originally anticipated and should be eliminated for undeveloped properties." Attachment 7
8. Zoning Map Amendment for APN 1320069022 (Levander). The request is to amend the zoning map from (R-1) Low Density Single-Family Residential to (R-2) Moderate Density Single-Family Residential. Future Land Use Map designates the area as "Urban/Rural Transition Overlay" to remove this designation from this property. Attachment 8

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 city-initiated amendments are city wide with the exception that the Stormwater Management Action Plan amendment focuses primarily on actions and projects within the Watercress Priority Catchment Area (see attached map). The public initiated amendments are listed below:

    Address:

- Holdener Rezone (LUA2023-0007): 27921 SE 448th Street, Enumclaw. Parcel Number 8141380880
- Levander (LUA2023-0014): Parcel Number 1320069022
- Harkness (LUA2023-0015): 45015 244th Avenue Se, Enumclaw. Parcel Number 2720069001

B. Environmental Elements

Pursuant to WAC 197-11-315(1)(e), no discussion of the individual environmental elements is required for this non-project as the City has determined that the questions in Part B do not contribute meaningfully to the analysis of the proposal. However, Public Initiated amendments include additional SEPA checklists for each amendment and those will be attached.

C. Signature Find help about who should sign

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.

_____ _____ Digitally signed by Chris Pasinetti
DN: cn=Chris Pasinetti, o=City of Enumclaw, ou=Community Development, email=cpasinetti@ci.enumclaw.wa.us, c=US
Date: 2023.08.31 14:30:40 -07'00'

Type name of signee: Chris Pasinetti

Position and agency/organization: CD Director, City of Enumclaw

Date submitted: August 15, 2023

D. Supplemental sheet for nonproject actions

Find help for the nonproject actions worksheet IT IS NOT REQUIRED to use this section 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 proposed amendments to the comprehensive plan will not likely increase discharges to water, emissions to air, production, storage or release of toxic or hazardous substances. The Stormwater Management Action Plan includes projects and actions designed to reduce pollutant loadings and hydraulic impacts from stormwater runoff in existing developed areas of the City.

- Proposed measures to avoid or reduce such increases are:

Any projects as a result from the amendments will be reviewed project by project to determine any measures. Discharges to water, emissions to air, the production, storage or release of toxic or hazardous substances and the production of noise are regulated by State law and development regulations specific to the City.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

The proposed amendments to the comprehensive plan will not likely affect plants, animals, fish or marine life. The Stormwater Management Action Plan includes projects and actions designed to conserve, protect, and restore receiving waters which will ultimately benefit fish and other aquatic species. Any projects which may occur as a result of this proposal may be subject to the SEPA process and additional environmental review.

- Proposed measures to protect or conserve plants, animals, fish, or marine life are:

Existing State law and City development regulations have been adopted to protect and conserve plants, animals, fish and/or marine life. The Stormwater Management Plan seeks to restore impacts to plants, animals, fish, or marine life from historic development.

Projects that may be permitted following the proposed CIPs and/or land use/rezones will be reviewed under SEPA depending on the size and/or type of activity, City of Enumclaw codes and any other state or federal laws that are invoked depending on the type of projects proposed.

3. How would the proposal be likely to deplete energy or natural resources?

The amendments will not likely deplete energy or natural resources.

- Proposed measures to protect or conserve energy and natural resources are:

No measures are proposed as part of these comprehensive plan amendments. Any projects that result of these amendments will be required to comply with state and federal law as well as the city municipal code for energy and natural resource conservation.

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?

The Comprehensive Plan Amendments will not like affect environmentally sensitive areas or other areas designated for governmental protection. Parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains or prime farmlands. The Stormwater Management Action Plan includes projects and actions designed to conserve, protect, and restore environmentally sensitive areas.

- Proposed measures to protect such resources or to avoid or reduce impacts are:

Any projects that result from the amendments or capital improvements plans will be required to comply with state and federal law as well as the city municipal code for protecting the environment, to include the items noted above. LUA2023-0007 (Holdener) rezone property does include a Type F stream at the site and the application of Title 19, Critical Areas will mitigate development in and around the stream.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

The Comprehensive Plan amendments will not likely affect land and shoreline use, or encourage land or uses that are incompatible with existing plans.

- Proposed measures to avoid or reduce shoreline and land use impacts are:

Any projects that result from the amendments or capital improvements plans will be required to comply with state and federal law as well as the city municipal code and shoreline master program for protecting the environment.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

The yearly Comprehensive Plan Amendments could have a very moderate increase in demand for transportation, but overall could have a net decrease in traffic overall. The public initiated amendments are all up zones from low density residential to high density residential, excluding LUA2023-0007 (Holdener) which could result in less traffic generated from the expansion of allowed uses afforded under the PUD zone. The traffic impacts are outlined below in terms of PM peak trips:

Project	Current Zoning PM Peak	Proposed Zoning PM Peak	Net Change
LUA2023-0007 Holdener	388	298	-101
LUA2023-0014 Levander	13	21	8
LUA2023-0015 Harkness	7	14	7

- Proposed measures to reduce or respond to such demand(s) are:

For Applicant

Any projects as a result of the comprehensive plan amendments would mitigate traffic impacts via project specific traffic analysis as well as impact fees assessed. Any intersections that show a level of service (LOS) that is reduced below designated the adopted LOS at the time of the project would be required to mitigated.

For City Use

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The proposed comprehensive plan amendments would not likely conflict with local, state or federal requirements for environmental protection. The City of Enumclaw Stormwater Management Action Plan was developed pertinent to current Department of Ecology Phase II Municipal Stormwater Permit requirements.

Classified Proof

Client	91263 - City of Enumclaw/ Community Dev-LEGALS	Phone	(360) 615-5730
Address	1309 Myrtle Ave.	E-Mail	cburbank@ci.enumclaw.wa.us
	Enumclaw, WA, 98022-3101	Fax	(360) 825-7232

Order#	983463	Requested By	CATHY BURBANK	Order Price	$299.86
Classification	3030 - Legal Notices	PO #		Tax 1	$0.00
Start Date	09/06/2023	Created By	8280	Tax 2	$0.00
End Date	09/06/2023	Creation Date	08/31/2023, 04:42:20 pm	Total Net	$299.86
Run Dates	1			Payment	$0.00
Publication(s)	Enumclaw Courier Herald				

Sales Rep	9470 - Jennifer Tribbett	Phone	(360) 802-8212
		E-Mail	jtribbett@courierherald.com
		Fax	

PROJECT NUMBER: LUA2023-0027, 0007, 0014 & 0015
City of Enumclaw 2023 Comprehensive Plan Amendments

Proposal: 2023 Comprehensive Plan Amendments include minor updates to the City's Comprehensive Plan that was adopted in 2016. The proposed amendments are as follows:

1. Six-Year TIP – This is a routine amendment done every year. The amendment would include the six-year Transportation Improvement Plan which outlines roadway, pedestrian and maintenance projects for the city's transportation system.
2. School District Capital Facilities Plan – Routine adoption of the School District's Capital Plan.
3. City of Enumclaw Stormwater Comprehensive Plan Amendment. This amendment was prepared to incorporate the Department of Ecology mandated Stormwater Management Action Plan into the overall Comprehensive plan.
4. Water System Plan Amendment. This is an updated water system plan for the City of Enumclaw and includes a revised 20-year capital plan.
5. General Sewer Plan Amendments. Updates the 20-year sewer Capital Improvement Plan and Appendix G, Standards for Sanitary Sewer Systems.
6. Future Land Use and Zoning Map Amendment for 45015 244th Avenue

SE, APN#2720069001 (Harkness). The request is to amend the Future Land Use map from Single Family Residential to Multifamily Residential and amend the Zoning Map from (R-2) Moderate Density Single-Family Residential District to (R-4) Multifamily Residential District. Also, the amendment would amend or remove Land Use Element Policy 14.1 which states: "Limit residential densities to R1 or R2 within ¼ mile of the airport to minimize conflicts between residential uses and airport operations (noise, safety)."

7. Zoning Map Amendment for 27921 Se 448th Street, APN #8141380880 (Holdener). The request is to amend the Zoning Map from (HCB) Highway Community Business zoning to (PUD) Planned Unit Development Zoning. Also, amend or remove City Policy Land Use Element 5.6 which states: "The Planning Unit Development designation has not resulted in enhanced development as originally anticipated and should be eliminated for undeveloped properties."

8. Zoning Map Amendment for APN 1320069022 (Levander). The request is to amend the zoning map from (R-1) Low Density Single-Family Residential to (R-2) Moderate Density Single-Family Residential and to amend the properties Comprehensive Plan's Future Land Use Map designates so it's removed from the "Urban/Rural Transition Overlay".

Dates: Issued DNS: September 6, 2023

Applicant: City of Enumclaw

Lead Agency: City of Enumclaw

Determination of Non-Significance: The lead agency has determined that this proposal will not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) 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 or online here: https://www.cityofenumclaw.net/556/2022-Planning-Commission-Work-PlanComp-P

Public Hearing: On September 28, at 7:00 p.m., the Planning Commission will hold a public hearing on these

amendments at the City Hall Council Chambers located at 1339 Griffin Avenue. The Enumclaw City Council will hold a public hearing on these amendments on October 9, 2023, at 6:00 p.m. at the City Hall Council Chambers located at 1339 Griffin Avenue.

Environmental Studies (Available upon request):

- SEPA Checklist prepared by Chris Pasinetti dated August 15, 2022
- SEPA Checklist prepared by Jason Harkness dated March 2, 2023 (LUA2023-0015)

Trip Generation Memo by Transpo Group dated April 7, 2023

- SEPA Checklist prepared by Jeff Potter dated February 21, 2023 (LUA2023-0007)

-Critical Areas Report by Sewall Wetland Consulting, Inc dated October 27, 2022

-Geotechnical Report by Earth Solutions NW dated February 14, 2023

-Cultural Resources Assessment by Perteet dated April 12, 2023 (Not available for viewing)

-Traffic Impact Assessment by Heath & Associates dated March 7, 2023

- SEPA Checklist prepared by Scott Clark dated April 12, 2023 (LUA2023-0014)

-Trip Generation Assessment by Heath & Associates dated April 28, 2023

- SEPA Checklist prepared by Scoot Woodbury dated July 26, 2023

Comment Period: The lead agency will not act on this proposal for fifteen (15) days from the issued date identified above. Written comments on this SEPA determination must be received by the Community Development Department at 1309 Myrtle Avenue no later than, 4:00 p.m., September 21, 2023.

Comment Period for Other Agencies: This DNS is issued under WAC 197-11-340. Commenting agencies should submit any comments within the above-stated period. Upon request, the City will reconsider its lead agency status, the issuance of this DNS, or any mitigating measures.

Information or comments regarding this application may be requested at: City of Enumclaw Community Development Department, Attn: Chris Pasinetti, Commu-

Classified Proof

nity Development Director, 1309 Myrtle Avenue, Enumclaw, WA 98022, or by email to cpasinetti@ ci.enumclaw.wa.us.

Appeal: There is no administrative appeal for this determination. Appeals must be filed in conjunction with appeals of the adopted amendments to the Growth Management Hearings Board (GMHB). Appeals shall be taken in accordance and limitations set forth in RCW 43.21C.075 and WAC 242-03. In addition to GMHB requirements, a copy of the appeal shall also be filed with the City Clerk, 1339 Griffin Avenue, Enumclaw, WA 98022.

Administrator of Development Regulations and Responsible SEPA Official

Chris Pasinetti, AICP
Community Development Director
cpasinetti@ ci.enumclaw.wa.us
tel. (360) 615-5726
#983463
9/6/23

APPENDIX G

ADDITIONAL DATA ON THE CITY'S SOURCES AND FACILITIES

City of Enumclaw
Comprehensive Water System Plan
Well Facilities Data
NGVD 1929 Datum

Well Data

Name	Pressure Zone	Year Const.	Current Pumping Rate (gpm)	Max. Well Capacity (gpm)	Max Inst Water Right (gpm)	Casing Size (inches)	Well Depth (feet)	Well Screen Depth (feet)	Pump Intake Depth (feet)	Static Water Depth (feet)	Pumping Water Depth (feet)	Ground Elv (feet)	Pumping Water Elv (feet)
PC Johnson 2	888	1986	900	Note 1	Note 2	16	227.2	203.6 to 224	200	39-47	127	747.44	620
PC Johnson 3	888	1997	760	Note 1	Note 2	16	229	195 to 225	171	39-47	136	747.71	612
Watercress Springs Well 1	888	1953/1968	2000	Note 5	2289	N/A	9	25'x60' bottomless vault	8	2	5	738.69	734
Watercress Springs Well 2	888	2008	2289	2289	2289	20	52	22 to 42	47	5	7	741.93	735
GCW	888 / 983	2007	676	Note 4	676	16 to 20	136	80 to 131	82	40	44	780	736

Note 1 - The recommended operating scheme is both wells together for the full water right of 1500 gpm, but this represents significant throttling so typically only one well is operated at a time.
Note 2 - Maximum rate for the wellfield is 1500 gpm.
Note 3 - Depth to Level Probe 191.8' for PC2 and 173.3'+/- for PC3.
Note 4 - Well test pumped at initial construction at 776 gpm with only about 4 feet of drawdown at 24 hrs.
Note 5 - Since transmission main installed in 2002, additional friction head prevents full water right production.

Well Pump Data

Name / Year Installed	Pump Manufacturer	Pump Model	Pump Type	Design Capacity (gpm)	Design Head (feet)	Motor Mfgr	Motor Size (HP)	Control Valve Size & Model	Main Breaker Amps/Standby Power	E.G. Set Receptacle Type & Amps
PC Johnson 2 / 2006	Flowserve	8EHM	Submersible	900	340	Flowserve	100	10" CLA-VAL 81-02-21E	400 / Note 1	Crouse Hinds AR4042 / 400
PC Johnson 3 / 1997	Goulds	9RCLC	Submersible	820	410	Franklin Electric	100	8" 100-G CLA-VAL 850C13ABC	400 / Note 1	Crouse Hinds AR4042 / 400
Watercress Springs Well 1 / 200	Fairbanks Morse Pomona	6927 12" XHC	Vert Turbine	2300	190	Fairbanks Morse	150	10" CLA-VAL 10-60P	600 / Yes	No
Watercress Springs Well 2 / 196	Peerless	14MD	Vert Turbine	1900	285	US Motors	200	None (VFD w/o purge)	600 / Yes	No
GCW / 2017	American Marsh	12IC	Vert Turbine	766	444	US Motors	125	None (VFD w/o purge)	400/Yes	No

Note 1 - Separate main breakers at each well. Must manually plug in a portable 200 kW generator to only one well at a time.

Well Pump Curve Data

Name	Point 1		Point 2		Point 3		Pump Serial Number	Pump Impeller Diameter
	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)		
PC Johnson 2	600	400	900	340	1100	260	0606SN063141-1	5.96
PC Johnson 3	0	550	500	496	820	410	FR389797	6.38
Watercress Springs Well 1	1500	226	1900	210	2300	190	F2N21167	8.56
Watercress Springs Well 2	0	410	1900	285	3000	120		8.81 x 10.62
GCW	0	534	766	444	900	390		9.25

Control Data

Name	Control Facility	Supplied Pressure Zone	Supply To Zone Priority	Well Have Telemetry
PC Johnson 2	Typ. Crews Res, but can be City Res or both	888	Seasonal	Yes
PC Johnson 3	Typ. Crews Res, but can be City Res or both	888	Seasonal	Yes
Watercress Springs Well 1	Typ. City Res, but can be Crews Res or both	888	Permanent	Yes
Watercress Springs Well 2	Typ. City Res, but can be Crews Res or both	888	Permanent	Yes
GCW	City Res	888	Seasonal	Yes

City of Enumclaw
Comprehensive Water System Plan
Pump Station Facilities Data
NGVD 1929 Datum
Does not include CL2 booster pumps or Watercress bypass pumps

Pump Station Data

Name	Suction Pressure Zone	Discharge Pressure Zone	Year Const.	Ground Elev & Above or Below Grade	Maximum Capacity (gpm)	Meter Size & Model	Main Breaker Amps/Standby Power	Have Surge Protection	E.G. Set Receptacle Type & Amps
Tacoma Intertie	Tacoma Pipe #1	888	(4)	735/Below	1000	8" Siemans	350 / No	No	Appleton AR40034RS / 400
New Horizons	888	988	1962/1996	762/Above	90 (1)	6" Siemans	60 / No	No	Crouse Hinds ARE46 / 60
Stanridge	988	1040	2021	957.5/Above	100 (3)	2" Siemans	100 / Yes	Yes	No
983 Zone	888	983	2017	783/Above	225 (2)	4" to 8" Siemans	400/Yes	Yes	No
Fairway Hills	983	1146	2017	972/Above	80 (3)	2" Siemans	100 / Yes	Yes	No
Weyerhaeuser	Boise Spring Transmission Main	1245	1993	875.5/Above	50 (1)	Neptune 1-1/2"	No	No	No
CCF	888	1013	2002	876/Above	80 (1)	N/A	200 / Yes	Yes	No
Highview	888	995	2010	740/Above	120 (3)	2" Siemans	100 / Yes	Yes	No

(1) Max capacity based on both pumps operating. Weyerhaeuser BPS has pressure sustaining valve set slightly above pump-off pressure to keep pumped flows at a steady rate for the duration of a pump run for more consistent dosing of caustic soda.
(2) Based on one 15 hp pump.
(3) Max capacity based on two of the three pumps operating.
(4) Orginal station was constructed in 1977 and upgraded in 1999 and 2005.

Pump Data

Name / Year Installed	Pump Manufacturer	Pump Model (Volts/# Ph)	Pump Type	Current Pump Rate (gpm)	Design Capacity (gpm)	Design Head (feet)	Motor Mfgr	Motor Size (HP)	Control Valve Size & Model
Tacoma Intertie #1/2 / 1999	Cornell	4HH-100-4 (460/3)	End Suction	1000	800	236	Cornell	100 (VFD)	N/A
NH #1 / 2011	Weinman	4AE-30S12 (208/1)	End Suction	45	60	110	Baldor	3 (3450 RPM)	N/A
NH #2 / 2018	Goulds	9SH1H12CO (208/1)	End Suction	30	45	112	Baldor	3 (3500 RPM)	N/A
Stanridge / 2021	Berkeley Pump Co	BVM8-40 (240/3)	Vert Stage	0-65	100	125		3 (VFD)	N/A
983 Zone #1/2 / 2017	Grundfos	CR 45-2-2 (460/3)	End Suction	225	208	162	Baldor	15 (VFD)	N/A
983 Zone High Flow / 2017	Cornell	5HH (460/3)	End Suction	1700	1500	201	Baldor	100 (VFD)	N/A
Fairway Hills #1/2/3 / 2017	Goulds	5SZHGF4C60 (230/3)	Vert Stage	0-60	30	220	Baldor	3 (VFD)	N/A
Weyerhaeuser #1/2 / 1993 (2)	Grundfos	A9334	Vert Stage	25	42	354	Baldor	7.5 (3450 RPM)	2" CLA-VAL
CCF #1/2 / 2002	Goulds	2SVB (480/3)	Vert Stage	40	40	100	Baldor	3 (3450 RPM)	1.5" Watts ACV 1115
Highview / 2010	Berkeley Pump Co	BVM8-40 (240/3)	Vert Stage	0-65	120	110	Baldor	3 (VFD)	N/A

(1) Do not have pump or system design information.
(2) See note (1) in pump station data. Design capacity listed is without pressure sustaining valve.

Pump Curve Data

Name	Point 1		Point 2		Point 3		Pump Serial Number	Pump Impeller Diameter
	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)		
Tacoma Intertie #1/2	0	250	800	236	1200	212	111428/111429	15.22
New Horizons #1	0	150	30	140	70	110		5.9
New Horizons #2	0	120	45	112	60	105	L1803883	5.6875
Stanridge								
983 Zone #1/2	0	196	208	152				(2)
983 Zone High Flow	0	220	1500	200				14.25
Fairway Hills #1/2/3	0	275	30	220			(2)	(2)
Weyerhaeuser BPS #1/2					42	354	(2)	(2)
CCF #1/2	0	310	20	244	40	100	5613260-P1 & P2	Standard
Highview	0	205	40	180	60	135	2407933-10	4.02

(1) Pump installed is different from that specified. No information found on supplied pump so specified pump curve data shown.
(2) Do not have information on pump.

Pump Control Data

Name	Control Facility	Supply To Zone Priority	Pump Operation Priority	Station Have Telemetry
Tacoma Intertie #1/2	City or Crews Reservoir	Emergency	Emergency	Yes
New Horizons #1/2	Stanridge Hill Reservoir Level	Permanent	Permanent	Yes
Stanridge	Pressure on Discharge Header (55 psi VFD)	Permanent	Permanent	Yes
983 Zone	Fairway Hills Reservoir	Permanent	Permanent	Yes
Fairway Hills	Pressure on Discharge Header (60 psi VFD)	Permanent	Permanent	Yes
Weyerhaeuser #1/2	Pressure on Discharge Header (120 psi lead on, 115 psi lag on, 160 psi lead/lag off)(1)	Permanent	Permanent	No
CCF #1/2	Pressure on Discharge Header (40/54 psi lead on/off, 35/52 psi lag on/off)	Permanent	Permanent	Yes
Highview	Pressure on Discharge Header (107 psi VFD)	Permanent	Permanent	Yes

(1) Bladder tanks owned and maintained by customer. The tanks are located in the truck shop on the customer site.

City of Enumclaw
Comprehensive Water System Plan
Storage Facilities Data
NGVD 1929 Datum

Reservoir Data

Reservoir Name	Pressure Zone	Year Const.	Material	Capacity (gallons)	Overall Height (feet)	Diameter (feet)	Water Base Elv (feet)	Overflow Elv (feet)	Ground Elv (feet)	Seismic Restraint (Y or N)
Fairway Hills	983	1991	Conc	60,000	16	26	968.3	15	974-987	Y
Stanridge Hill	988	1993	Conc	180,000	36	30	954.0	34	956+/-	Y
1 MG City Reservoir	888	1926 (1)	Conc	1,000,000	15.3	130x130 at top	875.7	12	883	N
3 MG City Reservoir	888	2017	Conc	3,000,000	25.0	150	864.5	24	864.5	Y
Crews Reservoir	888	1989	Conc	1,500,000	22	114	868.0	20	870-872	Y

(1) Conc roof installed in 1977.

Storage Data

Reservoir Name	Max Water Height (feet)	Volume Per Foot (gallons)	Fill/Draw Pipe Dia.
Fairway Hills	15.0	4,000	See Drawing
Stanridge Hill	34.0	5,300	See Drawing
1 MG City Reservoir	12.0	Varies	See Drawing
3 MG City Reservoir	24.0	132,000	See Drawing
Crews Reservoir	20.0	76,350	See Drawing

Level Control Data

Reservoir Name	Controlled Supply Facility	Reservoir Have Telemetry
Fairway Hills	983 Zone BPS	Yes
Stanridge Hill	Lower New Horizons BPS	Yes
1 MG City Reservoir (1)	Watercress, PCJ, GC Well, Tacoma	Yes
3 MG City Reservoir (1)	Same as 1 MG Reservoir	Yes
Crews Reservoir	Same as 1 MG Reservoir	Yes

(1) Boise Springs flows by gravity (uncontrolled) into the 1 MG & 3 MG reservoirs.

City of Enumclaw
Comprehensive Water System Plan
PRV, Relief Valve, and System Control Valve Data
NGVD 1929 Datum
See also separate CV Summary

Station Data

PRV Station Name	Upper Pressure Zone	Lower Pressure Zone	Year Const.	Ground Elv (feet)	Normal Pressure Inlet (psi)	Normal Pressure Outlet (psi)	Station Operation Status
New Horizons	1040	899	1996	833	86	30	Active
New Horizons BPS	988	888	2011	762	95	30	See note 1
983/888 Zone	983	888	2017	782.5	86	30	See note 1

(1) Valve to open on low pressure in 888 zone (i.e. fire event) to allow flow from higher zone.

PRV Set Point Data

PRV Station Name	Description	Valve Size (inches)	Valve Mfgr	Valve Model	Valve Elv (feet)	Valve Set Point (psi)	Valve Set Point (feet H.E.)
New Horizons	Small PRV	2	CLA-VAL	90G-01AB	830	30	899
	Large PRV	6	CLA-VAL	90G-01AS	830	25	888
New Horizons BPS	PRV	3	CLA-VAL	90A-01AS	765	30	818
983/888 Zone	PRV	6	CLA-VAL	90G-28BCSVY	778	30	847

Relief Valve Set Point Data

Station Name	Description	Valve Size (inches)	Valve Mfgr	Valve Model	Valve Elv (feet)	Valve Set Point (psi)	Valve Set Point (feet H.E.)
New Horizons (1)	899 Zone relief	3"	CLA-VAL	50G-01	740	90	948
983/888 Zone (2)	Auto flush dead end water line	6"	CLA-VAL	90G-28BCSVY	778	95	997

(1) In separate vault from New Horizons PRV vault; valve intended to prevent excessive pressures if the New Horizons PRV fails. Outlet directed to catch basin.

(2) Valve can be opened to flush long dead end lines along 472nd St / 276th Ave by closing control valve at Fairway Hills Reservoir and building pressure in 983 zone using 983 Zone BPS.

System Control Valve Data

Station Name	Description	Valve Size (inches)	Valve Mfgr	Valve Model	Valve Elv (feet)	Valve Control
City Reservoir (1)	1 MG Res Outlet Line	12	Rotork		874.5	Gear
City Reservoir (1)	Supply MOV	12	Rotork			Gear
City Reservoir (1)	Inlet MOV	12	Rotork			Gear
Fairway Reservoir (2)	Res Inlet/Outlet MOV	6	Rotork			Gear

(1) Valves moderated during peak demand season to force water out to the system and fill Crews Res. Requires manual supply valve next to supply MOV be open.

(2) Can close valve to build pressure in 983 zone and open 983/888 Zone relief valve, flushing long dead end line along 472nd St / 276th Ave and exercising 100 hp pump at 983 Zone BPS.

City of Enumclaw
Comprehensive Water System Plan
Check Valve and Zone Valve Data
NGVD 1929 Datum

Check Valves

Location	Low Pressure Zone	High Pressure Zone	Hydraulic Model Pipe No.	Year Const.	Valve Size	Valve Type
Stanridge Reservoir (1)	988	1040	725	1993	10	Single Check
Stanridge Reservoir (2)	988	1040	726	1993	8	Single Check
Watercress Creek Bridge at 424th St (3)	888	888	N/A	2011	2	Single Check
Y Bar S (4)	888	888	922	2009	4	Single Check

(1) If demand is too great for the Stanridge BPS, then the check valve will allow direct flow from 988 zone into the 1040 zone (fire demand scenerio).

(2) Originally the 8" allowed common line to reservoir to split with the 8" on the fill line and 10" on the tank outlet line. In 2020 new dedicated fill line obviated need for the 8".

(3) Intended to keep 10" from flowing into the 2" so the 2" line is not a dead end, but the 10" can function as a dedicated transmission main to Crews Res

(4) Intended as interim measure when private Y Bar S system connected to City system in 2009 until Y Bar S reservoir demolished (2010). Can be removed.

Zone Valves

Location	Low Pressure Zone	High Pressure Zone	Hydraulic Model Pipe No.	Valve Size
Watercress Spring (1)	888	888	293	12"
Stanridge (2)	988	1040	-	8"
Stanridge (3)	988	1040	-	4"
Stanridge (4)	988	1040	-	6"
Highview Booster Pump Station (5)	888	995	-	4"
Majestic Mountain Mobile Home Park (6)	888	888	-	8"
983 BPS (7)	888	888	-	8"
983/888 Zone PRV (8)	888	983	-	8"

(1) If opened Watercress could pump directly into the 888 zone, bypassing the transmission main to City Reservoir.

(2) Located at the Stanridge site east of 8" check valve. Separates reservoir fill and outlet lines.

(3) Located at the Stanridge site just east of the BPS double door.

(4) Located southeast of 39955 278th Way SE where 10" discharge and 6" fill line for Stanridge Reservoir intersect.

(5) Located at Warner Ave & Birch St. Opened only for a fire event in the mobile home park.

(6) Located at the GC Well/983 BPS Facility in 284th Ave west of the bldg.

(7) Located at the 983/888 Zone PRV in SE 472nd St south of the PRV vault.

City of Enumclaw
Comprehensive Water System Plan
Interties with Adjacent Water Systems
NGVD 1929 Datum

Station Data

Name	Location	City's Zone	Adjacent System Zone	Flow Direction	Pumped or Gravity	Year Const.	Ground Elv (feet)	Normal Pressure City (psi)	Normal Pressure Adjacent (psi)	Intertie Type
Tacoma Intertie	Near 560 State Rte 410	888	Pipeline #1	To City	Pumped	1999	735	58	Varies	Emerg.

Note: For more information see Pump Stations data sheet.
See also CT and Pipeline 1 flow calculation spreadsheets (hard copy not attached)

City of Enumclaw
Comprehensive Water System Plan
Control Valve (CV) Summary

Location	Manufacturer	Size	Cat/Model	Stock/Serial #	Code	Control	Last Maint.	Notes
PC2 Discharge Check	CLA-VAL	10"	50G-01BD	10-81-02	ON		12 2020	
PC2 Deep Well Valve	CLA-VAL	4"	650-01B	100-20-59A			12 2020	
PC2 Pressure Relief Valve	CLA-VAL	6"	661-02	661-02-42K	ON		12 2020	
PC3 Discharge Check/Pressure Sustaining Valve	CLA-VAL	8"	50G-01BD	850C13ABC	98		12 2020	
PC3 Deep Well Valve	CLA-VAL	4"	61-02	61-02-348F	PS		12 2020	
PC3 Pressure Relief Valve	CLA-VAL	4"	50-01B	50-01-66F	PS		12 2020	
Watercress 150hp Pump Control Discharge Check	CLA-VAL	10"	60G-11	69506-04	MG	120v solenoid w/ MO Model CSM11-A2-2	12 2020	
Watercress Stream Bypass PRV	CLA-VAL	2"	90-01ABS	90-01-194A	AI	3/8" CRD 71943-04H 2-30 psi	12 2020	
Watercress Stream Bypass Solenoid Valve	CLA-VAL	2"	136-01A	136-01-8J	AI		12 2020	
Watercress Sample Line PRV	Watts	1/2"	N55BM1	06301		25-75 psi		
Watercress Surge Valve	CLA-VAL	4"	52-03	52-03-52K	UQ	45 psi low 110? psi high	12 2020	
CCF Pressure Sustaining Valve	Watts	1.5"	ACV 1115	1115-3 / 9002-3				
New Horizons Pressure Reducing Valve	CLA-VAL	2"	90G-01ABS	90-01-81A	OQ		12 2020	
New Horizons Pressure Reducing Valve	CLA-VAL	6"	90G-01AB	90-01-56C	OQ		12 2020	
New Horizons Pressure Relief Valve	CLA-VAL	3"	50G-01	5101	XG		12 2020	
Crews Altitude Valve	CLA-VAL	12"	210G-18BDPYKC				04 2017	
Lower New Horizons PRV (new 2011)	CLA-VAL	3"	90A-01AS				12 2020	See O&M Manual for purpose description
Weyerhaeuser BPS Pressure Sustaining (new 2012)	CLA-VAL	2"	50-01/650-01			1/2" CRL 20-200 psi	12 2020	
GC Well Surge Valve 888 Zone	CLA-VAL	3"	52G-03KC				04 2017	
GC Well Surge Valve Irrigation Zone	CLA-VAL	3"	52G-03KC				04 2017	
983 Zone BPS Surge Valve	CLA-VAL	3"	52G-03KC				04 2017	
983/888 Zone PRV w Relief Override	CLA-VAL	6"	90G-28 BCSVY				04 2017	

Removed 2020 and put in inventory. Surplus if possible.

Fairway Hills Reservoir Solenoid Valve	CLA-VAL	6"	136DG-03BYKC				04 2017

Water System Generators

Water System Generators

	Highview	CCF	Watercress	PC Johnson	Boise	GC Well	Fairway BPS	Stanridge
Address	39520 254th Ave SE	1835 Roosevelt Ave E	28002 SE 440th St	42415 284th Ave SE	31000 Chinook Pass Hwy	395 Farman St S	46400 290th Ave	39957 278th Way SE
Elevation NGVD 1929	750	876	742	747	876	782	970	957
Generator								
Year	2009	2002	1995	1999	1998	2017	2017	2021
kW	20	50	350	200	8.5	200	20	20
Make	Onan-Cummins	Onan-Cummins	Onan-Cummins	Onan-Cummins	Gillette Sentry-Pro	Onan-Cummins	Onan-Cummins	Onan-Cummins
Model	20GGMA	50DGCA	350DFCC	200DGFC - 150	SP85LP	DSGAE	C20N6	20CN6
Serial #	L090075922	F020383314	J950590026	H990974879	VL16-215	K160121422	F170203529	
Fuel	Propane	Diesel	Diesel	Diesel	Propane	Diesel	Natural Gas	Propane
Tank Size (gal)	240	140	550	185	240	808	N/A	240
Engine								
HP			535			324	40	43.5
Make	Cummins	Cummins	Cummins	Cummins	Briggs & Stratton	Cummins	Cummins	Cummins
Model	GM3.0L	4BT3.9-G4	NTA855-G3	6CTAA8.3	303447	QSB7-G5 NR3	QSJ2.4	QSJ2.4
Serial #	3POL48100	46220998						
Run Time at Full Load								
gal/h	3.27	4.2	24.4	14.5	1.7	14.8	N/A	2.95
Hours	51	33	23	13	97	55		57
Days	2.1	1.4	0.9	0.5	4.0	2.3		2.4
Run Time at 1/4 Load								
gal/h	1.68	1.1	8	4.8	0.9	5.2	N/A	1.34
Hours	100	89	69	39	272	155		125
Days	4.2	3.7	2.9	1.6	11.3	6.5		5.2

Note:

1. Consumption at 1/4 load for 50 and 200 kW sets from 1/24/12 e-mail from Richard Dickson of Cummins NW.
2. Consumption for full and 1/4 load for 8.5 kW set from 1/25/12 e-mail from Gillette Generators.

Fill Tracking

Date	9/26/2012	1/24/2012	11/20/2011	10/23/2012	2/8/2012	1/14/2021		10/5/2021
Gallons	43%	88.5	58	18.3	94.4	112.4		
Total Hrs / Net Hrs	118.1	358.8	276.6	445.4		129.9		
Gal/hr						0.9		
Date	10/24/2012	10/23/2012	10/23/2012		9/29/2014	10/4/2021		
Gallons	49.8	3	92.1			161.5		
Total Hrs / Net Hrs	120.1	360.2	289		39.9	181.8		
Gal/hr		2.1	7.4			3.1		
Date	11/19/2013	11/22/2013	11/22/2013		11/12/2014			
Gallons	31.8				22.7			
Total Hrs / Net Hrs	152.2	364	326					
Gal/hr	1.0							
Date	11/12/2014	9/29/2014	9/29/2014		10/31/2017			
Gallons	71.1	11	253		67.3			
Total Hrs / Net Hrs	212.4	370.1	350.4					
Gal/hr	1.2	1.8	10.4					
Date	12/15/2014	11/12/2014	11/12/2014		10/23/2019			
Gallons	133.7	25.8	185.1		12.9			
Total Hrs / Net Hrs	214.9	389.8	398.9		146.5			
Gal/hr	Added 2nd tank	1.3	3.8					
Date	10/24/2017	10/4/2021	9/1/2015					
Gallons	122.4	71	477					
Total Hrs / Net Hrs	307.7	677.2	488					
Gal/hr	1.3		5.4					
Date	1/28/2019		12/10/2015					
Gallons	74.4		83.4					
Total Hrs / Net Hrs	370.4		506					
Gal/hr	1.2		4.6					
Date	1/14/2021		4/27/2017					
Gallons	114.5		150.4					
Total Hrs / Net Hrs	466.6		546.1					
Gal/hr	1.2		3.8					
Date			1/14/2021					
Gallons			150					
Total Hrs / Net Hrs			651					
Gal/hr			1.4					
Date			10/4/2021					
Gallons			285.9					
Total Hrs / Net Hrs			694.1					
Gal/hr			6.6					
Date								
Gallons								
Total Hrs / Net Hrs								
Gal/hr								

Unit	Last Repl/Service	Model	Expected Life/Refurbish Sch	Last Cost	Spare	Notes
pH probes						
Weyerhaeuser BPS	7/31/2020	Prominent PHER 112SE 3D	Life 6-mo to 3-yrs	$ 347.82		
WC at CCF	7/31/2020	Prominent PHER 112SE 3D	Life 6-mo to 3-yrs	$ 347.82		
Boise Spring at CCF	11/3/2021	Prominent PHER 112SE 3D	Life 6-mo to 3-yrs	$ 400.48		
Tacoma Intertie	7/31/2020	Prominent PHER 112SE 3D	Life 6-mo to 3-yrs	$ 347.82		
GC Well	9/25/2020	Kuntze Zirkon pH Sensor	Life 6-mo to 3-yrs	$ 206.00		
HQ11D Portable #1	11/3/2021	Hach PHC281	1-yr to 18-mo	$ 508.99		
HQ11D Portable #2	11/3/2021	Hach PHC281	1-yr to 18-mo	$ 499.67		
NaOH pumps						
Weyerhaeuser BPS	11/5/2021	Prominent GALA1601NPE200UD112000 / Serial #2002008720 / 1.4 l/h / Installed 2002 / 17w	Refurbish annually	See note		2014, 2016-21 refurbish incl. in Boise gas eqmt cost
Boise Spring #1	11/3/2021	Prominent GALA0232NPE260UD112000 / Serial 2002008716 / 32 l/h / Installed 2016	Refurbish annually	See note		
Boise Spring #2	11/3/2021	Prominent GALA0232NPE260UD112000 / 32 l/h / Installed 2017	Refurbish annually	See note		
Watercress #1	11/3/2021	Prominent S2CBH07120PVTS070UD110S1EN / Serial 2713023813 / 39.1 gph / Installed 9/3/13	Refurbish annually	See note		
Watercress #2	11/3/2021	Prominent S2CAHM07120PVT0070UD1100C / Serial 2710018256 / 38 gph / Installed 9/2010	Refurbish annually	See note		
NaOH Valve Board						
CCF	11/3/2021	Various parts. Completely rebuilt in 2020.	Refurbish annually	See note		
CL2 Gas Equipment						
Boise Spring	11/5/2021	See invoice	Refurbish annually	See note		
Watercress	11/4/2021	See invoice	Refurbish annually	See note		
PC Johnson	11/4/2021	See invoice	Refurbish annually	See note		
GC Well	10/28/2021	Hydro Instruments	Refurbish annually	See note		
CL2 Res Analyzer						``
Boise Spring	Unknown	Capital Controls Series 1770 Model 177001 Serial # 288-310-2 2-98		$ -		
Watercress	10/27/2020	Siemans (W&T) Depolox 3 Free CL2 Bare Electrode Sensor Kit Part #W2T9012 (UXA-96819)	2-yrs	$ -		
Tacoma Intertie	11/18/2021	Siemans (W&T) Membrane Sensor FC1 (electrolyte AAB6910, membrane cap AAC9067, spare parts	3-mo to 1-yr	See note		
Crews Reservoir	Removed 2017	Capital Controls Series 1770				
GC Well	9/25/2020	Kuntze Krypon Multi		$ 480.00		

Asset Management Data Organization

Recordset	Field Name
Water Backflows	Act Before
Water Backflows	Address Number
Water Backflows	City
Water Backflows	Condition Group
Water Backflows	Consequence of Failure Score
Water Backflows	County
Water Backflows	Criticality Factor
Water Backflows	Current Inspection ID
Water Backflows	Diameter
Water Backflows	Entered By
Water Backflows	Entry Date
Water Backflows	Estimated CCI
Water Backflows	Estimated CCR
Water Backflows	Estimated OCI
Water Backflows	Estimated OCR
Water Backflows	ID
Water Backflows	Inactive
Water Backflows	Installed
Water Backflows	Jurisdiction
Water Backflows	Last Modified
Water Backflows	Last Modified By
Water Backflows	Location Description
Water Backflows	Locator Address Number
Water Backflows	Locator City
Water Backflows	Locator Street
Water Backflows	Manufacturer
Water Backflows	Model
Water Backflows	Notes
Water Backflows	Prediction Group
Water Backflows	Primary Attachment
Water Backflows	Probability of Failure Score
Water Backflows	Rated Pressure
Water Backflows	Redundancy Value
Water Backflows	Replaced
Water Backflows	Retired
Water Backflows	Risk Rating
Water Backflows	Risk Score
Water Backflows	State
Water Backflows	Street
Water Backflows	Total Cost
Water Backflows	Type
Water Backflows	Water Type
Water Facilities	Act Before

Recordset	Field Name
Water Facilities	Address Number
Water Facilities	Area
Water Facilities	City
Water Facilities	Condition Group
Water Facilities	Consequence of Failure Score
Water Facilities	County
Water Facilities	Criticality Factor
Water Facilities	Current Inspection ID
Water Facilities	Entered By
Water Facilities	Entry Date
Water Facilities	Estimated CCI
Water Facilities	Estimated CCR
Water Facilities	Estimated OCI
Water Facilities	Estimated OCR
Water Facilities	Geo Record Missing Date
Water Facilities	Geo Sync Date
Water Facilities	ID
Water Facilities	Inactive
Water Facilities	Installed
Water Facilities	Jurisdiction
Water Facilities	Last Modified
Water Facilities	Last Modified By
Water Facilities	Location Description
Water Facilities	Locator Address Number
Water Facilities	Locator City
Water Facilities	Locator Street
Water Facilities	Notes
Water Facilities	Prediction Group
Water Facilities	Primary Attachment
Water Facilities	Probability of Failure Score
Water Facilities	Redundancy Value
Water Facilities	Replaced
Water Facilities	Retired
Water Facilities	Risk Rating
Water Facilities	Risk Score
Water Facilities	State
Water Facilities	Street
Water Facilities	Total Cost
Water Facilities	Type
Water Facilities	Water Type
Water Hydrants	Act Before
Water Hydrants	Address Number
Water Hydrants	Asset Ownership

Recordset	Field Name
Water Hydrants	Body Color
Water Hydrants	Bonnet Color
Water Hydrants	CG Concrete Collar
Water Hydrants	City
Water Hydrants	Condition Group
Water Hydrants	Consequence of Failure Score
Water Hydrants	County
Water Hydrants	Criticality Factor
Water Hydrants	Current Inspection ID
Water Hydrants	Depth
Water Hydrants	diameterNozzel_1
Water Hydrants	diameterNozzel_2
Water Hydrants	diameterNozzel_3
Water Hydrants	Direction to Turn
Water Hydrants	Entered By
Water Hydrants	Entry Date
Water Hydrants	Estimated CCI
Water Hydrants	Estimated CCR
Water Hydrants	Estimated OCI
Water Hydrants	Estimated OCR
Water Hydrants	Feat_Name
Water Hydrants	Fire District
Water Hydrants	Foot Valve Direction
Water Hydrants	Foot Valve Distance
Water Hydrants	Geo Record Missing Date
Water Hydrants	Geo Sync Date
Water Hydrants	Hydrant Year
Water Hydrants	ID
Water Hydrants	Inactive
Water Hydrants	Inspection Cycle Group
Water Hydrants	Inspection/Maintenance Status
Water Hydrants	Installed
Water Hydrants	Jurisdiction
Water Hydrants	Last Modified
Water Hydrants	Last Modified By
Water Hydrants	Legacy ID
Water Hydrants	Location Description
Water Hydrants	Locator Address Number
Water Hydrants	Locator City
Water Hydrants	Locator Street
Water Hydrants	Main
Water Hydrants	Manufacturer
Water Hydrants	Model

Recordset	Field Name
Water Hydrants	Notes
Water Hydrants	Number Of Turns To Open
Water Hydrants	Operating Nut Size
Water Hydrants	Prediction Group
Water Hydrants	Pressure Zone
Water Hydrants	Primary Attachment
Water Hydrants	Probability of Failure Score
Water Hydrants	Redundancy Value
Water Hydrants	Replaced
Water Hydrants	Retired
Water Hydrants	Risk Rating
Water Hydrants	Risk Score
Water Hydrants	Serial Number
Water Hydrants	State
Water Hydrants	Street
Water Hydrants	Total Cost
Water Mains	Act Before
Water Mains	City
Water Mains	Condition Group
Water Mains	Consequence of Failure Score
Water Mains	County
Water Mains	Criticality Factor
Water Mains	Current Inspection ID
Water Mains	Diameter
Water Mains	Entered By
Water Mains	Entry Date
Water Mains	Estimated CCI
Water Mains	Estimated CCR
Water Mains	Estimated OCI
Water Mains	Estimated OCR
Water Mains	Facility
Water Mains	Geo Record Missing Date
Water Mains	Geo Sync Date
Water Mains	GIS Improvements Needed
Water Mains	ID
Water Mains	Inactive
Water Mains	InstallationYear
Water Mains	Installed
Water Mains	Joint Type
Water Mains	Jurisdiction
Water Mains	Last Modified
Water Mains	Last Modified By
Water Mains	Length

Recordset	Field Name
Water Mains	Life Cycle Status
Water Mains	Lining Type
Water Mains	Location Description
Water Mains	Manufacturer
Water Mains	Material
Water Mains	Notes
Water Mains	Prediction Group
Water Mains	Pressure Zone
Water Mains	Primary Attachment
Water Mains	Probability of Failure Score
Water Mains	Redundancy Value
Water Mains	Replaced
Water Mains	Retired
Water Mains	Risk Rating
Water Mains	Risk Score
Water Mains	State
Water Mains	Street
Water Mains	Total Cost
Water Mains	Water Type
Water Meters	Act Before
Water Meters	Address Unit
Water Meters	billAccount
Water Meters	billAccountTrunc
Water Meters	City Service Line Material
Water Meters	Condition Group
Water Meters	Consequence of Failure Score
Water Meters	County
Water Meters	Criticality Factor
Water Meters	Current Inspection ID
Water Meters	Customer Service Line Material
Water Meters	Diameter
Water Meters	Entered By
Water Meters	Entry Date
Water Meters	Estimated CCI
Water Meters	Estimated CCR
Water Meters	Estimated OCI
Water Meters	Estimated OCR
Water Meters	Facility
Water Meters	Geo Record Missing Date
Water Meters	Geo Sync Date
Water Meters	ID
Water Meters	Inactive
Water Meters	Installation Triggered from Replacement

Recordset	Field Name
Water Meters	Installed
Water Meters	Jurisdiction
Water Meters	Last Modified
Water Meters	Last Modified By
Water Meters	Lateral
Water Meters	legacyID
Water Meters	Location Description
Water Meters	Locator Address Number
Water Meters	Locator City
Water Meters	Locator Street
Water Meters	Main
Water Meters	Meter AMR Number
Water Meters	Meter AMR Numeric
Water Meters	Meter Make
Water Meters	Meter Read
Water Meters	Meter Read Text
Water Meters	Meter Size
Water Meters	Meter Turned On
Water Meters	Model
Water Meters	Notes
Water Meters	Number of Units Per Meter
Water Meters	Prediction Group
Water Meters	Primary Attachment
Water Meters	Probability of Failure Score
Water Meters	Redundancy Value
Water Meters	Replaced
Water Meters	Retired
Water Meters	Risk Rating
Water Meters	Risk Score
Water Meters	Serial Number
Water Meters	Site Address City
Water Meters	Site Address Number
Water Meters	Site Address Street
Water Meters	State
Water Meters	Total Cost
Water Meters	Type
Water Meters	Water Type
Water Pumps	Act Before
Water Pumps	Activation Type
Water Pumps	Address Number
Water Pumps	Average Daily Usage
Water Pumps	Average Flow
Water Pumps	Baseline Meter

Recordset	Field Name
Water Pumps	Casing Type
Water Pumps	City
Water Pumps	Condition Group
Water Pumps	Consequence of Failure Score
Water Pumps	County
Water Pumps	Criticality Factor
Water Pumps	Current Inspection ID
Water Pumps	Current Reading
Water Pumps	Entered By
Water Pumps	Entry Date
Water Pumps	Estimated CCI
Water Pumps	Estimated CCR
Water Pumps	Estimated OCI
Water Pumps	Estimated OCR
Water Pumps	Facility
Water Pumps	ID
Water Pumps	Inactive
Water Pumps	Installed
Water Pumps	Jurisdiction
Water Pumps	Last Modified
Water Pumps	Last Modified By
Water Pumps	Location Description
Water Pumps	Locator Address Number
Water Pumps	Locator City
Water Pumps	Locator Street
Water Pumps	Main
Water Pumps	Manufacturer
Water Pumps	Meter Reset Date
Water Pumps	Model
Water Pumps	Motor Type
Water Pumps	Notes
Water Pumps	Prediction Group
Water Pumps	Pressure Zone
Water Pumps	Primary Attachment
Water Pumps	Priming Type
Water Pumps	Probability of Failure Score
Water Pumps	Rated Horsepower
Water Pumps	Redundancy Value
Water Pumps	Replaced
Water Pumps	Retired
Water Pumps	Risk Rating
Water Pumps	Risk Score
Water Pumps	RPM

Recordset	Field Name
Water Pumps	Seal Type
Water Pumps	State
Water Pumps	Storage Tank
Water Pumps	Street
Water Pumps	Total Cost
Water Pumps	Type
Water Pumps	Voltage
Water Pumps	Water Type
Water Services	Act Before
Water Services	Backflow
Water Services	City
Water Services	Condition Group
Water Services	Connection Type
Water Services	Consequence of Failure Score
Water Services	County
Water Services	Criticality Factor
Water Services	Current Inspection ID
Water Services	Depth At Main
Water Services	Diameter
Water Services	Distance Along Main
Water Services	Entered By
Water Services	Entry Date
Water Services	Estimated CCI
Water Services	Estimated CCR
Water Services	Estimated OCI
Water Services	Estimated OCR
Water Services	ID
Water Services	Inactive
Water Services	Installed
Water Services	Jurisdiction
Water Services	Last Modified
Water Services	Last Modified By
Water Services	Length
Water Services	Lining Type
Water Services	Location Description
Water Services	Main
Water Services	Manufacturer
Water Services	Material
Water Services	Notes
Water Services	Prediction Group
Water Services	Pressure Zone
Water Services	Primary Attachment
Water Services	Probability of Failure Score

Recordset	Field Name
Water Services	Redundancy Value
Water Services	Replaced
Water Services	Retired
Water Services	Risk Rating
Water Services	Risk Score
Water Services	State
Water Services	Street
Water Services	Total Cost
Water Services	Valve
Water Services	Water Type
Water Storage Tanks	Act Before
Water Storage Tanks	Address Number
Water Storage Tanks	Capacity
Water Storage Tanks	City
Water Storage Tanks	Condition Group
Water Storage Tanks	Consequence of Failure Score
Water Storage Tanks	County
Water Storage Tanks	Criticality Factor
Water Storage Tanks	Current Inspection ID
Water Storage Tanks	Entered By
Water Storage Tanks	Entry Date
Water Storage Tanks	Estimated CCI
Water Storage Tanks	Estimated CCR
Water Storage Tanks	Estimated OCI
Water Storage Tanks	Estimated OCR
Water Storage Tanks	Geo Record Missing Date
Water Storage Tanks	Geo Sync Date
Water Storage Tanks	Height
Water Storage Tanks	ID
Water Storage Tanks	Inactive
Water Storage Tanks	Inlet Main
Water Storage Tanks	Installed
Water Storage Tanks	Jurisdiction
Water Storage Tanks	Last Modified
Water Storage Tanks	Last Modified By
Water Storage Tanks	Lining Type
Water Storage Tanks	Location Description
Water Storage Tanks	Locator Address Number
Water Storage Tanks	Locator City
Water Storage Tanks	Locator Street
Water Storage Tanks	Manufacturer
Water Storage Tanks	Material
Water Storage Tanks	Notes

Recordset	Field Name
Water Storage Tanks	Outlet Main
Water Storage Tanks	Prediction Group
Water Storage Tanks	Primary Attachment
Water Storage Tanks	Probability of Failure Score
Water Storage Tanks	Redundancy Value
Water Storage Tanks	Replaced
Water Storage Tanks	Retired
Water Storage Tanks	Risk Rating
Water Storage Tanks	Risk Score
Water Storage Tanks	State
Water Storage Tanks	Street
Water Storage Tanks	Total Cost
Water Storage Tanks	Type
Water Storage Tanks	Width
Water Valves	Act Before
Water Valves	Address Number
Water Valves	Asset Ownership
Water Valves	Box Condition
Water Valves	City
Water Valves	Condition Group
Water Valves	Consequence of Failure Score
Water Valves	County
Water Valves	Criticality Factor
Water Valves	Current Inspection ID
Water Valves	Describe Maintenance Needed
Water Valves	Direction to Turn
Water Valves	Entered By
Water Valves	Entry Date
Water Valves	Estimated CCI
Water Valves	Estimated CCR
Water Valves	Estimated OCI
Water Valves	Estimated OCR
Water Valves	Fitting Type
Water Valves	Geo Record Missing Date
Water Valves	Geo Sync Date
Water Valves	ID
Water Valves	Inactive
Water Valves	Inspection Maintenance Group
Water Valves	Inspection or Maintenance Status
Water Valves	Installed
Water Valves	Jurisdiction
Water Valves	Last Modified
Water Valves	Last Modified By

Recordset	Field Name
Water Valves	Location Description
Water Valves	Locator Address Number
Water Valves	Locator City
Water Valves	Locator Street
Water Valves	Main
Water Valves	Maintenance Due to Start Date
Water Valves	Manufacturer
Water Valves	Model
Water Valves	Normal Valve Position
Water Valves	Notes
Water Valves	Prediction Group
Water Valves	Primary Attachment
Water Valves	Probability of Failure Score
Water Valves	Redundancy Value
Water Valves	Replaced
Water Valves	Retired
Water Valves	Risk Rating
Water Valves	Risk Score
Water Valves	Serial Number
Water Valves	Size
Water Valves	State
Water Valves	Storage Tank
Water Valves	Street
Water Valves	Total Cost
Water Valves	Type
Water Valves	Valve Detail Number
Water Valves	Valve Number
Water Valves	Valve or Fitting
Water Valves	Valve Replacement Needed
Water Valves	Water Type

APPENDIX H

RETAIL AGREEMENTS

WATER SERVICE AGREEMENT

WHEREAS, the City of Tacoma, Department of Public Utilities, Water Division ("**Tacoma**") has received a request for wholesale water service from the City of Enumclaw ("**Enumclaw**"),

WHEREAS, Tacoma's Public Utility Board recently approved up to a total of five (5) million gallons per day (mgd) of additional water supply for wholesale purposes,

WHEREAS, Enumclaw has a water supply deficit and has a declared building moratorium,

WHEREAS, Tacoma is revising its System Development Charge fee structure and agrees to hold additional water requests in reserve until the study is complete.

NOW, THEREFORE, BE IT RESOLVED, that Tacoma has agreed to provide additional water supply to Enumclaw as provided below:

1. Upon payment to Tacoma of the calculated System Development Charge (SDC) of $548,153 for Enumclaw's existing water supply deficit of 0.33 MGD, Tacoma will commit the water for Enumclaw's immediate use.

2. Enumclaw shall pay Tacoma the current SDC amount for any new customers that are connected to Enumclaw's water system before Tacoma's current SDC study and implementation is completed. This provision is in accordance with Policy #1 of Tacoma's Wholesale Service Policies/Principles dated June 13, 1997.

3. Enumclaw's additional request for water reservation for 1,400 single family equivalents (minus those in Item 2 above) will be held in reserve by Tacoma until the current SDC study is completed. When the study is completed this Agreement will be amended to provide the provisions for additional water supply.

4. The Conditions of Water Delivery which cover issues dealing with water quality and pressure are as stated in the letter to Enumclaw from Tacoma dated May 7, 1997.

5. Tacoma plans to develop new water sources that will allow it to provide more than five (5) mgd total additional supply to its wholesale customers. However, until these new source are assured, Tacoma cannot commit permanent water supply beyond the combined total of five (5) mgd for all wholesale customers.

Dated and signed this 21st day of October, 1997 by the duly authorized officers.

City of Tacoma

Kenneth J. Merry
Water Superintendent

Legal Approval

City of Enumclaw

Mayor

9-29-97
enumagmt.doc

Tacoma Public Utilities

Mark Crisson
Director

3628 South 35th Street
P.O. Box 11007
Tacoma, WA 98411-0007

Divisions
Light
Water
Belt Line

RECEIVED
MAY 0 8 1997
CITY OF ENUMCLAW

May 7, 1997

Mr. Mark Bauer
Public Works Director
City of Enumclaw
1309 Myrtle Avenue
Ecumclaw, WA 98022

Dear Mr. Bauer:

From our communications in recent months, we understand that Enumclaw needs wholesale water supply from Tacoma to meet an existing deficit and to provide for new customers. We have addressed below how we can provide water for both water supply needs.

As you know, in January our Public Utility Board authorized us to offer an additional 5 million gallons per day (MGD) to help satisfy the needs of our wholesale customers. Therefore, we do have water available to cover your water supply deficit and a limited amount, until we develop a new large resource project, to satisfy new customer needs.

1. Water Supply to Meet the Existing Deficit: From the information provided to us, we understand you have a current summer supply deficit of about 0.75 MGD. The 0.75 MGD (annual daily average = 0.2 MGD +/- assuming 0.75 MGD over three months) can be provided to your system upon payment of our current System Development Charge (SDC). The SDC analysis uses customer information in our 1991 SDC report and is calculated as follows:

Based on 1995 Numbers

SDC = *Commodity-* ~~56,055~~ ~~40,300~~ 200,000 gpd / 662 gal/ERU = 302 ERU
330,000 - ~~56,055~~ ~~40,300~~ 302 ERU x $256.95 = $77,599

Peak- (750,000 - 200,000) gpd / 384 gal/ERU = 1,432 ERU
1,432 ERU x $735.79 = $1,053,651

Total SDC = $1,131,250

330,000 x 61 / 365 = 55,150 Ave. / 662 = 83 ERU's x 256.95 = $21,327.00
~~660,000~~
330,000 - 55,150 / 384 = 716 ERU's x 735.79 = $526,826.00
Deficit $548,153.00

The 662 and 384 gallons per ERU (equivalent residential unit) are the average day and added peak day component, respectively, for our average customer. The $256.95 (commodity or base use) and $735.79 (peak use) costs are the cost components from our SDC report that add up to our $990 SDC amount for our typical residential customer.

2. Water Supply for New Customers: As with the SDC for the deficit, the commitment to a portion of the 5 MGD is secured upon payment to us of our prevailing SDC. Enumclaw would collect our SDC from its new customers or from customers requesting an additional amount of water (such as an industrial user) and the total SDCs collected would be forwarded to us quarterly. Our current SDC amount would be collected for new water services with up to 2" meters. For new services with 3" meter and larger, and for increases in water requested from existing larger customers, the SDC will not be determined until later this year when a study to update the SDC amounts is completed.

We anticipate that all of the SDC amounts will be higher after the study is done and expect it to be substantially higher for meters 3" and larger. Recent evaluations have indicated current SDC amounts do not adequately collect costs for water use through larger meter sizes.

3. Conditions of Water Delivery: We will provide water under the limitations of our water transmission system and Enumclaw would have responsibility for managing any special water quality or supply needs. It is important to identify three water supply conditions upon which service would be provided.

a) As you are aware, our source of supply to Enumclaw would come directly from the Green River. With the surface water source there are requirements from the Safe Drinking Water Act that deal with disinfectant contact time (CT), and lead and copper concentrations at the consumers tap. The CT requirement may not be fully met in our transmission system at Enumclaw under some operating conditions i.e. winter operations.

b) Additionally, the lead and copper rule requirements may need to be dealt with in your water system because the surface water is moderately corrosive. If you need more information on these water quality requirements in relation to our water supply system, please contact Al Medak our Water Quality Manager (253-502-8210).

c) As mentioned before, our transmission main (Pipeline No. 1) through Enumclaw is not always flowing at full capacity. The effect of this is that there is no water pressure because the water level is below the top of pipe. Any connections on Pipeline No. 1 may not be fully submerged if the connection is at the springline (middle) of the pipe, such as with your existing emergency water service. This low flow condition exists now in the non-summer months and will exist most of the year if our proposed Second Supply Project is constructed. If you need more information on options to assure a submerged pump suction, please contact Dave Sherman our Water Supply Manager (253-502-8213).

Please contact Craig Gibson, Project Manager, at 253-502-8204 or myself if you have questions or wish to meet.

Sincerely,

Craig Gibson

for Kennneth J. Merry
Superintendent
Water Division

cc: Water Division Managers

WATER SERVICE AREA AGREEMENT

THE CITY OF ENUMCLAW and the Remolif Addition WATER COMPANY, hereby and for the following reasons have entered into this Water Service Area Agreement under the following terms and conditions:

WHEREAS, The Remolif Addition Water Company is the owner of a water system serving domestic water to the area generally north of SE 384th Street and east of the Enumclaw-Black Diamond Highway, and

WHEREAS, The nearest area provided water from the City's sources is part of the Krain Water Works service area, and

WHEREAS, The City of Enumclaw has no authority to serve customers from Krain Water Works water lines making it unlikely that City water service will be extended into the Company's area,

NOW, THEREFORE, The City and the Water Company do hereby agree as follows:

1. The City agrees to notify the company of any proposed improvements to the City water system which might benefit the Company or which might be detrimental to the Company.

2. The City agrees that it shall not install water lines or serve customers within the area served by the Company unless a Notice of Intent to do so is given to the Company sixty (60) days prior to taking such action.

IN WITNESS WHEREOF, the parties hereto have executed this Water Service Area Agreement as of the 10th day of November, 1977.

CITY OF ENUMCLAW

BY [signature]
Mayor

CORRECT ATTEST:

Margaret E. High
City Clerk

Remolif Addition WATER COMPANY

BY [signature]
President

BY Karen McKim
Secretary

STATE OF WASHINGTON)
) SS.
COUNTY OF KING)

On this 10th day of November, 1977, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared FRED C. FARMAN and MARGARET E. HIGH, to me known to be the Mayor and City Clerk, respectively, of the City of Enumclaw, the corporation that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned and on oath stated that they are authorized to execute the said instrument and that the seal affixed is the corporate seal of said corporation.

WITNESS my hand and official seal hereto affixed the day and year first above written.

NOTARY PUBLIC in and for the State of Washington, residing at Enumclaw.

STATE OF WASHINGTON)
) SS.
COUNTY OF KING)

On this 28TH day of OCTOBER, 1977, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared R. V. BANGERT and KAREN McKIM, to me known to be the President and Secretary, respectively, of REMOLIF ADDITION Water Company, the corporation that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes herein mentioned, and on oath stated that they are authorized to execute the said instrument and that the seal affixed is the corporate seal of said corporation.

WITNESS my hand and official seal hereto affixed the day and year first above written.

Martin L. Strom
NOTARY PUBLIC in and for the State of Washington, residing at Enumclaw.

RETAIL WATER SERVICE AGREEMENT

BETWEEN CITY OF ENUMCLAW

AND

Schodde-Gamblin Homeowners Association

This retail water agreement ("Agreement") is made by and between the City of Enumclaw, a municipal corporation (hereafter "Enumclaw"), and Schodde-Gamblin Homeowners Association (hereafter "Schodde-Gamblin"). Enumclaw and Schodde-Gamblin collectively shall be referred to as the "Parties" or either Enumclaw or Schodde-Gamblin may be referred to as "Party" when appropriate.

A. RECITALS:

WHEREAS, Enumclaw has evaluated its retail projections in its demand forecast and has determined that adequate water resources are available to serve those projected demands; and

WHEREAS, the Parties are responsible for operating and maintaining their respective water systems in accordance with federal, state and local laws and regulations; and

WHEREAS, the Parties further recognize that water resources are finite and valuable, and the prudent use and management of these resources requires cooperation; and

WHEREAS, Schodde-Gamblin has requested and Enumclaw has agreed to provide a retail water supply to Schodde-Gamblin, and Enumclaw is able and willing to provide the requested quantity of water on the terms and conditions as herein provided, now therefore;

for and in consideration of the mutual covenants, conditions and payments to be made as set forth herein, the Parties hereto agree as follows:

B. DEFINITIONS:

The meaning of certain words or terms, when used in this Agreement, is as follows:

1. "Retail Service Connection" means a physical connection between water mains of the two Parties to this Agreement, at a specifically identified point or points, where water may be transferred from one Party's system to the transmission or distribution facilities of the other Party.

2. "Isolation Valve" means a positive shut off valve that shall be installed at the point in each water system that is used to accept or deliver water through the Retail Service Connection. Each Party has sole responsibility for operating their Isolation Valve.

3. "Retail Service Connection Capacity" means the maximum flow capacity for water to be delivered through a Retail Service Connection as agreed upon by the Parties to this Agreement. Retail service connection facilities shall be designed so as to be capable of conveying no less than the agreed upon Retail Service Connection Capacity.

4. "Emergency" means an unforeseen event that causes damage or disrupts normal operations and requires immediate action to protect public health and safety including exclusively when water system repairs are necessary due to a water system failure or when there is a water supply shortfall.

5. "Enumclaw Municipal Code (EMC)" means the City of Enumclaw's municipal code.

6. The City of Enumclaw water system includes:
   a. two spring sources and a wellfield, all with chlorine disinfection, and an emergency connection with the City of Tacoma;
   b. 4.5 million gallons of storage in three main zone reservoirs;
   c. corrosion control treatment for the spring sources;
   d. over 135 miles of water transmission and distribution mains.

   Detailed information on the water quality, treatment, and operation of the City system is contained in the City of Enumclaw Comprehensive Water System Plan.

7. The Schodde-Gamblin water system is within the City of Enumclaw service area and includes: privately owned water lines and booster pump station, separated from the City's water meter by a 4" double check valve assembly. The pump station includes two Goulds 3SVB six-stage 7.5 HP pumps, with ability to add a third pump.

8. The service area of Schodde-Gamblin is as described following: Lots 1, 2, 3, and 4 of King County Short Plat #L00S0012 recorded under file #20030421900004.

C. <u>CONDITIONS</u>:

The responsibilities of the parties to this contract are set forth below:

1. <u>General.</u> Enumclaw agrees to furnish the Retail Service Connection Capacity to Schodde-Gamblin of a quality that will satisfy all applicable local, state, and

federal requirements and in accordance with the City's Comprehensive Water System Plan and the terms and conditions of this Agreement.

2. Service Area. The City of Enumclaw and Schodde-Gamblin agree that the boundary of the Schodde-Gamblin system is as described in Section B of this agreement and that the system is entirely within the Enumclaw retail water service area.

3. Water Quantity Reserved. Enumclaw commits to and agrees to install a 2" meter, for the projected use of the Schodde-Gamblin water system. The quantity so reserved is based on a total number of no more than 5 Equivalent Resident Units (ERUs) served by Schodde-Gamblin as of the date of this agreement.

4. System Development Charge (SDC). Based upon the water supply request information provided to Enumclaw by Schodde-Gamblin, and in accordance with the charges specified in City Resolution No. 1044 and future amendments, Schodde-Gamblin shall pay to Enumclaw the determined System Development Charge (SDC) for the initial Retail Service Connection Capacity and any additional connections to the Schodde-Gamblin system added after execution of this agreement. The 5 contracted Equivalent Resident Unit amount may be adjusted upwards based on additional SDC payment(s).

5. Retail Water Rates. Enumclaw will supply Schodde-Gamblin with retail water at the outside City water service rate as identified in the EMC. In the absence of a specific retail customer class, Enumclaw will charge Schodde-Gamblin at the multi-family residential customer class rate. The water rates are periodically adjusted and shall be applicable as set forth in the rate schedule as adopted by the Enumclaw City Council.

6. Reliability. Enumclaw agrees to supply retail water pursuant to this Agreement with the same degree of reliability and surety of supply as water provided by Enumclaw to its existing customers.

7. Connection(s). The cost for design and construction of the new Retail Service Connection at the point of connection shown in Exhibit "A", including pipe, valves, meter(s), Washington State approved backflow device(s), and appurtenances and vaults, shall be the responsibility of Schodde-Gamblin. The connection shall meet the requirements of the City of Enumclaw and the State Health Department, Office of Drinking Water. No future Retail Service Connections shall be permissible without a subsequent and separate written agreement between the Parties, which agreement may supplement this Agreement. Neither Party shall be obligated to agree to or execute any agreement or permit with the other Party to construct additional water Retail Service Connection(s).

8. Ownership, Capital and Maintenance Costs. Schodde-Gamblin agrees that the City of Enumclaw owns the retail water meter and all equipment and piping upstream of the meter. Maintenance and operation costs for this equipment are the responsibility of the City of Enumclaw. Any material and installation (capital) costs related to the original equipment, including upgrades or replacement and renewal are Schodde-Gamblin's responsibility. Schodde-Gamblin is responsible for installation, operation, and maintenance of the Schodde-Gamblin system.

9. Transferability. The rights and obligations of this Agreement are transferable to heirs, successors and assignees of the Parties.

10. Resale. Water provided under this Agreement may only be resold to the customers of Schodde-Gamblin as allowed under law.

11. Conservation and Curtailment. As a requirement of retail service Schodde-Gamblin commits to a water conservation program that is substantially equivalent to Enumclaw's programs and consistent with applicable state law and regulations. In the event that a major water shortage occurs and Schodde-Gamblin fails to abide by the conservation and/or curtailment requirements as publicly announced by Enumclaw, then Enumclaw may terminate water supplied under this Agreement until such time as Schodde-Gamblin agrees to abide by such requirements or apply appropriate financial penalties to be determined by the Enumclaw City Council.

12. Emergency. Schodde-Gamblin acknowledges that during an emergency situation or a planned outage Enumclaw may temporarily be unable to meet all or part of its retail service commitment. If Enumclaw has a planned outage, Enumclaw commits to give Schodde-Gamblin a minimum of seven (7) days advance notice in writing. Enumclaw and Schodde-Gamblin will work together to identify mutually acceptable dates for planned outages.

13. Indemnification. The City of Enumclaw shall not be liable to Schodde-Gamblin customers for the failure of Schodde-Gamblin system to supply and deliver water provided under this Agreement at any time or for any reason. Each Party agrees to indemnify the other and hold it harmless from and against any loss, cost, damage, or expense of any kind and nature, including reasonable attorney's fees arising out of injury to person or damage to property in any manner caused by the negligence or omission of the Party in the performance of its roles and responsibilities in connection with this Agreement.

14. Agreement not a Joint Venture. This Agreement is intended to be and is a contract for the purchase and sale of wholesale water, and no provision hereof shall be construed to make the Parties partners or engaged in a joint venture. Neither Party is the agent of the other nor shall either Party be held liable for the acts of the other on a theory of agency or any other representative capacity.

15. Dispute Resolution. In the event of a disagreement over any aspect of this Agreement, except as herein further provided, it is agreed that any dispute shall be submitted to binding arbitration pursuant to Chapter 7.04 RCW. The Parties shall agree upon who will arbitrate the dispute, and upon failure to reach agreement within a reasonable period of time, the presiding judge of the King County Superior Court may be asked to appoint an arbitrator from one of the recognized dispute resolution services. The Party that substantially prevails in the arbitration proceeding shall be awarded its reasonable attorney fees and costs. If neither Party substantially prevails in the arbitration proceeding, the Parties shall each bear their respective costs and divide the mutual costs associated with the arbitration equally.

16. Notice. All notices, requests, demands and other communications hereunder shall be in writing and shall be deemed given if personally delivered or mailed, certified mail, return receipt requested, or sent by overnight carrier to the following addresses:

If to Enumclaw:
Chris Searcy
Public Works Director
City of Enumclaw
1309 Myrtle Ave
Enumclaw, WA 98022
Phone: 360-825-3593 Ext. 5721
Fax: 360-825-7232

If to Schodde-Gamblin:
Schodde-Gamblin
PO Box 622
Enumclaw, WA 98022
Phone: 360-825-1049
Fax: 360-825-7915

Billings for payments due the City by Schodde-Gamblin shall be served by regular mail to the address above.

17. Invalidity. If any term of this Agreement is found to be void or invalid, such invalidity shall not affect the remaining terms of this Agreement, which shall continue in full force and effect. The parties shall agree that if any provisions are deemed not enforceable, they shall be deemed modified to the extent necessary to make them enforceable. To the extent that there is any inconsistency between the provisions of this agreement, any exhibit incorporated as part of this agreement, or subsequent amendments and other rules and regulations of the City, the provisions of this agreement shall control.

18. Counterparts. This Agreement may be executed in any number of counterpart copies, each of which shall be deemed an original, but all of which together shall constitute a single instrument.

19. Records Inspection. Each Party shall maintain and make available for inspection at reasonable times all records pertaining to each Party's water system. These records shall be maintained for a minimum 3-year period.

20. Monitoring and Reporting. Schodde-Gamblin shall keep records of total water supplied to its system and water consumed. The difference between water supplied and consumed shall be computed monthly. If the difference is more than 10% of water supplied Schodde-Gamblin shall conduct leak survey(s) to identify where leakage is occurring and implement a regular program to reduce the leakage within a timeframe mutually agreed upon by the Parties.

21. Improvement and Operation of Schodde-Gamblin System. Schodde-Gamblin shall be responsible for improvements in the Schodde-Gamblin system that may be needed because of differences between the City and Schodde-Gamblin system pressures. Schodde-Gamblin shall be responsible for obtaining any required county and state approvals of the Schodde-Gamblin system improvements. The City is not responsible for ensuring the adequacy of the Schodde-Gamblin water system or that all necessary easements and approvals have been obtained. Fire flow to Schodde-Gamblin system will not be provided. Residential fire sprinkler systems will not be allowed to be connected to the Schodde-Gamblin water system. All services in the Schodde-Gamblin system shall be metered and read on a monthly basis. Enumclaw will not be liable for failure of any booster pump used in Schodde-Gamblin system if the City water supply loses pressure for any reason. The pump station design should include a protective system to ensure the pump is not damaged because of lack of water. Schodde-Gamblin shall be solely responsible for flushing water mains within its system. Flushing allowances will be provided by the City only when the City's Water Maintenance Supervisor determines that flushing is required to maintain or improved water quality.

22. Payment. The City shall bill Schodde-Gamblin on a monthly basis for all charges due under the agreement. Schodde-Gamblin shall pay such charges within the period of time specified by the EMC. Any amounts disputed by Schodde-Gamblin shall be paid under protest within the prescribed time period. All late payments, and any refund of an amount in dispute that was paid under protest, shall accrue interest as specified in the EMC.

23. Uncontrollable Forces or Changes. Uncontrollable forces or State or Federal Law changes may occur during the time this Agreement is in place. Neither of the parties hereto shall be considered to be in default in respect to any obligations hereunder if prevented from fulfilling such obligations by reason or uncontrollable forces or material changes in state or federal law or enforcement thereof. Parties rendered unable to fulfill any obligation hereunder by reason of an uncontrollable force or material change in state or federal law shall exercise due diligence to deal with such uncontrollable force with all reasonable dispatch and to take actions consistent with the purpose of this agreement.

24. Independent Relationship. This Agreement describes the entire relationship of the parties with regard to the subject matter herein concerned. Except as maybe explicitly provided otherwise herein, the parties are independent agencies and shall not be deemed to be partners, joint ventures, principals, or agents or each other for any purpose whatsoever. Each party shall have and maintain sole and complete control over all or its employees, agents and operations. Except as may otherwise be explicitly provided herein, or in separated agreement, each and all of the obligations, responsibilities, and liabilities of the parties under and in connection with this Agreement are several, and not joint, and no separate legal or administrative entity will be created to fulfill the purposes of this Agreement.

25. Term. This Agreement shall remain in effect so long as the City of Enumclaw remains in the business of providing water and so long as Schodde-Gamblin meets the terms and conditions of this Agreement. Either party can request amendment or renegotiation of this agreement, but no more frequently than every five years.

26. Authority to Bind. Each of the Parties to this Agreement certifies that the person signing this Agreement has authority to bind the respective governing bodies to all of the terms and conditions of the Agreement herein. No change, amendment or modification or any provision of this agreement shall be valid unless set forth in a written amendment to this Agreement signed by all parties.

Dated this 23rd day of MAY, 2006.

City of Enumclaw

Chris Searcy, P.E.
Public Works Director

Schodde-Gamblin

David Schodde, Partner
Schodde-Gamblin, President

Partner
Schodde-Gamblin, Secretary

Approved by:
City Attorney

EXHIBIT "A"

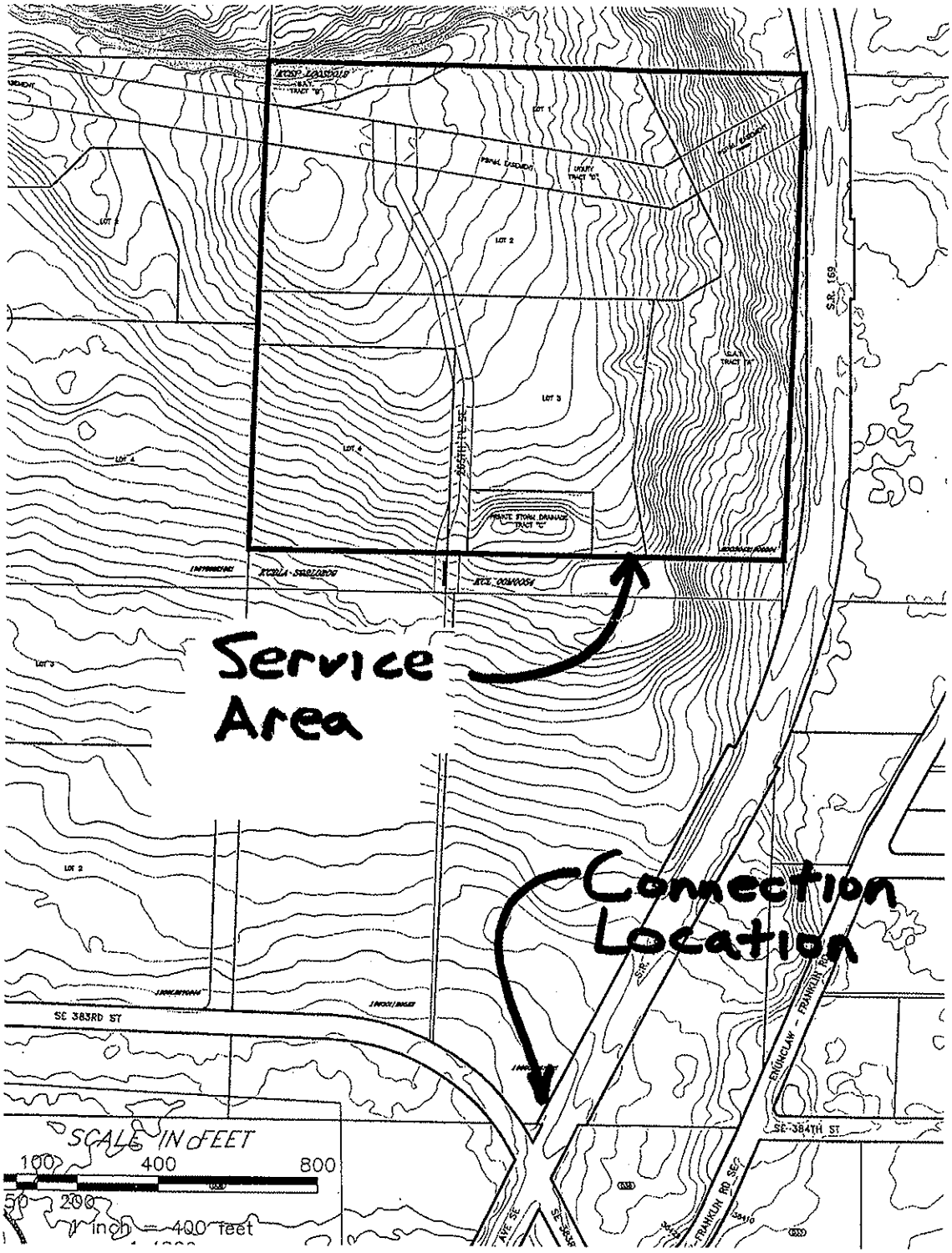
SERVICE CONNECTIONS SPECIFICATIONS

Connection Location	Connection Size	Meter Size	Max HGL Elevation (ft, NGVD)		Meter Flow Capacity (GPM)	Contracted Quantity		
			Enumclaw	S-Gamblin		ERU's	Total MG/YR	Peak GPD
SR169 and SE 383rd Street	8"	2"	888		160	5	0.56	3213

1) Total MG/YR based on 306 gpd/ERU.
2) Peak GPD based on 306 gpd/ERU and 2.1 peaking factor.

EXHIBIT B

GENERAL LOCATION MAP OF SERVICE CONNECTION



RETAIL WATER SERVICE AGREEMENT

BETWEEN CITY OF ENUMCLAW

AND

BACK LLC

This retail water agreement ("Agreement") is made by and between the City of Enumclaw, a municipal corporation (hereafter "Enumclaw"), and BACK LLC (hereafter "BACK"). Enumclaw and BACK collectively shall be referred to as the "Parties" or either Enumclaw or BACK may be referred to as "Party" when appropriate.

A. RECITALS:

WHEREAS, Enumclaw has evaluated its retail projections in its demand forecast and has determined that adequate water resources are available to serve those projected demands; and

WHEREAS, the Parties are responsible for operating and maintaining their respective water systems in accordance with federal, state and local laws and regulations; and

WHEREAS, the Parties further recognize that water resources are finite and valuable, and the prudent use and management of these resources requires cooperation; and

WHEREAS, BACK has requested and Enumclaw has agreed to provide a retail water supply to BACK, and Enumclaw is able and willing to provide the requested quantity of water on the terms and conditions as herein provided, now therefore;

for and in consideration of the mutual covenants, conditions and payments to be made as set forth herein, the Parties hereto agree as follows:

B. DEFINITIONS:

The meaning of certain words or terms, when used in this Agreement, is as follows:

1. "Retail Service Connection" means a physical connection between water mains of the two Parties to this Agreement, at a specifically identified point or points, where water may be transferred from one Party's system to the transmission or distribution facilities of the other Party.

2. "Isolation Valve" means a positive shut off valve that shall be installed at the point in each water system that is used to accept or deliver water through the Retail Service Connection. Each Party has sole responsibility for operating their Isolation Valve.

3. "Retail Service Connection Capacity" means the maximum flow capacity for water to be delivered through a Retail Service Connection as agreed upon by the Parties to this Agreement. Retail service connection facilities shall be designed so as to be capable of conveying no less than the agreed upon Retail Service Connection Capacity.

4. "Emergency" means an unforeseen event that causes damage or disrupts normal operations and requires immediate action to protect public health and safety including exclusively when water system repairs are necessary due to a water system failure or when there is a water supply shortfall.

5. "Enumclaw Municipal Code (EMC)" means the City of Enumclaw's municipal code.

6. The City of Enumclaw water system includes:
   a. two spring sources and a wellfield, all with chlorine disinfection, and an emergency connection with the City of Tacoma;
   b. 4.5 million gallons of storage in three main zone reservoirs;
   c. corrosion control treatment for the spring sources;
   d. over 135 miles of water transmission and distribution mains.

   Detailed information on the water quality, treatment, and operation of the City system is contained in the City of Enumclaw Comprehensive Water System Plan.

7. The BACK water system is within the City of Enumclaw service area and includes: privately owned water lines and booster pump station, separated from the City's water meter by a double check valve assembly. The pump station includes a water storage tank and two 2 HP pumps operating between 26 and 27 gallons per minute for a pump run cycle.

8. The service area of BACK is as described following: Lots 1, 2, 3, and 4 of King County Testamentary Lot Div #L11M0033 recorded under King County file #20120411900001.

C. <u>CONDITIONS</u>:

The responsibilities of the parties to this contract are set forth below:

1. <u>General.</u> Enumclaw agrees to furnish the Retail Service Connection Capacity to BACK of a quality that will satisfy all applicable local, state, and federal

requirements and in accordance with the City's Comprehensive Water System Plan and the terms and conditions of this Agreement.

2. Service Area. The City of Enumclaw and BACK agree that the boundary of the BACK system is as described in Section B of this agreement and that the system is entirely within the Enumclaw retail water service area.

3. Water Quantity Reserved. Enumclaw commits to and agrees to install a 1.5" meter, for the projected use of the BACK water system. As of the date of this agreement the quantity so reserved is shown in Exhibit A and is based on a total number of no more than 4 Equivalent Residential Units (ERUs) to be served by BACK.

4. System Development Charge (SDC). Based upon the water supply request information provided to Enumclaw by BACK, and in accordance with the charges specified in City Resolution No. 1438 and future amendments, BACK shall pay to Enumclaw the determined System Development Charge (SDC) for the initial Retail Service Connection Capacity and any additional connections to the BACK system added after execution of this agreement. Provided Enumclaw has additional capacity available, the 4 contracted Equivalent Resident Unit amount may be adjusted upwards based on additional SDC payment(s). An additional SDC will also be charged if usage is greater than 110 percent of the purchased ERU capacity. This requirement for an additional SDC may be waived upon satisfactory demonstration by BACK that the increased water use was temporary in nature and will return to the originally anticipated level.

5. Retail Water Rates. Enumclaw will supply BACK with retail water at the outside City water service rate as identified in the EMC. In the absence of a specific retail customer class, Enumclaw will charge BACK at the multi-family residential customer class rate. The water rates are periodically adjusted and shall be applicable as set forth in the rate schedule as adopted by the Enumclaw City Council.

6. Reliability. Enumclaw agrees to supply retail water pursuant to this Agreement with the same degree of reliability and surety of supply as water provided by Enumclaw to its existing customers.

7. Connection(s). The cost for design and construction of the new Retail Service Connection at the point of connection shown in Exhibit "B", including pipe, valves, meter(s), Washington State approved backflow device(s), and appurtenances and vaults, shall be the responsibility of BACK. The connection shall meet the requirements of the City of Enumclaw and the State Health Department, Office of Drinking Water. No future Retail Service Connections shall be permissible without a subsequent and separate written agreement between the Parties, which agreement may supplement this Agreement. Neither Party

shall be obligated to agree to or execute any agreement or permit with the other Party to construct additional water Retail Service Connection(s).

8. Ownership, Capital and Maintenance Costs. BACK agrees that the City of Enumclaw owns the retail water meter and all equipment and piping upstream of the meter. Maintenance and operation costs for this equipment are the responsibility of the City of Enumclaw. Any material and installation (capital) costs related to the original equipment, including upgrades or replacement and renewal are BACK's responsibility. BACK is responsible for installation, operation, and maintenance of the BACK system.

9. Transferability. The rights and obligations of this Agreement are transferable to heirs, successors and assignees of the Parties.

10. Resale. Water provided under this Agreement may only be resold to the customers of BACK as allowed under law.

11. Conservation and Curtailment. As a requirement of retail service BACK commits to a water conservation program that is substantially equivalent to Enumclaw's programs and consistent with applicable state law and regulations. In the event that a major water shortage occurs and BACK fails to abide by the conservation and/or curtailment requirements as publicly announced by Enumclaw, then Enumclaw may terminate water supplied under this Agreement until such time as BACK agrees to abide by such requirements or apply appropriate financial penalties to be determined by the Enumclaw City Council.

12. Emergency. BACK acknowledges that during an emergency situation or a planned outage Enumclaw may temporarily be unable to meet all or part of its retail service commitment. If Enumclaw has a planned outage, Enumclaw commits to give BACK a minimum of seven (7) days advance notice in writing. Enumclaw and BACK will work together to identify mutually acceptable dates for planned outages.

13. Indemnification. The City of Enumclaw shall not be liable to BACK customers for the failure of BACK system to supply and deliver water provided under this Agreement at any time or for any reason. Each Party agrees to indemnify the other and hold it harmless from and against any loss, cost, damage, or expense of any kind and nature, including reasonable attorney's fees arising out of injury to person or damage to property in any manner caused by the negligence or omission of the Party in the performance of its roles and responsibilities in connection with this Agreement.

14. Agreement not a Joint Venture. This Agreement is intended to be and is a contract for the purchase and sale of wholesale water, and no provision hereof shall be construed to make the Parties partners or engaged in a joint venture.

Neither Party is the agent of the other nor shall either Party be held liable for the acts of the other on a theory of agency or any other representative capacity.

15. Dispute Resolution. In the event of a disagreement over any aspect of this Agreement, except as herein further provided, it is agreed that any dispute shall be submitted to binding arbitration pursuant to Chapter 7.04 RCW. The Parties shall agree upon who will arbitrate the dispute, and upon failure to reach agreement within a reasonable period of time, the presiding judge of the King County Superior Court may be asked to appoint an arbitrator from one of the recognized dispute resolution services. The Party that substantially prevails in the arbitration proceeding shall be awarded its reasonable attorney fees and costs. If neither Party substantially prevails in the arbitration proceeding, the Parties shall each bear their respective costs and divide the mutual costs associated with the arbitration equally.

16. Notice. All notices, requests, demands and other communications hereunder shall be in writing and shall be deemed given if personally delivered or mailed, certified mail, return receipt requested, or sent by overnight carrier to the following addresses:

If to Enumclaw:
Chris Searcy
Public Works Director
City of Enumclaw
1309 Myrtle Ave
Enumclaw, WA 98022
Phone: 360-825-3593 Ext. 5721
Fax: 360-825-7232

If to BACK:
David Knight
19408 SE 322 St
Kent WA 98042
253-631-9545

Billings for payments due the City by BACK shall be served by regular mail to the address above.

17. Invalidity. If any term of this Agreement is found to be void or invalid, such invalidity shall not affect the remaining terms of this Agreement, which shall continue in full force and effect. The parties shall agree that if any provisions are deemed not enforceable, they shall be deemed modified to the extent necessary to make them enforceable. To the extent that there is any inconsistency between the provisions of this agreement, any exhibit incorporated as part of this agreement, or subsequent amendments and other rules and regulations of the City, the provisions of this agreement shall control.

18. Counterparts. This Agreement may be executed in any number of counterpart copies, each of which shall be deemed an original, but all of which together shall constitute a single instrument.

19. Records Inspection. Each Party shall maintain and make available for inspection at reasonable times all records pertaining to each Party's water system. These records shall be maintained for a minimum 3-year period.

20. Monitoring and Reporting. BACK shall keep records of total water supplied to its system and water consumed. The difference between water supplied and consumed shall be computed monthly. If the difference is more than 10% of water supplied BACK shall conduct leak survey(s) to identify where leakage is occurring and implement a regular program to reduce the leakage within a timeframe mutually agreed upon by the Parties.

21. Improvement and Operation of BACK System. BACK shall be responsible for improvements in the BACK system that may be needed because of differences between the City and BACK system pressures. BACK shall be responsible for obtaining any required county and state approvals of the BACK system improvements. The City is not responsible for ensuring the adequacy of the BACK water system or that all necessary easements and approvals have been obtained. Fire flow to BACK system will not be provided. Residential fire sprinkler systems will not be allowed to be connected to the BACK water system. All services in the BACK system shall be metered and read on a monthly basis. Enumclaw will not be liable for failure of any booster pump used in BACK system if the City water supply loses pressure for any reason. The pump station design should include a protective system to ensure the pump is not damaged because of lack of water. BACK shall be solely responsible for flushing water mains within its system. Flushing allowances will be provided by the City only when the City's Water Maintenance Supervisor determines that flushing is required to maintain or improved water quality.

22. Payment. The City shall bill BACK on a monthly basis for all charges due under the agreement. BACK shall pay such charges within the period of time specified by the EMC. Any amounts disputed by BACK shall be paid under protest within the prescribed time period. All late payments, and any refund of an amount in dispute that was paid under protest, shall accrue interest as specified in the EMC.

23. Uncontrollable Forces or Changes. Uncontrollable forces or State or Federal Law changes may occur during the time this Agreement is in place. Neither of the parties hereto shall be considered to be in default in respect to any obligations hereunder if prevented from fulfilling such obligations by reason or uncontrollable forces or material changes in state or federal law or enforcement thereof. Parties rendered unable to fulfill any obligation hereunder by reason of an uncontrollable force or material change in state or federal law shall exercise due diligence to deal with such uncontrollable force with all reasonable dispatch and to take actions consistent with the purpose of this agreement.

24. Independent Relationship. This Agreement describes the entire relationship of the parties with regard to the subject matter herein concerned. Except as maybe explicitly provided otherwise herein, the parties are independent agencies and shall not be deemed to be partners, joint ventures, principals, or agents or each other for any purpose whatsoever. Each party shall have and maintain sole and complete control over all or its employees, agents and operations. Except as may otherwise be explicitly provided herein, or in separated agreement, each and all of the obligations, responsibilities, and liabilities of the parties under and in connection with this Agreement are several, and not joint, and no separate legal or administrative entity will be created to fulfill the purposes of this Agreement.

25. Term. This Agreement shall remain in effect so long as the City of Enumclaw remains in the business of providing water and so long as BACK meets the terms and conditions of this Agreement. Either party can request amendment or renegotiation of this agreement, but no more frequently than every five years.

26. Authority to Bind. Each of the Parties to this Agreement certifies that the person signing this Agreement has authority to bind the respective governing bodies to all of the terms and conditions of the Agreement herein. No change, amendment or modification or any provision of this agreement shall be valid unless set forth in a written amendment to this Agreement signed by all parties.

27. Succession. The Parties agree that BACK shall be succeeded in this Agreement by a homeowners association to be established. That homeowners association shall replace BACK in this Agreement by notice to the City of Enumclaw. That succession shall remove from BACK any and all duties and responsibilities under this Agreement.

Dated this 26TH day of OCTOBER, 2012.

City of Enumclaw

Chris Searcy, P.E.
Public Works Director

BACK LLC

10/24/12
Sheldon Hay, Manager, BACK LLC

Approved by:
City Attorney

EXHIBIT "A"

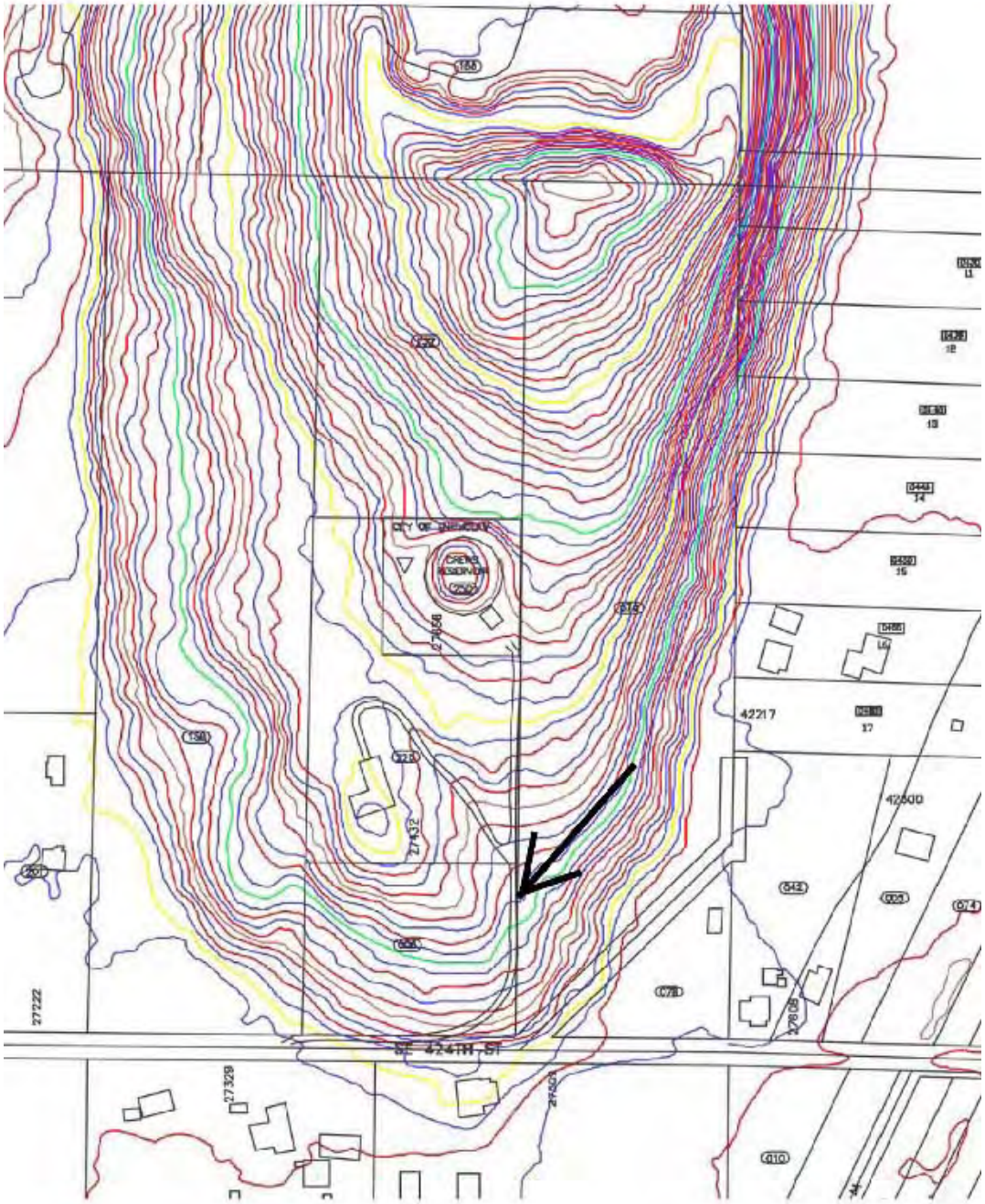
SERVICE CONNECTIONS SPECIFICATIONS

Connection Location	Connection Size	Meter Size	Max HGL Elevation (ft, NGVD 1929)		Peak Flow Capacity (gpm)	Contracted Quantity per ERU Purchased	
			Enumclaw	BACK		Total CCF/yr (1)	Peak GPD
16" water main in access rd to Crews Reservoir	2"	1.5"	888	790 at Meter	80	126	542

1) Total CCF (hundred cubic feet) per year is based on 258 gpd/ERU per EMC 14.04.195.C.
2) Peak GPD based on 258 gpd/ERU and 2.1 peaking factor.
3)

EXHIBIT B

GENERAL LOCATION MAP OF SERVICE CONNECTION



RETAIL WATER SERVICE AGREEMENT
BETWEEN CITY OF ENUMCLAW
AND LISA INC

This retail water service agreement ("Agreement") is made by and between the City of Enumclaw, a municipal corporation (hereafter "Enumclaw"), and Lisa Inc (hereafter "Lisa"), a Washington corporation. Enumclaw and Lisa collectively shall be referred to as the "Parties" or either Enumclaw or Lisa may be referred to as "Party" when appropriate.

A. RECITALS:

WHEREAS, Lisa is owner of certain properties previously owned by the Weyerhaeuser Company at the former Weyerhaeuser White River Mill site situated east of Enumclaw; and

WHEREAS, Enumclaw has supplied water for domestic use at the former mill site since 1994 through a booster station created by and paid for by Weyerhaeuser that solely serves Lisa; and

WHEREAS, the Parties are responsible for operating and maintaining their respective water systems in accordance with federal, state and local laws and regulations; and

WHEREAS, the Parties further recognize that water resources are finite and valuable, and the prudent use and management of these resources requires cooperation; and

WHEREAS, it is expected that no use of water by Lisa will result, directly or indirectly, in the reduction of the quality or quantity of water downstream from Lisa property flowing through Boise Creek; and

WHEREAS, the Parties recognize the need for a formal service agreement that clearly defines the Parties' responsibilities, now therefore;

for and in consideration of the mutual covenants, conditions and payments to be made as set forth herein, the Parties hereto agree as follows:

B. DEFINITIONS:

The meaning of certain words or terms, when used in this Agreement, is as follows:

1. "Retail Service Connection" means a physical connection between water mains of the two Parties to this Agreement, at a specifically identified point or points, where water may be transferred from one Party's system to the transmission or distribution facilities of the other Party.

2. "Retail Service Connection Capacity" means the maximum flow capacity for water to be delivered through a Retail Service Connection as agreed upon by the Parties to this Agreement.

3. The properties or Service Area where water supplied by Enumclaw is available for use by Lisa under the terms of this Agreement is limited to the existing office, security building, storage building and truck shop located on King County Parcel No. 2820079007 and 2820079010. These structures are defined in the City of Enumclaw's Comprehensive Water System Plan as being in Enumclaw's designated retail water service area.

4. Water is supplied by a booster pump station located on a site shared with Enumclaw's Boise Spring chlorination building, approximately one-half mile east of the city limits, just north of SR 410 and Boise Creek. The station, which was constructed in 1993 by Weyerhaeuser, is used to pump water from the discharge side of the Boise Creek Spring chlorination system to the Service Area in the 1245 Zone, as designated by Enumclaw's Comprehensive Water System Plan. Enumclaw has operated the booster pump station on behalf of the applicable property owners. A concrete building houses the booster pump station's mechanical, electrical and corrosion control equipment. The station has two parallel pumps with 7.5 horsepower motors. Pump cycling is controlled by bladder tanks located at the truck shop on the Lisa property. A small diaphragm pump in the booster pump station injects caustic soda and provides corrosion control by adjusting the pH of the water supplied from Boise Spring. Booster pump output is regulated by a back pressure sustaining valve set slightly above pump-off pressure to keep pumped flows at a steady rate for the duration of a pump run for more consistent dosing of the caustic soda. The booster pump station does not have standby power or a power receptacle to enable connection of a portable generator. Water is measured by a 1-1/2" Neptune turbine meter installed in 2002 with 4-20 mA output to drive the corrosion control metering pump. This replaced the original 4" water meter because the smaller meter would measure flows more accurately for better control of the metering pump. A double check valve assembly is installed on the pump discharge header inside the station. Except for pH monitoring, the existing pump station is not on Enumclaw telemetry. The pH process requires continuous monitoring with a small waste stream that is part of the water consumption charge.

   The station is located at an elevation of 876 feet (NGVD 1929) with the pump on/off currently set at 170/120 psi. Because Enumclaw's Boise Spring source has been determined to be in hydraulic continuity with surface water the water supplied by Enumclaw must be provided with a minimum chlorine contract time of 6 mg/l-min. The Lisa discharge main from the pump station has approximately 4520 feet of 6" and 870 feet of 4" pipe before any potable water use. With a minimum chlorine residual of 0.33 mg/l, this provides a contact time of about 60 mg/l-min at a 40 gpm discharge, or about 10 times that required. Enumclaw monitors chlorine residual continuously at the chlorination station next to the booster pump station.

5. The Lisa water system receiving water from Enumclaw includes privately owned water lines, valves, air bladder pressure tanks, air/vacuum valves, blowoffs, and appurtenances. Lisa also owns and operates a separate private water system for providing fire flow for the Lisa properties. This system is connected to a collection works on Boise Creek upstream of the falls east of the Service Area.

6. "Emergency" means an unforeseen event that causes damage or disrupts normal operations and requires immediate action to protect public health and safety including exclusively when water system repairs are necessary due to a water system failure or when there is a water supply shortfall.

7. "Enumclaw Municipal Code (EMC") means the City of Enumclaw's municipal code and its amendments thereto.

C. CONDITIONS:

The responsibilities of the parties to this contract are set forth below:

1. General. Enumclaw agrees to furnish the Retail Service Connection Capacity to Lisa of a quality that will satisfy all applicable local, state, and federal requirements and in accordance with Enumclaw's Comprehensive Water System Plan and the terms and conditions of this Agreement.

2. Service Area. Enumclaw and Lisa agree that the properties or Service Area where water supplied by Enumclaw for use by Lisa under the terms of this Agreement is limited to the existing office, security building, storage building and truck shop located on King County Parcel No. 2820079007 and 2820079010. Water supplied by Enumclaw is for potable domestic water use only. Domestic use only means that any non-domestic use is excluded, such as process, industrial, irrigation or vehicle washing use. Domestic use at future buildings which meet the then applicable building permit requirements will be allowed as long as the improvements do not exceed the Retail Service Connection Capacity noted in Section C.3 (as currently existing or as hereafter modified pursuant to C.4 or other provisions in this Agreement). In the event required as part of the building permit process with respect to such future buildings, Lisa will analyze whether there would be any negative impact on any of the goals and objectives of Enumclaw's comprehensive plan and any impact on the quality or quantity of the downstream flow of Boise Creek.

3. Water Quantity Reserved. Enumclaw has installed a 1-1/2" meter for the projected use of the Lisa water system. The Retail Service Connection Capacity so reserved is a maximum of 20,000 gallons per day (gpd). Per EMC 14.04.195.C, an Equivalent Resident Unit (ERU) is defined as 258 gallons per day. The 20,000 gpd capacity equates to 77.5 ERU.

4. System Development Charge (SDC). If Lisa requests additional capacity and Enumclaw elects to provide such capacity, then Lisa shall pay to Enumclaw a System Development Charge (SDC) applicable at such time for properties outside of the City's incorporated limits. The 77.5 ERU contracted amount may be adjusted upwards based on additional SDC payment(s). An additional SDC will also be charged if usage is greater than 110 percent of the purchased capacity. This requirement for an additional SDC may be waived upon satisfactory demonstration by Lisa that the increased water use was temporary in nature and will return to the originally anticipated level.

5. Retail Water Rates. Enumclaw will supply Lisa with retail water at the outside City commercial customer water service rate using a 4" base charge as identified in the EMC to reflect the original meter size. Commercial water rates are periodically adjusted and shall be applicable as set forth in the rate schedule as adopted by the Enumclaw City Council.

6. Reliability. Enumclaw agrees to supply retail water pursuant to this Agreement with the same degree of reliability and surety of supply as water provided by Enumclaw to its other retail customers.

7. Ownership, Capital and Maintenance Costs. Lisa owns and is responsible for the booster pump station, its power supply, and the Lisa system, including the bladder tanks that effect on/off operation of City booster pumps. The parties agree that Enumclaw has never been transferred ownership or otherwise had any rights of ownership to the foregoing and has instead operated the station on behalf of the applicable property owner, and no portion of this agreement shall be deemed or otherwise construed to be transferring ownership to the station to Lisa without fair market consideration. The water meter is owned by Enumclaw. Enumclaw agrees to operate the booster pump station as contract operator on Lisa's behalf, with costs for this service included in the retail rate. The booster station shall be keyed to allow access by both Enumclaw and Lisa with no advance notice required. The parties will notify PSE that Lisa shall be responsible for all electricity charges associated with the pump station.

8. Transferability. The rights and obligations of this Agreement are transferable to heirs, successors and assignees of the Parties.

9. Resale. Water provided under this Agreement may not be resold.

10. Conservation and Curtailment. As a requirement of retail service Lisa commits to a water conservation program that is substantially equivalent to Enumclaw's programs and consistent with applicable state law and regulations. In the event that a major water shortage occurs and Lisa fails to abide by the conservation and/or curtailment requirements as publicly announced by Enumclaw, then Enumclaw may terminate water supplied under this Agreement until such time as Lisa agrees to abide by such requirements or apply appropriate financial penalties to be determined by the Enumclaw City Council.

11. Emergency. Lisa acknowledges that during an emergency situation or a planned outage Enumclaw may temporarily be unable to meet all or part of its retail service commitment. If Enumclaw has a planned outage, Enumclaw commits to give Lisa a minimum of seven (7) days advance notice in writing. Enumclaw and Lisa will work together to identify mutually acceptable dates for planned outages.

12. Indemnification. Enumclaw shall not be liable to Lisa for the failure of Lisa's system to supply and deliver water provided under this Agreement at any time or for any reason. Each Party agrees to indemnify the other and hold it harmless from and against any loss, cost, damage, or expense of any kind and nature, including reasonable attorney's fees arising out of injury to person or damage to property in any manner caused by the negligence or omission of the Party in the performance of its roles and responsibilities in connection with this Agreement.

13. Agreement not a Joint Venture. This Agreement is intended to be and is a contract for the purchase and sale of water and no provision hereof shall be construed to make the Parties partners or engaged in a joint venture. Neither Party is the agent of the other nor shall either Party be held liable for the acts of the other on a theory of agency or any other representative capacity.

14. Dispute Resolution. In the event of a disagreement over any aspect of this Agreement, except as herein further provided, it is agreed that any dispute shall be submitted to binding arbitration pursuant to Chapter 7.04 RCW. The Parties shall agree upon who will arbitrate the dispute, and upon failure to reach agreement within a reasonable period of time, the presiding judge of the King County Superior Court may be asked to appoint an arbitrator from one of the recognized dispute resolution services. The Party that substantially prevails in the arbitration proceeding shall be awarded its reasonable attorney fees and costs. If neither Party substantially prevails in the arbitration proceeding, the Parties shall each bear their respective costs and divide the mutual costs associated with the arbitration equally.

15. Notice. All notices, requests, demands and other communications hereunder shall be in writing and shall be deemed given if personally delivered or mailed, certified mail, return receipt requested, or sent by overnight carrier or e-mail to the following addresses:

If to Enumclaw one separate copy each to:
City Administrator, Public
Works Director, and City Attorney
City of Enumclaw
1309 Myrtle Ave
Enumclaw, WA 98022
Phone: 360-825-3593
pwinbox@ci.enumclaw.wa.us

If to Lisa:
Lisa Inc
400 Valley Ave NE
Puyallup, WA 98372
Phone: 253-833-3705
Fax: 253-833-3746

Billings for payments due Enumclaw by Lisa shall be served by regular mail and/or electronically to the address above or such address as Lisa may designate.

16. Invalidity. If any term of this Agreement is found to be void or invalid, such invalidity shall not affect the remaining terms of this Agreement, which shall continue in full force and effect. The parties shall agree that if any provisions are deemed not enforceable, they shall be deemed modified to the extent necessary to make them enforceable. To the extent that there is any inconsistency between the provisions of this agreement, any exhibit incorporated as part of this agreement, or subsequent amendments and other rules and regulations of the City of Enumclaw, the provisions of this agreement shall control.

17. Counterparts. This Agreement may be executed in any number of counterpart copies, each of which shall be deemed an original, but all of which together shall constitute a single instrument.

18. Records Inspection. Each Party shall maintain and make available for inspection at reasonable times all records pertaining to each Party's water system. These records shall be maintained for a minimum 3-year period.

19. Improvement and Operation of Lisa Water System. Lisa shall be responsible for improvements in the Lisa water system and booster pump station. Lisa shall be responsible for obtaining any required county and state approvals of the Lisa water system and booster station improvements. Except as otherwise provided herein, Enumclaw is not responsible for ensuring the adequacy of the Lisa water system and booster station or that all necessary approvals have been obtained. Lisa also acknowledges that:
    1) the booster pump station provides insufficient flow for developing scouring velocities necessary for flushing Lisa's water mains.
    2) the bladder tanks must be in good working condition to prevent excessive cycling of the booster station pumps and Lisa commits to ensuring that the tanks are properly maintained.
    3) there is only one backflow device at the booster pump station and that it must be tested annually resulting in a short disruption of service.
    4) the importance of quickly addressing leaks in the Lisa water system to prevent excessive cycling of the booster station pumps.
    5) it will ensure that the separate fire system on the Lisa property is not and will not be interconnected to the water system provided water by Enumclaw.
    6) because of the complexity of Lisa's private water lines, the existing double check valve assembly at the booster station may be required to be replaced with a reduced pressure backflow assembly at Lisa's sole cost within 90-days after being directed to do so by Enumclaw, provided that the timeline shall be reasonably extended in the event Lisa begins the replacement within the initial period and the replacement is not finalized prior to the initial 90 days for any reason outside of Lisa's control (i.e. supply chain issues, terrorism, acts of god, etc.).

7) all backflow devices on water fixtures in Lisa's facilities served by Enumclaw water shall be added to Enumclaw's cross connection database and Lisa shall cause such to be tested annually by a certified backflow assembly tester.

8) no taps are allowed off the Lisa water transmission main from the booster pump station to the Lisa properties that would compromise Enumclaw's ability to meet regulations for chlorine contact time prior to the first tap. Lisa shall install a dedicated water sample station and continuous chlorine residual monitor to Enumclaw requirements at a mutually agreed upon location near the end of the transmission main and hereby allows Enumclaw staff access rights to the sample station at a mutually agreeable time.

9) fire flow to Lisa's system will not be provided by Enumclaw under this Agreement. Fire sprinkler systems will not be allowed to be connected to the Lisa system as described herein.

10) the pH adjustment process requires continuous monitoring with a small waste stream that is part of the water consumption charge billed to Lisa.

20. Payment. Enumclaw shall bill Lisa on a monthly basis for all charges due under the agreement. Lisa shall pay such charges within the period of time specified by the EMC. Any amounts disputed by Lisa shall be paid under protest within the prescribed time period. All late payments, and any refund of an amount in dispute that was paid under protest, shall accrue interest as specified in the EMC.

21. Uncontrollable Forces or Changes. Uncontrollable forces or State or Federal Law changes may occur during the time this Agreement is in place. Neither of the parties hereto shall be considered to be in default in respect to any obligations hereunder if prevented from fulfilling such obligations by reason or uncontrollable forces or material changes in state or federal law or enforcement thereof. Parties rendered unable to fulfill any obligation hereunder by reason of an uncontrollable force or material change in state or federal law shall exercise due diligence to deal with such uncontrollable force with all reasonable dispatch and to take actions consistent with the purpose of this agreement.

22. Independent Relationship. This Agreement describes the entire relationship of the parties with regard to the subject matter herein concerned. Except as maybe explicitly provided otherwise herein, the parties are independent agencies and shall not be deemed to be partners, joint ventures, principals, or agents or each other for any purpose whatsoever. Each party shall have and maintain sole and complete control over all or its employees, agents and operations. Except as may otherwise be explicitly provided herein, or in separated agreement, each and all of the obligations, responsibilities, and liabilities of the parties under and in connection with this Agreement are several, and not joint, and no separate legal or administrative entity will be created to fulfill the purposes of this Agreement.

23. Term. This Agreement shall remain in effect so long as the City of Enumclaw remains in the business of providing water and so long as Lisa meets the terms and conditions of this

Agreement. Either party can request amendment or renegotiation of this agreement, which shall not be unreasonably withheld.

24. Authority to Bind. Each of the Parties to this Agreement certifies that the person signing this Agreement has authority to bind the respective governing bodies to all of the terms and conditions of the Agreement herein. No change, amendment or modification or any provision of this agreement shall be valid unless set forth in a written amendment to this Agreement signed by all parties.

Dated this June 12, 2023.

City of Enumclaw

Brian Spindor
Public Works Director

Approved by:
City Attorney

Lisa Inc

Lisa Kittilsby
President

APPENDIX I

WATER RIGHT CERTIFICATES, PERMITS, AND SELF-ASSESSMENT FORM

Local Name: Boise Spring

Date of Priority: February 25, 1977

Certificate Number: S1-22798-C

Control Number:

Permit Number: S1-22798-P

Page Number:

Application Number: S1-22798

Type of Withdrawal: Surface Water

Quantity:

2.0 cfs

1,270 acre feet

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

Boise Spring

[X] 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
February 25, 1977	S1-22798	S1-22798P	S1-22798C

NAME
CITY OF ENUMCLAW

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1339 Griffin Avenue	Enumclaw	Washington	98022

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
Unnamed springs (City Spring or Boise Spring)

TRIBUTARY OF (IF SURFACE WATERS)
Boise Creek

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
2.0		1270.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

82/02/18 #0509 E
RECD F
CASHSL ****4.00

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
750 feet north and 250 feet west from the center of Sec. 29

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	29	20	7 E	9	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 Enumclaw.

FILED for Record at Request of
Name City of Enumclaw
Address 1339 W Griffin Ave.
Enumclaw Wash. 98022

RECORDED THIS DAY
FEB 18 2 16 PM '82
BY THE DIVISION OF
RECORDS & ELECTIONS
KING COUNTY

PROVISIONS

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 benefically used and required.

Diversion intake shall be tightly screened at all times with wire mesh having openings with dimensions not greater than 0.125 (1/8) inch.

8202180509

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* 16th *day of* February, *19* 82

ENGINEERING DATA
OK YY

Department of Ecology

by Robert K. McCormick

ROBERT K. McCORMICK, Regional Manager

FOR COUNTY USE ONLY

BOISE SPRING

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PROOF OF APPROPRIATION OF WATER

APPLICATION NUMBER S1 - 22798	PERMIT NUMBER S1 - 22798 P

NAME OF PERMITTEE
City of Enumclaw

POST OFFICE ADDRESS	(CITY)	(STATE)	(ZIP CODE)
1339 Griffin Avenue,	Enumclaw	WA	98022

ACTUAL SOURCE OF APPROPRIATION
Boise Spring

PURPOSE OR PURPOSES WATER IS USED FOR
Municipal Supply - continuously

DATE WATER WAS COMPLETELY APPLIED TO PERMITTED USE 1912	IF USED FOR IRRIGATION, NUMBER OF ACRES ACTUALLY IRRIGATED N/A
IF SOURCE IS A WELL, IS AN ACCESS PORT NOW INSTALLED ☐ YES ☐ NO N/A	MONTHS DURING WHICH WATER IS USED January through December

PUMP SIZE
N/A

ACTUAL AMOUNT WITHDRAWN OR DIVERTED FROM PERMANENT SYSTEM 2.0 C.F.S.	☐ GPM ☒ CFS
HAVE ALL PROVISIONS AS REQUIRED BY PERMIT BEEN ACCOMPLISHED ☒ YES ☐ NO	IF NO, EXPLAIN

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS USED (USE ADDITIONAL SHEET IF NECESSARY)

Beginning at a point 1673.5 feet south and 446.4 feet west of the northwest corner of the northeast quarter of Section 29, Township 20 North, Range 7 East W.M. in King County, Washington; Thence east 1000 feet; Thence south 653.4 feet; Thence west 1000 feet; Thence north 653.4 feet to the point of beginning.

STATE OF WASHINGTON,
County of KING } ss.

I, MARGARET E. HIGH, being first duly sworn, depose and say that I have read the above and foregoing proof of appropriation; that I know the contents thereof; and that the facts therein stated are true.

IN WITNESS WHEREOF, I have hereunto set my hand this 4th day of JANUARY, 19 82.

Margaret E. High
Permittee Signature City Clerk

Subscribed and sworn to before me this 4th day of JANUARY, 19 82.

E. Kholl

FILE WITH WATER RIGHTS

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

[X] 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
February 25, 1977	S1-22798	S1-22798P	

NAME
CITY OF ENUMCLAW

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1339 Griffin Avenue	Enumclaw	Washington	98022

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
Unnamed springs (City Spring or Boise Spring)

TRIBUTARY OF (IF SURFACE WATERS)
Boise Creek

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
2.0		1270.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
750 feet north and 250 feet west from the center of Sec. 29

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	29	20	7 E	9	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 Enumclaw.

DESCRIPTION OF PROPOSED WORKS

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Complete	November 30, 1981

PROVISIONS

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 benefically used and required.

In accordance with the recommendations of the departments of Fisheries and Game, the permit shall be issued subject to the following provision: Diversion intake shall be tightly screened at all times with wire mesh having openings with dimensions not greater than 0.125 (1/8) inch.

A certificate of water right will not be issued until a final 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* 29th *day of* May *, 19* 81

Department of Ecology

ENGINEERING DATA

OK .....

by Robert K. McCormick

ROBERT K. McCORMICK, Regional Manager

Local Name: Watercress Spring

Date of Priority: February 7, 1945

Certificate Number: 5576

Control Number:

Permit Number: 4176

Page Number: 5576

Application Number:

Type of Withdrawal: Surface Water

Quantity:

.75 cfs

Watercress Springs OC

S. P. No. 369—3-51—75C. 27755.

CERTIFICATE RECORD NO. 12, PAGE NO. 5576

STATE OF WASHINGTON, COUNTY OF King

CERTIFICATE OF SURFACE WATER RIGHT

(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.)

This is to certify that CITY OF ENUMCLAW

of Enumclaw, *State of* Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the waters of* Water Cress Spring, *a tributary of* Newaukan Creek, *with point or points of diversion within* Lot 1 of *Sec.* 19, *Twp.* 20 *N., R.* 7 E *, W. M., under and subject to provisions contained in* Appropriation *Permit No.* 4176 *issued by the State Supervisor of Water Resources, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 12, *at Page* 5576, *on the* 31st *day of* December, 19 53, *that the priority date of the right hereby confirmed is* February 7, 1965; *that the amount of water under the right hereby confirmed, for the following purposes is limited to an amount actually beneficially used and shall not exceed*

0.75 of a cubic foot per second for the purpose of domestic supply for community.

A description of the lands under such right to which the water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

City of Enumclaw, King County, Washington.

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.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 31st *day of* December, 19 53.

Chas J. Carkeek

State Supervisor of Water Resources.

ENGINEERING DATA

O.K.

Form 10 S. F. No. 310—6-44.—1M. 6920.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
Division of Hydraulics

Permit to Appropriate Public Waters of the State of Washington

Book No. 16 of Permits, on Page 4176 Under Application No. 6308

CITY OF ENUMCLAW

of Enumclaw, Washington

is hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the following limitations and provisions: Permittee shall construct and maintain at his own expense a weir, or other suitable device, for measuring any water granted herein for irrigation purposes and such appropriation shall be subject to a reasonable rotation system if ordered by the State Supervisor of Hydraulics; and it is further provided that Permittee, in the use of water under this permit, shall comply with all the laws of the Departments of Fisheries and Game in accordance with Chap. 127, Laws of 1939, and all regulations and laws hereafter enacted.

Priority date of this permit is February 7, 1945

Source of the proposed appropriation is Water Cress Spring

tributary of Newaukum Creek

The quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 0.75 cubic feet per second, or its equivalent in case of rotation, to be used for the following purposes:

community domestic supply

as more definitely set out below.

The approximate point of diversion is located 100 feet west and 100 feet north of the southeast corner of Lot 1 of Section 19

being within Lot 1 Sec. 19 Twp. 20 N. Rge. 7 E. W. M.

county of King.

The use, or uses, to which water is to be applied:

For Domestic Supply and Miscellaneous Uses: 0.75 cubic feet per second during entire year for community domestic supply to be used within the land described below Sec. Twp. N. Rge. W. M.

For Irrigation: cubic feet per second, from to

each year, for irrigation of acres, described as follows:
within the boundaries of the City of Enumclaw.

For Power: . . cubic feet per second continuously each year. Total power to be developed . . . . . theoretical horse power. Total fall to be utilized . . . . . feet.

Nature of works by means of which power is to be developed . . . . . .

Works to be located in . . . . . Sec. . . . . , Twp. . . . . N., Rge. . . . . W. M.

Water to be returned to . . . . . .

Point of return . . . . . Sec. . . . . Twp. . . . . N., Rge. . . . . W. M.

Use to which power is to be applied . . . . . .

For Municipal Supply: . . . . . cubic feet per second during entire year to supply . . . . . .

DESCRIPTION OF DIVERSION WORKS

Height of dam . . . . . ft.; Length on top . . . . . ft.; Length on bottom . . . . . ft.

Material to be used and character of construction . . . . . .

Description of headgate . . . . . .

CANAL SYSTEM

At Headgate: Width on top (at water line) . . . . . ft.; Width on bottom . . . . . ft.; Depth of water . . . . . ft.; Grade . . . . . ft. fall per one thousand feet.

At . . . . . Miles From Headgate: Width on top (at water line) . . . . . ft.; Width on bottom . . . . . ft.; Depth of water . . . . . ft.; Grade . . . . . feet per one thousand feet.

(Please read carefully provisions below)

Construction work shall begin on or before . . . . . August 1, 1947 4 tension Act 1950 B 1-53

and shall thereafter be prosecuted with reasonable diligence and completed on or before . . . . . August 1, 1948 . . . . . .

and complete application of water to proposed uses shall be made on or before . . . . . October 1, 1948 . . . . . .

Given under my hand and the seal of this office at Olympia, Washington, this . . . . 20th . . . day of . . . . August 194 5

J. F. R. Affleck
Assistant State Supervisor of Hydraulics.

Local Name: Watercress Spring

Date of Priority: August 9, 1951

Certificate Number: 5579

Control Number:

Permit Number: 7960

Page Number: 5579

Application Number:

Type of Withdrawal:

Quantity:

1 cfs

Watercress Springs c.c.

S. F. No. 309—3-51—75C. 27755.

CERTIFICATE RECORD NO. 12, PAGE NO. 5579

STATE OF WASHINGTON, COUNTY OF King

CERTIFICATE OF SURFACE WATER RIGHT

(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.)

This is to certify that CITY OF ENUMCLAW WATER DEPARTMENT *of* Enumclaw, *State of* Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the waters of* Water Cress Spring, *a tributary of* Ditch 5-A and Newaukum Creek, *with point or points of diversion within* ~~SW~~ Lot 1 of *Sec.* 19, *Twp.* 20 *N., R.* 7 E., *W. M., under and subject to provisions contained in* Appropriation *Permit No.* 7960 *issued by the State Supervisor of Water Resources, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 12, *at Page* 5579, *on the* 31st *day of* December, 1953, *that the priority date of the right hereby confirmed is* August 9, 1951; *that the amount of water under the right hereby confirmed, for the following purposes is limited to an amount actually beneficially used and shall not exceed*

1.0 cubic feet per second for the purpose of municipal supply.

A description of the lands under such right to which the water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

The City of Enumclaw, King County, Washington.

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.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 31st *day of* December, 1953.

State Supervisor of Water Resources.

ENGINEERING DATA

O.K. [illegible]

Form 10. S. F. No. 370—3-51—75C. 27754.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
Division of Water Resources

Permit to Appropriate Public Waters of the State of Washington

Book No. 23 of Permits, on Page 7960 Under Application No. 10594

CITY OF ENUMCLAW WATER DEPARTMENT

of Enumclaw, Washington

is hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the following limitations and provisions: Permittee shall construct and maintain at his own expense a weir, or other suitable device, for measuring any water granted herein for irrigation purposes and such appropriation shall be subject to a reasonable rotation system if ordered by the State Supervisor of Water Resources. It is further provided that the diversion intake shall be tightly screened with wire having a mesh opening not greater than .125 (1/8) inch.

Priority date of this permit is August 8, 1951

Source of the proposed appropriation is Water Cress Spring

tributary of Ditch 5-A and Newaukum Creek

The quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 1.0 cubic feet per second, or its equivalent in case of rotation, to be used for the following purposes: municipal supply

as more definitely set out below.

The approximate point of diversion is located 100 feet West & 100 feet North of Southeast corner of Lot 1, Sec. 19

being within Lot 1 of Sec. 19 Twp. 20 N., Rge. 7 E. W. M.,

county of King

The use, or uses, to which water is to be applied:

For Domestic Supply and Miscellaneous Uses: cubic feet per second during entire year for to be used within Sec. , Twp. N., Rge. W. M.

For Irrigation: cubic feet per second, from to each year, for irrigation of acres, described as follows:

For Power: ..... cubic feet per second continuously each year. Total power to be developed ..... theoretical horse power. Total fall to be utilized ..... feet.

Nature of works by means of which power is to be developed .....

Works to be located in ..... Sec. ....., Twp. ..... N., Rge. ..... W. M.

Water to be returned to .....

Point of return ..... Sec. ....., Twp. ..... N., Rge. ..... W. M.

Use to which power is to be applied .....

For Municipal Supply: 1.0 cubic feet per second during entire year to supply the City of Enumclaw

DESCRIPTION OF DIVERSION WORKS

Height of dam ..... ft.; Length on top ..... ft.; Length on bottom ..... ft.

Material to be used and character of construction .....

Description of headgate .....

CANAL SYSTEM

At Headgate: Width on top (at water line) ..... ft.; Width on bottom ..... ft.; Depth of water ..... ft.; Grade ..... ft. fall per one thousand feet.

At ..... Miles From Headgate: Width on top (at water line) ..... ft.; Width on bottom ..... ft.; Depth of water ..... ft.; Grade ..... feet per one thousand feet.

(Please read carefully provisions below)

Construction work shall begin on or before April 1, 1953

and shall thereafter be prosecuted with reasonable diligence and completed on or before April 1, 1954

and complete application of water to proposed uses shall be made on or before April 1, 1955

Given under my hand and the seal of this office at Olympia, Washington, this 5th day of April, 1952.

Chas J Birkhoed

State Supervisor of Water Resources

Local Name: Watercress

Date of Priority: March 28, 1968

Certificate Number:

Control Number:

Permit Number:

Page Number:

Application Number: G1-9339

Type of Withdrawal: Surface Water

Quantity:

3.35 cfs

1,220 acre feet

S. F. No. 7361—(Rev. 10-00)—10-00—5M. 15000.

CERTIFICATE RECORD NO. 14, PAGE NO. 6894-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 ENUMCLAW

of Enumclaw, Washington, *has made proof to the satisfaction of the Department of Water Resources of a right to the use of the public ground waters of the State of Washington from* a well

located within Government Lot 1

Sec. 19, *Twp.* 20 *N., R.* 7 E. *W.M.,*

for the purpose(s) of municipal supply

under and specifically subject to provisions contained in Ground Water Permit No. 9044 *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 and entered of record in Volume* 14 *at page* 6894-A*; that the priority of the right hereby confirmed dates from* March 27, 1968*; 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* 1500 gallons per minute, 1220 acre-feet per year, each year, for municipal supply.

A description of the lands to which such ground water right is appurtenant is as follows:

Area served by the City of Enumclaw.

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.

WITNESS the seal and signature of the Assistant Director, Division of Water Management, Department of Water Resources, affixed this 22nd *day of* June, *1970*

Glen H. Lindley

Assistant Director
Division of Water Management
Department of Water Resources

S. F. No. 7354—05—7 68.

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 19 of Ground Water Permits, on page 9044 under Application No. 9339

CITY OF ENUMCLAW

of Enumclaw, Washington

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is March 27, 1968

Source of the proposed ground water appropriation is a well

within ..... area, ... sub-area

..... zone. Name or number of works is .....

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 1513 gallons per minute; 1220 acre-feet per year, to be used for the following purposes: .....

as more definitely set out below.

Location of the well, tunnel, or infiltration trench is 1065 feet south and 1250 feet east of the northwest corner of Sec. 19

being within Government lot 1 of Sec. 19, T. 20 N., R. 7 E.W.M.

county of King

Use, or uses to which water is to be applied:

For municipal supply: 1513 gallons per minute; 1220 acre-feet per year, to supply an expected population of 27,500 by the year 2000

For irrigation: ..... gallons per minute; ..... acre-feet per year, for the irrigation of ..... acres.

For miscellaneous uses: ..... gallons per minute; ..... acre-feet per year, for .....

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Enumclaw

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be dug (Dug or drilled) and have a diameter of 25x60 ~~inches~~ feet and depth of 9 feet.

Description of tunnel or infiltration trench:

SPECIAL LIMITATIONS AND PROVISIONS: The installation of an access port as described in Ground Water Bulletin No. 1 shall be required prior to issuance of final Certificate of Water Right.

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.

Total annual diversion under this permit shall not exceed 1220 acre-feet, less any amount in excess of 2033 acre-feet diverted under prior rights.

This permit shall be subject to cancellation should the permittee fail to comply with the development schedule contained herein and/or fail to give notice to the Division of Water Management on forms provided by said office documenting such compliance.

Construction work shall begin on or before Started

and shall thereafter be prosecuted with reasonable diligence and completed on or before

May 1, 1970

and complete application of water to proposed use shall be made on or before

May 1, 1971

Given under my hand and the seal of this office at Olympia, Washington, this 18th day of April, 1969

Glen H. Fuller

Assistant Director
Division of Water Management
Department of Water Resources

Local Name: P. C. Johnson 1

Date of Priority: April 23, 1980

Certificate Number: G1-23600C

Control Number:

Permit Number: G1-23600P

Page Number:

Application Number: G1-23600

Type of Withdrawal: Groundwater

Quantity: 550 gpm

880 acre feet

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 23, 1980	G1-23600	G1-23600P	G1-23600C

S209210547

NAME
CITY OF ENUMCLAW

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1339 Griffin Avenue	Enumclaw	Washington	98022

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
	550	880

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal Supply - continuously

RECORDED THIS DAY
SEP 21 12 10 PM '82
BY THE DIVISION OF
[illegible]
KING COUNTY

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
100 feet south and 100 feet west of center of Sec. 18

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼SW¼	18	20	7 E	9	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 will be used for municipal use within the area served by the City of Enumclaw.

82/09/21 #0547 D
RECD F 4.00
CASHSL ****4.00
22

FILED for Record at Request of
Name City of Enumclaw
Address 1339 Griffin Avenue
Enumclaw, Wa. 98022

PROVISIONS

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.

At such time that the Department of Ecology determines that regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 and WAC 508-64-020 through WAC 508-64-040.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Redmond. *Washington, this* 15th *day of* September, *19* 82

Department of Ecology

ENGINEERING DATA
OK.

by Robert K. McCormick
ROBERT K. McCORMICK, Regional Manager

FOR COUNTY USE ONLY

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 23, 1980	G1-23600	G1-23600 P	

NAME
CITY OF ENUMCLAW

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1339 Griffin Avenue	Enumclaw	Washington	98022

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
	1500	2400

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal Supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
100 feet south and 100 feet west of center of Sec. 18

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼SW¼	18	20	7 E	9	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 will be used for municipal use within the area served by the City of Enumclaw.

DESCRIPTION OF PROPOSED WORKS

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	August 31, 1982	August 31, 1983

PROVISIONS

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.

At such time that the Department of Ecology determines that regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 and WAC 508-64-020 through WAC 508-64-040.

A certificate of water right will not be issued until a final 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* 31st *day of* August, *19* 81

Department of Ecology

by Robert K. McCormick

ROBERT K. McCORMICK, Regional Manager

ENGINEERING DATA

OK

Local Name: P. C. Johnson 2

Date of Priority: October 16, 1986

Certificate Number: G1-24918C

Control Number:

Permit Number: G1-24918P

Page Number:

Application Number: G1-29918

Type of Withdrawal: Groundwater

Quantity: 1,500 gpm

1,680 acre feet

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
October 16, 1986	G1-24918	G1-24918P	G1-24918C

NAME
City of Enumclaw

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1339 Griffin Avenue	Enumclaw	Washington	98022

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
—	1500	1680*

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal water supply - continuously.

*Totally supplemental to existing rights.

8801210592

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
~~Approximately 2500 feet east and 2600 feet north of southwest corner of~~

Section 18.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼SW¼	18	20	7E	9	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 the City of Enumclaw.

88/01/21 #0592 B
RECD F 6.00
CASHSL 6.00
11

JAN 21 10 3? AM '88
BY THE
RECEIVED

FILED for Record at Request of
NAME City of Enumclaw
ADDRESS 1339 Griffin Ave.
CITY Enumclaw, WA 98022

(SEE REVERSE SIDE)

CERTIFICATE

PROVISIONS

The groundwater withdrawal is subject to the following conditions:

1. P.C. Johnson Well 1 should be used as a backup supply in the event of pump failure in Well 2.

2. The applicant should monitor the well regularly for early detection of well or aquifer problems. Monitoring data should be collected at least on a monthly basis and contain data as to static water level, pumping water level, instantaneous and total pumpage records.

8801210592

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* 15 *day of* January, *19* 88

Department of Ecology

ENGINEERING DATA

OK Ron

by Nancy Ellison

Nancy Ellison, Regional Manager

FOR COUNTY USE ONLY

application

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
October 16, 1986	G1-24918		

NAME
City of Enumclaw

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1339 Griffin Avenue	Enumclaw	Washington	98022

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
—	1500	1680*

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal water supply - continuously.

*Totally supplemental to existing rights.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
Approximately 2500 feet east and 2600 feet north of southwest corner of Section 18.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼SW¼	18	20	7E	9	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 the City of Enumclaw.

COPY

DESCRIPTION OF PROPOSED WORKS

Well 16" X 227', 150 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 October 16, 1986, this application was received from the City of Enumclaw requesting 1500 gallons per minute from a well for municipal water supply.

Notice was published in the Enumclaw Courier-Herald on December 4 and 11, 1986. No protests were filed.

Investigation:

Evaluation for this application consists of review of office records, visit to the site on June 29, 1987.

The well site is one mile northeast of Enumclaw at the intersection of S.E. 424th Street and 284th S.E. being with the SW¼ of Section 18, Township 20N., Range 7E. The city has another well located at the same site. Both wells are developed in the same aquifer and are 60 feet apart. The earlier established well at this location will be referred to as Well #1 and the well for this application as Well #2.

Office records indicate the City of Enumclaw holds the following rights:

Cert. No.	Priority Date	Source	Rate	Annual Quantity (acre-feet)
4239	8/17/60	Well Cascade	97 gpm	28
6894	3/27/68	Watercress well	1500 gpm	1220
5576	2/7/45	Watercress spring	.75 cfs	540
5579	8/9/51	Watercress spring	1.0 cfs	720
S1-22798C	2/25/77	Boise springs	2.0 cfs	1270
G1-23600C	4/23/80	P.C. Johnson Well #1	550 gpm	800
				4658

Pending

G1-24918 (this App)	10/16/86	P.C. Johnson Well #2 1500 gpm	1680*

*Supplemental to existing rights

According to the city's comprehensive water plan prepared by Kramer Chin and Mayo and adopted in 1983, the 20-year population figure for the city's service area will be 19,420. The 1985 water consumption figures indicate 79,227,500 cubic feet used by 3,017 services which figures to 0.6 acre-foot per year per service. Figuring 3 persons per service, the city would require 3883.8 acre-feet of water per year to meet their projected 20-year demand.

The well for this application was constructed in February 1986 to a depth of 227.2 feet. The screens were set from 203 feet to 224 feet. The firm of Robinson and Noble conducted a 24-hour pump test on Well #2. Drawdown and recovery was monitored in both Wells 1 and 2. Static water level was at 42.65 feet in Well 2 and 43.75 feet in Well 1 prior to the pump test. Well 2 was pumped at 1500 gallons per minute with a total drawdown of 95.05 feet. Drawdown in Well 1 was 35.85 feet. The recovery data indicates that water level in Well 2 registered at 1.3 feet below pre-test conditions, 24 hours after the pump test ended. The recovery graph does not plot the water levels for Well 1 beyond 30 minutes past pump shut off at which it measured 23.6 feet of recovery.

It was the recommendation of Robinson and Noble in their report on P.C. Johnson Well 2, that Well 1 and 2 not be pumped simultaneously. The interference between the two wells would restrict the pumping capacity and duration if both wells were allowed to operate together at any time. A telephone conversation between John Noble and this writer confirmed Robinson and Noble's findings that Well 2 was capable of 1500 gpm when pumped

alone. This writer was informed that the city would follow Robinson and Noble's recommendations.

A check of office files for well logs in the area indicate the only other well within a quarter mile from the well is the city's Well 1.

The yearly volume allowed for Well 2 would be 1680 acre-feet (based on continuous pumping at 70% full use). The quantity would be totally supplemental to the city's existing rights since existing rights total 4,658 acre-feet and the city's projected 20-year needs amount to 3883.8 acre-feet per year.

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 1500 gpm, 1680 acre-feet per year supplemental to existing rights from P.C. Johnson Well 2 for the purpose of municipal domestic supply.

The groundwater withdrawal is subject to the following conditions:

1. P.C. Johnson Well 1 should be used as a backup supply in the event of pump failure in Well 2.

2. 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.

3. 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).

4. The applicant should monitor the well regularly for early detection of well or aquifer problems. Monitoring data should be collected at least on a monthly basis and contain data as to static water level, pumping water level, instantaneous and total pumpage records.

REPORT BY: Janet Jory DATE: 9-2-87

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
October 16, 1986	G1-24918	G1-24918P	

NAME
City of Enumclaw

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
1339 Griffin Avenue	Enumclaw	Washington	98022

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
—	1500	1680*

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal water supply - continuously.

*Totally supplemental to existing rights.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
Approximately 2500 feet east and 2600 feet north of southwest corner of Section 18.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼SW¼	18	20	7E	9	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 the City of Enumclaw.

DESCRIPTION OF PROPOSED WORKS

Well 16" X 227', 150 HP pump.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	October 15, 1988	October 15, 1989

PROVISIONS

The groundwater withdrawal is subject to the following conditions:

1. P.C. Johnson Well 1 should be used as a backup supply in the event of pump failure in Well 2.

2. 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.

3. 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).

4. The applicant should monitor the well regularly for early detection of well or aquifer problems. Monitoring data should be collected at least on a monthly basis and contain data as to static water level, pumping water level, instantaneous and total pumpage records.

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* October, *19* 87

Department of Ecology

ENGINEERING DATA
OK. [signature]

by Nancy Ellison
Nancy Ellison, Regional Manager

Local Name: Golf Course Water Right 1: Surface Water Right S-5127C

Date of Priority:	**9/9/1940**
Certificate Number:	**S-5127C**
Control Number:	
Permit Number:	**3370**
Page Number:	
Application Number:	**5251**
Type of Withdrawal:	**Surface Water**

Quantity:

90 gpm

60 acre feet

S. F. No. 369—3-51—75C. 27755.

CERTIFICATE RECORD NO. 11 PAGE NO. 5127

STATE OF WASHINGTON, COUNTY OF King

CERTIFICATE OF SURFACE WATER RIGHT

(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.)

This is to certify that KING COUNTY DEPARTMENT OF PUBLIC WORKS *of* Kent, *State of* Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the waters of* Chappel Springs, *a tributary of* Boise Creek, *with point or points of diversion within the* NW¼ of NW¼ of *Sec.* 29, *Twp.* 20 *N., R.* 7 E., *W. M., under and subject to provisions contained in* Appropriation *Permit No.* 3370 *issued by the State Supervisor of Water Resources, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 11 *at Page* 5127 *on the* 27th *day of* February, 1953 *that the priority date of the right hereby confirmed is* September 3, 1940; *that the amount of water under the right hereby confirmed, for the following purposes is limited to an amount actually beneficially used and shall not exceed*

0.20 of a cubic foot per second for the purposes of domestic supply and the irrigation of 30 acres.

A description of the lands under such right to which the water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

Beginning at the Northwest corner of Sec. 29, Twp. 20 N., Rge. 7 E.W.M., and running south along the west line of said Section 208.5 feet, more or less, to the south boundary line of the right-of-way of State Road No. 5, as now located, which is the true point of beginning of this description, then south along the west line of said Section 29, 150.0 feet; then in an easterly direction on a curve to the right having a radius of 1232.5 feet a distance of 615.0 feet, more or less; thence North 37°51' West along the radius of a 4° curve a distance of 150.0 feet, more or less, to the Engineer's Station 86+22.0 point on the south boundary line of the right-of-way of State Road No. 5; then southeasterly along said boundary line 400 feet, more or less; then south 925.0 feet, more or less; thence west 660.00 feet, more or less; then south 330.0 feet, more or less; then west 330.0 feet, more or less; then north 400 feet, more or less; then west 330 feet, more or less, on a line which shall be parallel to the south line of Northeast quarter of the NE¼ of Sec. 30, Twp. 20 N., Rge. 7 E.W.M.; then north 330 feet, more or less; then west along the south line of the foresaid NE¼ of NE¼ of Sec. 30, 990 feet, more or less, to the quarter corner of the NE¼ of said Sec. 30, then north along the west line of the foresaid NE¼ of NE¼ of Sec. 30, 450.0 feet, more or less; thence South 89°35' West 290.5 feet, more or less; then North 10°19' East 467.0 feet, more or less; then South 75°51' East 343 feet, more or less; then North 10°19' West 250 feet, more or less, to the south boundary line of the right-of-way of State Road No. 5, then along said south boundary line to the true point of beginning; less portions used for county roads.

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.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 27th *day of* February, 1953.

Chas. J. Bartholomew

State Supervisor of Water Resources

Form 10. S. F. No. 370—7-20-40—3M. 19676.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
Division of Hydraulics

Permit to Appropriate Public Waters of the State of Washington

Book No. 14 of Permits, on Page 3370 Under Application No. 5251

King County Department of Public Works, Parks & Playgrounds, District #2

of Kent, Washington

is hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the following limitations and provisions: Permittee shall construct and maintain at his own expense a weir, or other suitable device, for measuring any water granted herein for irrigation purposes and such appropriation shall be subject to a reasonable rotation system if ordered by the State Supervisor of Hydraulics; and it is further provided that Permittee, in the use of water under this permit, shall comply with all the laws of the Departments of Fisheries and Game in accordance with Chap. 127, Laws of 1939, and all regulations and laws hereafter enacted; and it is also provided that Permittee shall at all times allow not less than 1.0 c.f.s. to pass their intake.

Priority date of this permit is September 3, 1940

Source of the proposed appropriation is (Boise Creek) Chappel Springs

tributary of Boise Creek (White River)

The quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 0.2 cubic feet per second, or its equivalent in case of rotation, to be used as set out below:

The approximate point of diversion is located South 26°00' East a distance of 1325 feet from the NW corner of Section 29

being within SW cl. of Bt of Hlis: NW¼ of NW¼ Sec. 29, Twp. 20 N., Rge. 7 E. W. M.,

county of King

The use, or uses, to which water is to be applied:

For Domestic Supply and Miscellaneous Uses: 0.01 cubic feet per second during entire year for Domestic supply for field house to be used within lands described below Sec. , Twp. N., Rge. W. M.

For Irrigation: 0.19 cubic feet per second, from April 15 to October 1 each year, for irrigation of 30 acres, described as follows: (on golf course, baseball park, football field, tennis courts, and surrounding ground):

Sections 29 & 30, Twp. 20 N., Rge. 7 E.W.M.; NE¼ of the NE¼ of Sec. 30; East 330 feet of the North 264 feet of the SE¼ of the NE¼ of Sec. 30; West 990 feet of that portion of the NW¼ of the NW¼ of Sec. 29 South of the Naches Highway. The West 990 feet of the North 330 feet and the North 330 feet of the remaining 330 feet of the SW¼ of the NW¼ of Section 29.

FOR POWER: ..... cubic feet per second continuously each year. Total power to be developed ..... theoretical horse power. Total fall to be utilized ..... feet.

Nature of works by means of which power is to be developed .....

.....

Works to be located in ..... Sec. ..... Twp. ..... N., Rge. ..... W. M.

Water to be returned to .....

Point of return ..... Sec. ..... Twp. ..... N., Rge. ..... W. M.

Use to which power is to be applied .....

FOR MUNICIPAL SUPPLY: ..... cubic feet per second during entire year to supply .....

.....

DESCRIPTION OF DIVERSION WORKS

Height of dam ..... ft.; Length on top ..... ft.; Length on bottom ..... ft.

Material to be used and character of construction .....

.....

Description of headgate .....

CANAL SYSTEM

AT HEADGATE: Width on top (at water line) ..... ft.; Width on bottom ..... ft.;

Depth of water ..... ft.; Grade ..... ft. fall per one thousand feet.

AT ..... MILES FROM HEADGATE: Width on top (at water line) ..... ft.; Width on bottom ..... ft.; Depth of water ..... ft; Grade ..... feet per one thousand feet.

(Please read carefully provisions below)

Construction work shall begin on or before June 1, 1942

and shall thereafter be prosecuted with reasonable diligence and completed on or before June 1, 1943 extended to 10-1-46 10-1-49

and complete application of water to proposed uses shall be made on or before 10-1-49 7-1-51 June 1, 1944

Given under my hand and the seal of this office at Olympia, Washington, this 27th day of August, 1941

Chas J. Bonthoux

State Supervisor of Hydraulics.

Local Name: Golf Course Water Right 2: Ground Water Right G-2514A

Date of Priority:	**11/28/1952**
Certificate Number:	**G-2514A**
Control Number:	
Permit Number:	**2593**
Page Number:	
Application Number:	**2838**
Type of Withdrawal:	**Ground Water**

Quantity:

126 gpm

80 acre feet

2514

S. F. No. 7361—3-53—3M. 34100.

CERTIFICATE RECORD No. 6 PAGE No. 2514-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 State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY *That* PAUL W. MOORE

of Enumclaw, Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a* well

located within the NW¼SE¼, sec. 30, T.20 N., R.7 E.W.M.

for the purpose of irrigation and stock water

under and subject to provisions contained in Ground Water Permit No. 2593 *issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 6 *at page* 2514-A; *that the right hereby confirmed dates from* November 28, 1952; *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* 126 gallons per minute; 80 acre-feet per year for stock water and *for irrigation of* 40 *acres.*

A description of the lands to which such ground water right is appurtenant, and the place where such water is put to beneficial use, is as follows:

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 9th *day of* March, 19 56.

M. G. Walker
State Supervisor of Water Resources.

The W½SW¼NE¼, sec. 30, T.20 N., R.7 E.W.M., EXCEPT the North 40 feet and the South 10 feet thereof:

That part of the N½SE¼ described as follows: Beginning at the quarter corner on the east line of said sec. 30; thence West along the East-West center line of said section to a point 602.5 feet East of the center of said section and the true point of beginning; thence S.0°59' West 23.8 feet; thence S.83°13' East 114.4 feet; thence S.45°55' East 120.3 feet; thence S.14°23' West 320.[illegible] feet; thence S.49°47'30" West 149.8 feet; thence S.8°20'30" West 186.5 feet; thence S.49°55' West 123.1 feet; thence S.9°41' West 72.2 feet; thence S.2°37' East 202.4 feet; thence S.0°43' East 36.4 feet; thence East parallel with the south line of the N½SE¼ of said section to an intersection with the east line of Sec. 30; thence South along the East line of said section to the South line of the N½SE¼ of said section; thence West along the South line of the N½SE¼ of said section to the North-South center line of said section; thence North along the North-South center line of said section to the center of said section; thence East along the East-West center line of said section to the true point of beginning.

The N½SW¼SE¼, sec. 30:

The North 313.5 feet of the S½SW¼ of said sec. 30, EXCEPT the West 973.5 feet thereof and EXCEPT the East 295.25 feet of the North 295.25 feet thereof; EXCEPT portion, if any, of said last described tract lying within the right-of-way for drainage ditch condemned in King County Superior Court Cause No.121089 by Drainage District No. 6, and EXCEPT county roads; ALSO EXCEPT EASEMENTS.

S. F. No. 7354—3-31—75C. 27701.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
DIVISION OF WATER RESOURCES

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 6 of Ground Water Permits, on page 2593 under Application No. 2838

PAUL W. MOORE

of Enumclaw, Washington

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is November 28, 1952

Source of the proposed ground water appropriation is a well

within ..... area, ... sub-area

..... zone. Name or number of works is .....

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 400 gallons per minute: 80 acre-feet per year, to be used for the following purposes: irrigation and stock water

as more definitely set out below.

Location of the well, tunnel, or infiltration trench is 300 feet South and 300 feet East of center of Sec. 30

being within the NW¼ of SE¼ of Sec. 30, Twp. 20 N., Rge. 7 E.W.M.

county of King

Use, or uses to which water is to be applied:

For municipal supply: ..... gallons per minute; ..... acre-feet per year, to supply .....

For irrigation: 400 gallons per minute; 80 acre-feet per year, for the irrigation of 40 acres.

For miscellaneous uses: ..... gallons per minute; ..... acre-feet per year, for .....

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be drilled and have a diameter of 8 inches, and depth of 70 feet.
(Dug or drilled)

Description of tunnel or infiltration trench:

(Please read carefully provisions below)

Particular specifications required by the Supervisor of Water Resources for the purpose of preventing waste of public waters:

Construction work shall begin on or before February 1, 1954

and shall thereafter be prosecuted with reasonable diligence and completed on or before August 1, 1954

and complete application of water to proposed use shall be made on or before August 1, 1955

Given under my hand and the seal of this office at Olympia, Washington, this 6th day of February, 19 53.

N. Walker, Actg Asst
State Supervisor of Water Resources

Local Name: Golf Course Water Right 3: Ground Water Right G1-20890C

Date of Priority:	**9/6/1973**
Certificate Number:	**G1-20890C**
Control Number:	
Permit Number:	**G1-20890P**
Page Number:	
Application Number:	**G1-20890**
Type of Withdrawal:	**Ground Water**

Quantity:

550 gpm

516 acre feet

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.)

CERTIFICATE NUMBER	PERMIT NUMBER	APPLICATION NUMBER	PRIORITY DATE
G1-20890C	G1-20890P	G1-20890	September 6, 1973

NAME
KING COUNTY DIVISION OF PROPERTY AND PURCHASING

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
King County Courthouse, Rm. E531, 3rd and James	Seattle,	Washington	98104

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
Wells (2)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	550	516.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Irrigation - during irrigation season

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
#1 - 280 feet East and 650 feet South of center of Sec. 30

#2 - 560 feet East and 1050 feet South from center of Sec. 30

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼SE¼	30	20	7 E	9	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Those portions of land owned by King County which are contained within the NE¼; N½SE¼; and SW¼SE¼ Sec. 30 and the W½NW¼ Sec. 29, T. 20 N. R. 7 E containing 258 acres more or less.

2514 is Paul Moore 1952

PROVISIONS

G1-20820C is supplemental to existing rights perfected under Certificates No. 2514 and No. 5127, the total combined quantity should not exceed 516.0 acre-feet per year.

5127 is KC 1940

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia, Washington, this 28th *day of* February, *19* 77

~~JOHN A. BIGGS, Director~~
Department of Ecology

ENGINEERING DATA
OK

by
ROBERT K. McCORMICK, Regional Manager

FOR COUNTY USE ONLY

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
G1-20890P	G1-20890	September 6, 1973

NAME
KING COUNTY DIVISION OF PROPERTY AND PURCHASING

ADDRESS (STREET) (CITY) (STATE) (ZIP CODE)
King County Courthouse, Rm. E531, 3rd and James Seattle, Washington 98104

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
Wells (2)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	550	516.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Irrigation - during irrigation season

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
#1 - 280 feet East and 650 feet South of center of Sec. 30

#2 - 560 feet East and 1050 feet South from center of Sec. 30

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼SE¼	30	20	7 E	9	King

RECORDED PLATTED PROPERTY

LOT	BLOCK	OFFICIAL NAME OF PLAT OR ADDITION

LEGAL DESCRIPTION OF PROPERTY WATER TO BE USED ON

Those portions of land owned by King County which are contained within the NE¼; N½SE¼; and SW¼SE¼ Sec. 30 and the W½NW¼ Sec. 29; T. 20 N. R. 7 E containing 258 acres more or less.

DESCRIPTION OF PROPOSED WORKS

DEVELOPMENT SCHEDULE

BEGINNING DATE	COMPLETION DATE	DATE COMPLETE APPLICATION OF WATER TO BE MADE
Started	April 15, 1976	April 15, 1977

PROVISIONS

Nothing in this permit shall be construed as excusing the permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations including those administered by local agencies under the Shoreline Management Act of 1971.

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.

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* April *19* 75

JOHN A. BIGGS, *Director*
Department of Ecology

ENGINEERING DATA
OK. [illegible]

by [signature]
R. JERRY DOLL
Assistant Director

Local Name: Cemetery Well

Date of Priority:	**8/17/1960**
Certificate Number:	**G-4239A**
Control Number:	
Permit Number:	**5363**
Page Number:	
Application Number:	**5705**

Type of Withdrawal: **Ground Water**

Quantity:

97 gpm

28 acre feet

S. F. No. 7361—5-60—3M. 62396.

CERTIFICATE RECORD No. 9 PAGE No. 4239-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 State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY *That* CITY OF ENUMCLAW, WASHINGTON

~~or~~ _____, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a* well *located within* NW¼NE¼ *Sec.* 15, *Twp.* 20 *N., R.* 6 E. *W. M.* *for the purpose of* irrigation of municipal cemetery *under and subject to provisions contained in Ground Water Permit No.* 5363 *issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 9 *at page* 4239-A; *that the right hereby confirmed dates from* August 17, 1960; *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* 97 gallons per minute; 28 acre-feet per year for the irrigation of 14 acres.

Special provisions required by the Supervisor of Water Resources:

A description of the lands to which such ground water right is appurtenant:

West 924 feet of the north 660 feet of NE¼, sec.15, T.20 N.,R.6 E.W.M.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 9th *day of* August, 19 62.

Robert H. Russell
State Supervisor of Water Resources.

SIGNATURE DATA

S. F. No. 7354—9-60—3M. 63080.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

Permit to Appropriate Public Ground Waters of the State of Washington

Book No. 11 of Ground Water Permits, on page 5363 under Application No. 5705

CITY OF ENUMCLAW, WASHINGTON

is hereby granted a permit to appropriate the following described public ground waters of the State of Washington, subject to existing rights, and to the limitations and provisions set out herein.

Priority date of this permit is August 17, 1960

Source of the proposed ground water appropriation is a well

within _____ area, _____ sub-area

_____ zone. Name or number of works is _____

Quantity of water appropriated shall be limited to the amount which can be beneficially applied and not to exceed 100 gallons per minute; 28 acre-feet per year, to be used for the following purposes: irrigation of municipal cemetery

as more definitely set out below.

Location of the well, tunnel, or infiltration trench is 330 ft. south of the northwest corner of NE¼, sec.15

being within NW¼NE¼, sec.15, T.20 N., R.6 E.W.M.

county of King

Use, or uses to which water is to be applied:

For municipal supply: _____ gallons per minute; _____ acre-feet per year, to supply _____

For irrigation: 100 gallons per minute; 28 acre-feet per year, for the irrigation of 14 acres.

For miscellaneous uses: _____ gallons per minute; _____ acre-feet per year, for _____

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

West 924 feet of the north 660 feet of NE¼, sec.15, T.20 N., R.6 E.W.M.

DESCRIPTION OF WORKS FROM WHICH WATER IS TO BE WITHDRAWN

The well will be ~~drilled~~ or dug and have a diameter of 18 inches, and depth of 20 feet.
(Dug or drilled)

Description of tunnel or infiltration trench:

(Please read carefully provisions below)

Particular specifications required by the Supervisor of Water Resources for the purpose of preventing waste of public waters:

Construction work shall begin on or before November 1, 1961

and shall thereafter be prosecuted with reasonable diligence and completed on or before May 1, 1962

and complete application of water to proposed use shall be made on or before May 1, 1963

Given under my hand and the seal of this office at Olympia, Washington, this 28th day of October, 1960.

M G Walker
State Supervisor of Water Resources

Water Right Self-Assessment Form for Water System Plans

331-372 • 1/13/2017

All water right permits, claims, and certificates must be evaluated in a water right self-assessment for all sources used to supply the water system. The self-assessment compares the parameters and other limitations of existing water rights against current and forecasted water production, as described in your water system plan, to determine whether the rights are adequate to serve your system's current and future water needs.

You must account for all sources of supply and total quantities of water withdrawn from the source. If you purchase water from another purveyor through a non-emergency intertie, you must complete the INTERTIES section of the self-assessment.

A Note on Exempt Wells

If you're seeking DOH approval of a new Group A or Group B water system using an exempt well, you must complete the self-assessment, although certain fields will not apply. Talk to your DOH regional planner about using the Water Right Self-Assessment form for a Small Water System Management Program instead of this version.

Local governments must ensure that an adequate potable water supply is available from the exempt well before issuing a building permit. Before developing a permit exempt well, check with your local authorities on their criteria for establishing an adequate potable water supply for your planned public water system.

Water Right Parameters

Below is a brief description of the parameters associated with a typical water right. For the self-assessment, you only need to describe the last two bulleted items if they apply to your water rights.

Source Type – this refers to whether the source is surface water, groundwater or a spring.
Source Location – this refers to the location of points of groundwater withdrawal or surface water diversion for each right.
Purpose of Use – this refers to the type of use, such as municipal water supply, community domestic, industrial or agricultural purposes.
Place of Use – this describes where water can be put to beneficial use under the right. Under the 2003 Municipal Water Law, RCW 90.03.386, the place of use for a water right held for municipal water supply purposes may be the system's service area as identified in an approved water system plan or small water system management program. See Ecology Policy 2030 for information on how Ecology administers the Municipal Water Law.

Period of Use – this refers to time-of-year limitations in which the water right may be put to use. If any water right has a time-of-year limitation, please include this information in the INTERRUPTIBLE WATER RIGHTS section.

Provisions or Limiting Conditions – this refers to any provisions or conditions placed on the water right. If a water right has a limiting condition or other provision, such as a collection and reporting requirement, other than a time-of year limitation, include this information in the ADDITIONAL COMMENTS section at the bottom of the self-assessment and in the water system plan narrative.

See Ecology Policy 1040 for more information on water right terminology. If you have questions about your water rights, please contact the Ecology regional office in your area.

Completing the Water Right Self-Assessment Form

The self-assessment is a Word document to allow users to make changes or to expand the document. You may use another format, if preferred, as long as all required information is included. Below is a description of all fields and how to complete them. This form is divided into four different sections. Each section is described in the headings below.

See the column identifiers (A, B, C, etc) at the bottom of each column for guidance in completing the necessary calculations.

Water Right Permit, Certificate, or Claim Number: This number is assigned by Ecology when a permit application is filed. It's listed at the top of the permit or certificate. For water right claims, this is the registration number stamped in the lower left hand corner of the claim form.

WFI Source #: Identify the individual sources (e.g. well #1, well #2) as defined on the DOH Water Facilities Inventory form. If a water right is associated with multiple sources, list all sources in the same row in this column. If a source is associated with multiple water rights, identify each water right on a separate row.

If you have any source(s) that is not currently being used (categorized as standby, back-up, or emergency), and the source has an associated water right that is not listed in column #1, please include the source and water right information in the ADDITIONAL COMMENTS section. This will identify that the source is still intended for a beneficial use under RCW 90.03.015(4). See Ecology Policy 1040.

EXISTING WATER RIGHTS SECTION *(olive green color, top section)*

This section refers to existing water rights. It does not include any water right applications that have been submitted to Ecology.

Primary Qi (Instantaneous Quantity): This is also known as instantaneous flow rate. It's the amount of water allowed to be taken under the right from the source during a period of peak operation. For surface water, this is generally expressed in terms of cubic feet per

second (cfs). For groundwater, this is generally expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm. Please indicate the units of measurement you are using for each source. If there are situations where the flow rate will be limited (e.g. limitations established on the source when other sources are utilized), please note them in the ADDITIONAL COMMENTS section in the form and in the WSP narrative.

Non-Additive Qi: This term was formally known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qi quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qi totals.*

Primary Qa (Annual Quantity): This is the amount of water that can be taken from the source under the right on an annual basis. It's usually expressed in terms of acre-feet. An acre-foot is the amount of water necessary to submerge an acre of land to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons of water.

Non-Additive Qa: This term was formerly known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qa quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qa totals.*

CURRENT SOURCE PRODUCTION SECTION *(light green color, top section)*

This section refers to how much water is withdrawn from the source under each water right for the most recent full calendar year. You will need to determine any excess or deficiency for each water right after calculating how much water was withdrawn compared to how much water is allowed under each water right. If demand has decreased over past years, you may wish to include historic maximum production information in the ADDITIONAL COMMENTS section. This will provide a more complete picture of the use of your water rights.

Use the water use data and demand projections from your water system plan to define current and projected water needs. You can determine if you'll need additional water rights based on the comparison of existing water rights, current water production, and projected 10- and 20-year needs.

Total Qi (Instantaneous Quantity): This refers to the total maximum instantaneous flow rate withdrawn from the source under each water right during the most recent calendar year. For surface water, this is expressed in terms of cubic feet per second (cfs). For groundwater, this is expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm.

Current Excess or Deficiency (Qi): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

Total Qa (Annual Quantity): This refers to the total volume of water withdrawn from each source under each water right during the most recent calendar year. It's usually expressed in acre-feet.

Current Excess or Deficiency (Qa): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

10-YEAR FORECASTED SOURCE PRODUCTION SECTION *(light blue color, top section)*

This section refers to how much water you project to withdraw from each source in ten years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 10-year forecasted amounts.

20-YEAR FORECASTED SOURCE PRODUCTION SECTION *(darker blue color, top section)*

This section refers to how much water you project to withdraw from each source in twenty years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 20-year forecasted amounts. If you are unable to provide 20-year forecasts for each source, you may choose to include the combined 20-year total at the bottom.

PENDING WATER RIGHTS SECTION *(second section of form)*

Please complete this section for any water right applications that have been submitted to Ecology. Please include the application number, whether it's a new or a change application, the date submitted, and the total quantities requested.

INTERTIES SECTION *(third section of form)*

This section must be completed by purveyors who purchase any amount of wholesale water. If your system sells water to another public water system, include the quantity sold in the CURRENT SOURCE PRODUCTION section.

Purchasers of wholesale water must account for all water obtained through the intertie for non-emergency supply purposes. This is to ensure that all sources of supply are considered when evaluating whether new water rights are needed within 20 years.

Please identify the maximum quantity of water, expressed in the same manner as the above sections, allowed under each intertie contract. If there are limiting conditions or temporary

agreements that effect the long-term use of the intertie, you must account for such limiting conditions when evaluating the current and forecasted water supply needs in your water system plan.

Finally, purchasers of wholesale water are responsible for ensuring that the underlying water right (held by the purveyor selling water) are adequate for such use. You should confirm that the selling system has accounted for the wholesale area in their water system plan to ensure that the water right authorizes the distribution of water through the intertie.

INTERRUPTIBLE WATER RIGHTS SECTION *(bottom section of form)*

This section refers to water rights that have an annual time-of-year interruption. Please complete this section for any water right listed in the above fields that has a time-of-year interruption. Please include the water right number, describe the limitation, and the time period of interruption. Purveyors with interruptible rights should develop a water shortage response plan as part of their water system plan to describe how demand will be met during periods of interruption through aggressive demand-side conservation, fixing leaks or other means.

ADDITIONAL COMMENTS SECTION *(bottom section of form)*

If the system has any source that is not currently being used on a regular basis (such a source may be categorized as stand-by, back-up, emergency), you should identify the source in this section if the source has an associated water right that is not listed in the above sections. The purpose is to identify that such water rights are still intended for a future beneficial use as required under RCW 90.03.015(4). See Page 2, Item 9 (b) in ECY Policy 2030. For these water rights, please briefly describe the future intended use of the source and when you expect to utilize the water right. This does not refer to sources categorized as seasonal sources.

You should also include any other comments in this section that will explain aspects of your water right portfolio that are not identified above.

Water Right Self-Assessment Form for Water System Plan

Mouse-over any link for more information. Click on any link for more detailed instructions.

Water Right Permit, Certificate, or Claim # *If water right is interruptible, identify limitation in yellow section below	WFI Source # If a source has multiple water rights, list each water right on separate line	Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM or CFS) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold				Current Source Production – Most Recent Calendar Year Qi = Max Instantaneous Flow Rate Withdrawn (GPM or CFS) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold				10-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold				20-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold			
		Primary Qi Maximum Rate Allowed	Non-Additive Qi Maximum Rate Allowed	Primary Qa Maximum Volume Allowed	Non-Additive Qa Maximum Volume Allowed	Total Qi Maximum Instantaneous Flow Rate Withdrawn	Current Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume Withdrawn	Current Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 10 Years	10-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 10 Years	10-Year Forecasted Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 20 Years	20-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 20 Years	20-Year Forecasted Excess or (Deficiency) Qa
S1-*05251	Golf Course	89.8			60					See comments		See comments					
S1-*10594	Watercress Spring	336.6		543		337			543	337			543				
S1-*06308	Watercress Spring	448.8		724		449			724	449			724				
G1-*02838	Golf Course	126			80	126				126							
G1-*05705	Cemetery Well	97		28			97		28		97		28				
G1-*09339	Watercress Spring	1500		1220		1500		693	527	1500		700	520				
G1-20398C	Y Bar S	45		18.6			45		18.6		45		18.6				
G1-20529C	Y Bar S	45		18.6			45		18.6		45		18.6				
G1-20890	Golf Course	550		516		550		103	413	550		131	385				
S1-22798	Boise Spring	897.6		1270		940	-42	1277	-7	898		1270					
G1-23600	PC Johnson Wellfield	550		880		550		34	846	550		200	680				
G1-24918	PC Johnson Wellfield	950			1680	660	290			950							
	TOTALS =	5635.8		5218.2		5112	435	2107	3111.2	5360	(277)	2301	2917.2	5360	(450)	2397	2821.2
Column Identifiers for Calculations:		A		B		C	=A-C	D	=B-D	E	= A-E	F	=B-F	G	=A-G	H	=B-H

PENDING WATER RIGHT APPLICATIONS: Identify any water right applications that have been submitted to Ecology.

Application Number	New or Change Application?	Date Submitted	Quantities Requested			
			Primary Qi	Non-Additive Qi	Primary Qa	Non-Additive Qa

INTERTIES: Systems receiving wholesale water complete this section. Wholesaling systems must include water sold through intertie in the current and forecasted source production columns above.

Name of Wholesaling System Providing Water	Quantities Allowed In Contract		Expiration Date of Contract	Currently Purchased Current quantity purchased through intertie				10-Year Forecasted Purchase Forecasted quantity purchased through intertie				20-Year Forecasted Purchase Forecasted quantity purchased through intertie			
	Maximum Qi Instantaneous Flow Rate	Maximum Qa Annual Volume		Maximum Qi Instantaneous Flow Rate	Current Excess or (Deficiency) Qi	Maximum Qa Annual Volume	Current Excess or (Deficiency) Qa	Maximum Qi 10-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 10-Year Forecast	Future Excess or (Deficiency) Qa	Maximum Qi 20-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 20-Year Forecast	Future Excess or (Deficiency) Qa
1 Tacoma Water	1000	232	None												
2															
3															
TOTALS =	1000	232													
Column Identifiers for Calculations:	A	B		C	=A-C	D	=B-D	E	=A-E	F	=B-F	G	=A-G	H	=B-H

INTERRUPTIBLE WATER RIGHTS: Identify limitations on any water rights listed above that are interruptible.

Water Right #	Conditions of Interruption	Time Period of Interruption
1		
2		
3		

ADDITIONAL COMMENTS:

- City plans to deed right S-5127C to Ecology.
- City has extended the Y Bar S rights (CG1-20398C, CG1-20529C) temporary trust donations to Dec 16, 2029.
- City plans to install an automatic valve to keep Boise Spring Qi and Qa from exceeding water right quantities.
- Currently Tacoma is only an emergency source. Although Enumclaw has purchased capacity from Tacoma, converting Tacoma to a seasonal source is not anticipated in the 20-year planning period. Qi deficiencies in the table above are met through the use of system storage.

APPENDIX J

2022 CONSUMER CONFIDENCE REPORT

Drinking Water Quality Report
For Calendar Year 2022

The City of Enumclaw Water Utility is pleased to provide this report on the quality of the drinking water the City delivered in 2022. We want to keep you informed about the City's water service and the on-going efforts made to provide a safe and dependable supply of drinking water.

Water Sources

The City owns and operates four water sources to the east of the City: Boise Springs, Watercress Spring and Well, PC Johnson Wellfield, and the Golf Course Well. The City also has an emergency intertie connection to the Tacoma Water pipeline that passes through the City. This connection has not been used since 2003.

According to the Washington State Department of Health, the Boise and Watercress sources have a high susceptibility to potential sources of contamination while the PC Johnson Wellfield and Golf Course Well have low susceptibility. To protect the health of our customers all the City sources are treated with chlorine for disinfection. The City of Enumclaw does not add fluoride to its sources. The City does raise the pH of the Boise and Watercress sources to reduce the potential for the water to corrode metal piping.

Water Quality

The City's drinking water is safe and meets or exceeds all federal and state requirements. Water quality sampling is conducted on a routine basis to monitor for contaminants and ensure the safety of the water. Substances detected in the City of Enumclaw water system in 2022 are listed in the Summary Table on the following page.

Explanation of Expected Contaminants

Sources of drinking water (tap 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 and, in some cases, radioactive materials, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in untreated source water include:

- Microbiological contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban storm 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 forestry, agriculture, urban storm water runoff, and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the federal Environmental Protection Agency (EPA) prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) 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 a trace of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at 800-426-4791.

Summary Table of Water Quality Detections

Substance	Highest Level Allowed (MCL or MRDL)	Highest Level Detected	Range of Level Detected or # Exceed AL	Ideal Goals (MCLG)	Potential Sources of Contaminant
Regulated at Treatment Plant/Distribution System					
Chlorine	4 ppm	0.63 ppm	0.16 - 0.63 ppm	Not applicable	Treatment disinfectant additive
Total Haloacetic Acids	60 ppb	1.7 ppb	0 – 1.7 ppb	0	By-product of drinking water chlorination
Total Trihalomethane	80 ppb	6.5 ppb	3.8 – 6.5 ppb	0	By-product of drinking water chlorination
Nitrate	10 ppm	2.1 ppm	0.7 – 2.1 ppm	10 ppm	Natural deposits. Runoff from fertilizer use. Leaching from septic tanks/sewage.
Regulated at Consumer's Tap (1)					
Lead	15 ppb AL	2.1 ppb	0 sites exceed AL	0	Household plumbing
Copper	1.3 ppm AL	0.31 ppm	0 sites exceed AL	1.3 ppm	Household plumbing

Notes:

(1) See Definitions for explanation of abbreviations used in the table. Data presented in the table are from 2022 or the most recent testing done in accordance with regulations. Many other substances were tested for, but not detected.

Notes from the EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA and Center for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are available from the Safe Drinking Water Hotline at 800-426-4791.

City of Enumclaw Water System Facts:
Number of Connections: 6,300
Miles of Water Mains: 150.8
Total Reservoir Storage: 4.74 million gallons
Water Department Staff: 8.5 Full Time Equivalents

Definitions

Maximum Contaminant Level (MCL): 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.

Maximum Residual Disinfectant Level (MRDL): 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.

Action Level (AL): The concentration of a contaminant which, when exceeded, triggers treatment or other requirements which a water system must follow. Action Level is reported at 90th percentile.

ppm: Parts per million or milligrams per liter

ppb: Parts per billion or micrograms per liter

Maximum Contaminant Level Goal (MCLG): 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.

Commitment to Using Water Efficiently

The City is committed to conserving water to help meet future growth and comply with state law requirements for improving water use efficiency. As required by state law, the City updated its water use efficiency goals in March 2019 through the adoption of Resolution 1649. The adopted goals are as follows:

Goal #1. Reduce distribution system leakage to 5% by 2023 through additional steel water main replacements, by conducting annual leak surveys and fixing any identified leak as soon as practicable, and completing the conversion to a new automated meter read system to more accurately measure consumptive use.

Goal #2. Reduce the annual volume of single family residential customer leakage billing adjustments by 10% by 2023 utilizing the new automated meter reading system to identify and notify customers of leaks more quickly than possible through the manual monthly read system.

To view a copy of the City's 2022 and prior annual performance reports, see cityofenumclaw.net (search 'WUE'). Distribution system leakage measured 7.6% in 2022 and the conversion to automated meters is complete. In 2022 the annual volume of leakage billing adjustments was 20.8% less than it was in 2019.

Informational Statement From the EPA About Lead in Drinking Water and Its Effects on Children
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. The City of Enumclaw 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 thirty 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 at 800-426-4791 or at http://www.epa.gov/safewater/lead.

Cross Connection Control Program: Protecting Our Water System From Contamination
A cross connection is a connection between a water pipe and a source of contamination. Examples include hose-end spray applicators, irrigation systems, boiler make-up water lines, and hose ends submerged in pools, stock tanks, hot tubs or buckets. Cross connections are dangerous because they provide opportunities for contaminated fluids to be pulled back into the water system. To protect our water supply, avoid using hose-end sprayers and maintain an air gap by keeping the hose end above the water surface when filling containers. Irrigation systems are required to have a backflow assembly. Backflow assemblies require a plumbing permit, must be inspected by a cross connection specialist, and must be tested by a certified tester when installed and yearly thereafter.

Hose Bib Vacuum Breaker

Capital Improvement Program
In 2022, efforts on improving the water system included replacing 1,550 feet of steel water main with ductile iron and high-density plastic piping. Approximately 3,280 feet of new water main was added to the system.

Thermal Expansion Protection for Customer Plumbing
To provide a measure of protection against backflow of water into the City water main and to facilitate meter maintenance, a check valve is installed at every water meter. The check valve prevents relief of thermal expansion pressure from the customer's hot water system into the City main. If not relieved, the pressure could shorten the life of the hot water tank or cause other damage to the plumbing. It is the customer's responsibility to ensure that their plumbing system complies with current codes, including a properly installed and maintained temperature-pressure relief valve and expansion tank on the hot water heater.

Landscaping Around Water Meters
Spring and summer spur a lot of plant growth. Excessive growth, however, may make it difficult to access and read your water meter. The Water Department encourages you to locate your meter and if plant growth is infringing, please trim and cut back to allow the meter reader access for accurate reading. Try to maintain a 2-foot perimeter around the meter if possible. On all untrimmed areas, the Water Department will cut back as necessary.

Recognizing Your Water Department Staff
You can recognize your water department staff at work by the logo on the City's construction equipment or white service vehicles. Personnel carry photo identification and wear work uniforms embroidered with their name. You can feel assured that your utility is in good hands as the City's maintenance personnel are certified by the state Department of Health to perform water system maintenance and operation and regularly attend continuing education classes to maintain their certification.

Water Utility Step Van

Reporting Suspicious Activity or Water Main Leaks
As a customer of a publicly-owned water system you are also an owner and have an additional vested interest in seeing your water supply kept safe and in good operating order. Similar to a neighborhood watch program you are encouraged to be aware of your water system and be alert to anything that seems unusual, such as seeing a water truck connected to a fire hydrant or water flowing out of the ground where you haven't seen it before. To report any such observation or anything unusual pertaining to the water system, please call 360-825-5541 during normal business hours or 360-825-3505 at other times.

Leaks on Customer Plumbing
Whether you notice it yourself or receive a notice from the City, it is always disconcerting to learn that you have what appears to be a water leak on your private plumbing, as evidenced by an unexpected jump in water usage on your utility bill. Sometime the leak is simply traced to a problem with a toilet, with the tank outlet flapper valve not closing or the tank level float not completely shutting off the water fill line. To test the flapper valve, remove the lid from the toilet tank and mark the water level, and shut off the water supply to the toilet. If the water level remains steady the flapper valve is not leaking. If the water level drops, the flapper valve is leaking and should be replaced. With the water on, the water level in the tank should not overtop the overflow tube. If it does the float that controls the water level in the tank should be adjusted to lower the water level at shutoff or you may have to replace the float shutoff valve. Toilet tank leaks typically result from worn parts or misalignment of some part of the flushing mechanism.

Another common area for leaks to occur is the in buried water line between the meter and the customer's building, especially if the service line is galvanized steel. Often repairs can be done by the owner, but if you are unsure you can hire a professional. It is prudent to get more than one quote to ensure you are getting the best price.

Water Service Shutoff / Leak Adjustment
City code prohibits tampering with a meter. If you need your water service shutoff for repairs please call the City Shops at 360-825-5541. The Water Department encourages all customers to install their own shutoff valve on the house side of the meter. This can facilitate a quick shutoff and prevent wasted water. The City Code includes a provision for leak credits. For information on the leak credit process, please call Utility Billing at 360-825-3591. For information on how to read your water meter and determine whether you have a leak, see cityofenumclaw.net (search 'read your meter').

Questions and Contact
City of Enumclaw Water Utility staff works hard to provide quality water to every tap. We ask that all our customers help us protect our water, which is the heart of our community, our way of life, and our future. If you have any questions about this report or concerning your water utility and/or want to know how you can be involved, please contact Scott Woodbury at swoodbury@ci.enumclaw.wa.us or at 360-615-5728. You can also find information about the water utility at the City's website cityofenumclaw.net. Also available for water utility customers is a toll-free hotline at 1-877-8NSF-HELP.

Regulation and policy decisions relating to the utility are made by City Council at their regular meetings on the second and fourth Monday of every month at 7:00 PM in the City Hall Council Chambers at 1339 Griffin Ave. Contact the City Clerk's office at 360-615-5608 for more information or see https://www.cityofenumclaw.net/131/City-Council.

APPENDIX K

WATER QUALITY MONITORING SCHEDULES, WAIVER FOR ASBESTOS TESTING, DBP PLAN, COLIFORM PLAN, 2022 WATER QUALITY MONITORING REPORT

Water Quality Monitoring Schedule

System: ENUMCLAW WATER DEPARTMENT
Contact: Kyte Ramberg

PWS ID: 23600 1
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 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Oct 2023	Nov 2023	Dec 2023	Jan 2024	Feb 2024	Mar 2024	Apr 2024
Coliform Monitoring Population	17150	17150	17150	17150	17150	17150	17150	17150	17150	17150	17150	17152
Number of Routine Samples Required	15	15	15	15	15	15	15	15	15	15	15	15

- 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

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*	
Lead and Copper	30	Jan 2023 - Dec 2025	standard - 3 year	10/18/2022	Aug 2025	
Asbestos	0	Jan 2020 - Dec 2028	waiver - 9 year	12/15/1998		
Total Trihalomethane (THM)	2	Jan 2023 - Dec 2023	reduced - 1 year	09/06/2022	***Jun 2023***	
Halo-Acetic Acids (HAA5)	2	Jan 2023 - Dec 2023	reduced - 1 year	09/06/2022	***Jun 2023***	

Water Quality Monitoring Schedule

Notes on Distribution System Chemical Monitoring

For *Lead and Copper*:
- Collect samples from the COLD WATER side of a KITCHEN or BATHROOM faucet that is used daily.
- Before sampling, make sure the water has sat unused in the pipes for at least 6 hours, but no more than 12 hours (e.g. overnight).
- If you are sampling from a faucet that has hot water, make sure cold water is the last water to run through the faucet before it sits overnight.
- If your sampling frequency is annual or every 3 years, collect samples between June 1 and September 30.

For *Asbestos:* Collect the sample from one of your routine coliform sampling sites in an area of your distribution system that has asbestos concrete pipe.

For *Disinfection Byproducts (HAA5 and THM):* Collect the samples at the locations identified in your Disinfection Byproducts (DBP) monitoring plan.

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /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 *Boise Spring* *Spring* *Use - Permanent* *Susceptility - High*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2023 - Dec 2023	standard - 1 year	07/19/2022	***Jul 2023***
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	07/19/2022	
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	07/26/2022	
Herbicides	1	Jan 2023 - Dec 2031	waiver - 9 year	07/26/2016	Jul 2025
Pesticides	0	Jan 2023 - Dec 2025	waiver - 3 year	05/23/2012	
PFAS	1	Jan 2023 - Dec 2025	standard - 3 year		***Mar 2023***
Soil Fumigants	0	Jan 2023 - Dec 2025	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	06/01/2022	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	06/01/2022	

Source S02 *Watercress Spring #1* *Spring* *Use - Permanent* *Susceptility - High*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2023 - Dec 2023	standard - 1 year	07/12/2022	***Sep 2023***
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	08/02/2016	Aug 2025

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 S02 *Watercress Spring #1* *Spring* *Use - Permanent* *Susceptility - High*

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Iron	1	Jan 2023 - Dec 2025	standard - 3 year	11/03/2022	Sep 2025
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	09/28/2021	
Herbicides	1	Jan 2023 - Dec 2031	waiver - 9 year	06/01/2021	Jun 2030
Pesticides	0	Jan 2023 - Dec 2025	waiver - 3 year	12/22/2003	
PFAS	1	Jan 2023 - Dec 2025	standard - 3 year		***Mar 2023***
Soil Fumigants	0	Jan 2023 - Dec 2025	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	08/10/2021	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	08/10/2021	

Source S07 *PC JOHNSON WELLS 2 & 3* *Well Field* *Use - Seasonal* *Susceptility - Moderate*

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2023 - Dec 2023	standard - 1 year	07/19/2022	***Jul 2023***
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	06/27/2017	Jul 2028
Manganese	1	Jan 2023 - Dec 2025	standard - 3 year	07/19/2022	Jul 2025
Volatile Organics (VOC)	1	Jan 2023 - Dec 2028	waiver - 6 year	01/05/2017	Jul 2028
Herbicides	1	Jan 2023 - Dec 2031	waiver - 9 year	01/05/2017	Jul 2031
Pesticides	0	Jan 2023 - Dec 2025	waiver - 3 year	12/22/2003	
PFAS	1	Jan 2023 - Dec 2025	standard - 3 year		***Mar 2023***
Soil Fumigants	0	Jan 2023 - Dec 2025	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	08/10/2021	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	08/10/2021	

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 S08 *Watercress Spring #2 ALK139* *Well* *Use - Permanent* *Susceptility - High*

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2023 - Dec 2023	standard - 1 year	07/12/2022	***Sep 2023***
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	08/02/2016	Aug 2025
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	09/28/2021	
Herbicides	1	Jan 2023 - Dec 2031	waiver - 9 year	06/01/2021	Jun 2030
Pesticides	0	Jan 2023 - Dec 2025	waiver - 3 year	06/17/2014	
PFAS	1	Jan 2023 - Dec 2025	standard - 3 year		***Mar 2023***
Soil Fumigants	0	Jan 2023 - Dec 2025	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	08/10/2021	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	08/10/2021	

Source S09 *Zone 888/983 Well AFT336* *Well* *Use - Seasonal* *Susceptility - Moderate*

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2023 - Dec 2023	standard - 1 year	07/19/2022	***Jul 2023***
Complete Inorganic (IOC)	1	Jan 2023 - Dec 2025	standard - 3 year	07/19/2022	Jul 2025
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	07/26/2022	
Herbicides	1	Jan 2017 - Dec 2025	waiver - 9 year	07/17/2018	Jul 2024
Pesticides	0	Jan 2023 - Dec 2025	waiver - 3 year	07/17/2018	
PFAS	1	Jan 2023 - Dec 2025	standard - 3 year		***Mar 2023***
Soil Fumigants	0	Jan 2023 - Dec 2025	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	07/07/2020	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	07/07/2020	

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):	07/01/2023
Submit CCR certification form to ODW (Community systems only):	10/01/2023
Submit Water Use Efficiency report online to ODW and to customers (Community and other municipal water systems only):	07/01/2023
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:	Ingrid Salmon: (253) 395-6754 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.

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

DOH 331-464
Updated July 2013

Stage 2 DBP Monitoring Plan - Groundwater (Reduced Monitoring)

System Name	Enumclaw Water Dept
PWSID#	236001
Date	9/16/2014
Completed by	Scott Woodbury
Population	15283

Initial Stage 2 Sampling Period First sampling period following **October 1, 2013**

Number of Samples Required 2 Dual Sample Sets per Year

Samples must be a dual sample set: one at the locaiton and during the quarter with the highest TTHM single measurement and one at the location and during the quarter with the highest HAA5 single measurement.

	Stage 2 Compliance Monitoring Site ID	Projected Sampling Date
Highest TTHM Site	19104 SE 440th St	August
Highest HAA5 Site	39626 224th Ave	May

If any annual or triennial sample exceeds the MCL (0.080 mg/l for TTHM or 0.060 mg/l for HAA5) you must begin quarterly monitoring for both TTHM and HAA5 for at least four consecutive quarters to determine if you exceed the MCL.

To remain on reduced monitoring:

The TTHM LRAA must be less than or equal to 0.060 mg/l AND the HAA LRAA must be less than or equal to 0.045 mg/l at each monitoring location.

What happens if you exceed any of the above levels?

You must return to routine monitoring.

Determining Compliance

Our system is required to monitor annually (or triennially). For compliance, we will determine that each sample taken is less than the MCL. If any sample exceeds the MCL, we must increase monitoring to dual sample sets once per quarter (taken every 90 days) at all locations. If the locational running annual average (LRAA) exceeds the MCL for either TTHM (0.080 mg/l) or HAA5 (0.060 mg/l), an MCL violation will have occurred. The LRAA is calculated based on four consecutive quarters of monitoring. Compliance will then 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 for TTHM and HAA5

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

You will need to print a hard copy for your records and make it available upon request. You do not need to submit a copy to DOH.

If you need this publication in an alternate format, call (800) 525-0127. For TTY/TDD call (800) 833-6388.

Coliform Monitoring Plan for: Enumclaw Water Dept

A. System Information

Plan Date: November 2019

Water System Name Enumclaw Water Dept	**County** King	**System I.D. Number** 23600
Name of Plan Preparer Scott Woodbury, P.E.	**Position** Asst PW Director	**Daytime Phone** 360-615-5728
Sources: DOH Source Number, Source Name, Well Depth, Pumping Capacity	S01 – Boise Spring, 5 ft, 898 gpm S02/S08 – Watercress Spring, 9 to 42 ft, 2289 gpm S07 – PC Johnson Wellfield, 195-225 ft, 1500 gpm S09 – Golf Course Well, 80-131, 676 gpm	
Storage: List and Describe	City Reservoir Tank 1 – 1,000,000 gallons City Reservoir Tank 2 – 3,000,000 gallons Crews Reservoir – 1,500,000 gallons Fairway Hills Reservoir – 60,000 gallons Stanridge Hill Reservoir – 180,000 gallons	
Treatment: Source Number & Process	Boise Spring – S01 gas CL2 w 4-log virus treatment Watercress – S02/S08 gas CL2 w 4-log virus treatment PC Johnson Well – S07 gas CL2 Golf Course Well – S09 gas CL2	
Pressure Zones: Number and name	888 Main Zone 899 Lower New Horizons 983 Lower Fairway Hills 988 Stanridge Hill 995 Highview 1013 City Reservoir 1040 Upper New Horizons 1146 Upper Fairway Hills	
Population by Pressure Zone	888 – 15,000 899 – 45 983 – 190 988 – 15 995 – 55 1013 – 15 1040 – 100 1146 – 30	
Number of Routine Samples Required Monthly by Regulation:		15
Number of Sample Sites Needed to Represent the Distribution System:		15
***Request DOH Approval of Triggered Source Monitoring Plan?**		**Yes** ☐ **No** ☒

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

B. Laboratory Information

Laboratory Name Water Management Laboratory	**Office Phone** 253-531-3121 **After Hours Phone** 253-841-0732
Address 1515 80th St E Tacoma, WA 98404	**Cell Phone** 253-312-1651; 253-691-6691 **Email** customerservice@watermanagementlabs.com
Hours of Operation 8 am – 5 pm Mon-Fri and 9 am – noon Sat	
Contact Name Christa Holme-Garrettson	
Emergency Laboratory Name Aqua Test	**Office Phone** 425-432-9360 **After Hours Phone** 503-930-7319
Address 28620 Maple Valley Rd SE Maple Valley, WA 98038	**Cell Phone** 503-930-7319 **Email** stacy@aquatestinc.com amanda@aquatestinc.com
Hours of Operation 8 am – 4 pm Mon-Fri	
Contact Name Stacy White	

C. Wholesaling of Groundwater

	Yes	No
We are a consecutive system and purchase groundwater from another water system.	☐	☒
We sell groundwater to other public water systems.	☐	☒

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

Location/Address for **Routine Sample Sites**	Location/Address for **Repeat Sample Sites**	Groundwater Sources for **Triggered Sample Sites****
X1. 46310 290th Ave. SE	**1-1. 46310 290th Ave. SE**	**S01**
	1-2. 46223 290th Ave. SE	**S02/08**
	1-3. 46423 288th Ave. SE.	**S07**
		S09
X2. 27321 SE 403rd St.	**2-1. 27321 SE 403rd St.**	**S01**
	2-2. 27304 SE 403rd St.	**S02/08**
	2-3. 27454 SE 403rd St.	**S07**
		S09
X3. 2342 Paramount Dr	**3-1. 2342 Paramount Dr**	**S01**
	3-2. 2410 Paramount Dr	**S02/08**
	3-3. 843 Harmony Lane	**S07**
		S09
X4. 23602 SE 473rd St.	**4-1. 23602 SE 473rd St.**	**S01**
	4-2. 23616 SE 473rd St.	**S02/08**
	4-3. 25530 SE 473rd St.	**S07**
		S09
X5. 45010 228th Ave. SE	**5-1. 45010 228th Ave. SE**	**S01**
	5-2. 44823 228th Ave. SE	**S02/08**
	5-3. 22826 SE 452nd St.	**S07**
		S09
X6. 39626 224th Ave. SE	**6-1. 39626 224th Ave. SE**	**S01**
	6-2. 39606 224th Ave. SE	**S02/08**
	6-3. 22410 SE 399th St.	**S07**
		S09

**** When you collect the repeats, you must sample every groundwater source that was in use when the original routine sample was collected.**

Location/Address for **Routine Sample Sites**	Location/Address for **Repeat Sample Sites**	Groundwater Sources for **Triggered Sample Sites****
X7. 18805 SE 416th St.	**7-1. 18805 SE 416th St.**	**S01**
	7-2. 18725 SE 416th St.	**S02/08**
	7-3. 19311 SE 416th St.	**S07**
		S09
X8. 41313 213th Ave. SE	**8-1. 41313 213th Ave. SE**	**S01**
	8-2. 41303 213th Ave. SE	**S02/08**
	8-3. 21216 SE 414th St.	**S07**
		S09
X9. 43010 234th Ave. SE	**9-1. 43010 234th Ave. SE**	**S01**
	9-2. 43103 234th Ave. SE	**S02/08**
	9-3. 43005 234th Ave. SE	**S07**
		S09
X10. 39520 254th Ave. SE	**10-1. 39520 254th Ave. SE**	**S01**
	10-2. 39414 254th Ave. SE	**S02/08**
	10-3. 39612 254th Ave. SE	**S07**
		S09
X11. 2620 Perry Court	**11-1. 2620 Perry Ct.**	**S01**
	11-2. 2702 Perry Ct.	**S02/08**
	11-3. 3165 Florence St.	**S07**
		S09
X12. 47335 260th Ave. SE	**12-1. 47335 260th Ave. SE**	**S01**
	12-2. 47219 260th Ave. SE	**S02/08**
	12-3. 47614 260th Ave. SE	**S07**
		S09

**** When you collect the repeats, you must sample every groundwater source that was in use when the original routine sample was collected.**

Location/Address for **Routine Sample Sites**	Location/Address for **Repeat Sample Sites**	Groundwater Sources for **Triggered Sample Sites****
X13. 2047 Roosevelt Ave. E	**13-1. 2047 Roosevelt Ave. E**	**S01**
	13-2. 1835 Roosevelt Ave. E	**S02/08**
	13-3. 29410 Chinook Hwy E	**S07**
		S09
X14. 28303 SE 472nd St.	**14-1. 28303 SE 472nd St.**	**S01**
	14-2. 46921 284th Ave. SE	**S02/08**
	14-3. 28128 SE 472nd St.	**S07**
		S09
X15. 19104 SE 440th St.	**15-1. 19104 SE 440th St.**	**S01**
	15-2. 19023 SE 440th St.	**S02/08**
	15-3. 44004 196th Ave. SE	**S07**
		S09

**** When you collect the repeats, you must sample every groundwater source that was in use when the original routine sample was collected.**

Important Notes for the Sample Collector:

1. Evaluate the representative status of each sample site every time, before a sample is collected. The sample collector may choose NOT to sample from a scheduled site if there is evidence of current or recent off-normal events at the sample site. Off-normal events include construction at the facility where the sample site is located, modification to the plumbing at the sample site, or an activity at the sample site that may have compromised the sanitary integrity of the sample faucet. A different nearby site within five active service connections from the original site may be used if deemed a better alternative.
2. Measure the free chlorine residual at each sample and note the measurement on the sample form.

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

None

F. Routine Sample Rotation Schedule

Month	Routine Site(s)	Month	Routine Site(s)
January	1-15	July	1-15
February	1-15	August	1-15
March	1-15	September	1-15
April	1-15	October	1-15
May	1-15	November	1-15
June	1-15	December	1-15

G. Level 1 and Level 2 Assessment Contact Information

Name Darren Breault, WDM3	**Office Phone** 360-615-5791 **After Hours Phone** 253-261-6919
Address 2041 Railroad St Enumclaw, WA 98022	**Email** dbreault@ci.enumclaw.wa.us
Name Scott Woodbury, P.E., WDM4	**Office Phone** 360-615-5728 **After Hours Phone** 253-261-1937
Address 1309 Myrtle Ave Enumclaw, WA 98022	**Email** swoodbury@ci.enumclaw.wa.us

H. *E. coli*-Present Sample Response

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

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

Distribution System *E. coli* Response Plan

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

1. Call DOH.
2. Collect repeat and triggered source samples per Part D. Collect additional investigative samples as necessary.
3. Discuss with DOH whether to issue a Health Advisory based on the findings of steps 1-2.

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

***E. coli*-Present Triggered Source Sample Response Checklist – Source S09**				
Alternate Sources	**Yes**	**No**	**N/A**	**To Do List**
We can stop using this source and still provide reliable water service to our customers.	☒	☐	☐	☐
We have an emergency intertie with a neighboring water system that we can use until corrective action is complete (perhaps for several months).	☒	☐	☐	☐
We can provide bottled water to all or part of the distribution system for an indefinite period.	☐	☒	☐	☐
We can quickly replace our existing source of supply with a more protected new source.	☐	☒	☐	☐
Temporary Treatment	**Yes**	**No**	**N/A**	**To Do List**
This source is continuously chlorinated, and our existing facilities can provide 4-log virus treatment (CT = 6) before the first customer. If yes, at what concentration? _____ mg/L	☐	☒	☐	☐
We can quickly introduce chlorine into the water system and take advantage of the existing contact time to provide 4-log virus treatment to a large portion of the distribution system.	☐	☒	☐	☐
We can reduce the production capacity of our pumps or alter the configuration of our storage quantities (operational storage) to increase the amount of time the water stays in the system before the first customer to achieve CT = 6.	☐	☒	☐	☐
We can alter the demand for drinking water (maximum day or peak hour) through conservation messages to increase the time the water is in the system prior to the first customer in order to achieve 4-log virus treatment with chlorine.	☐	☒	☐	☐

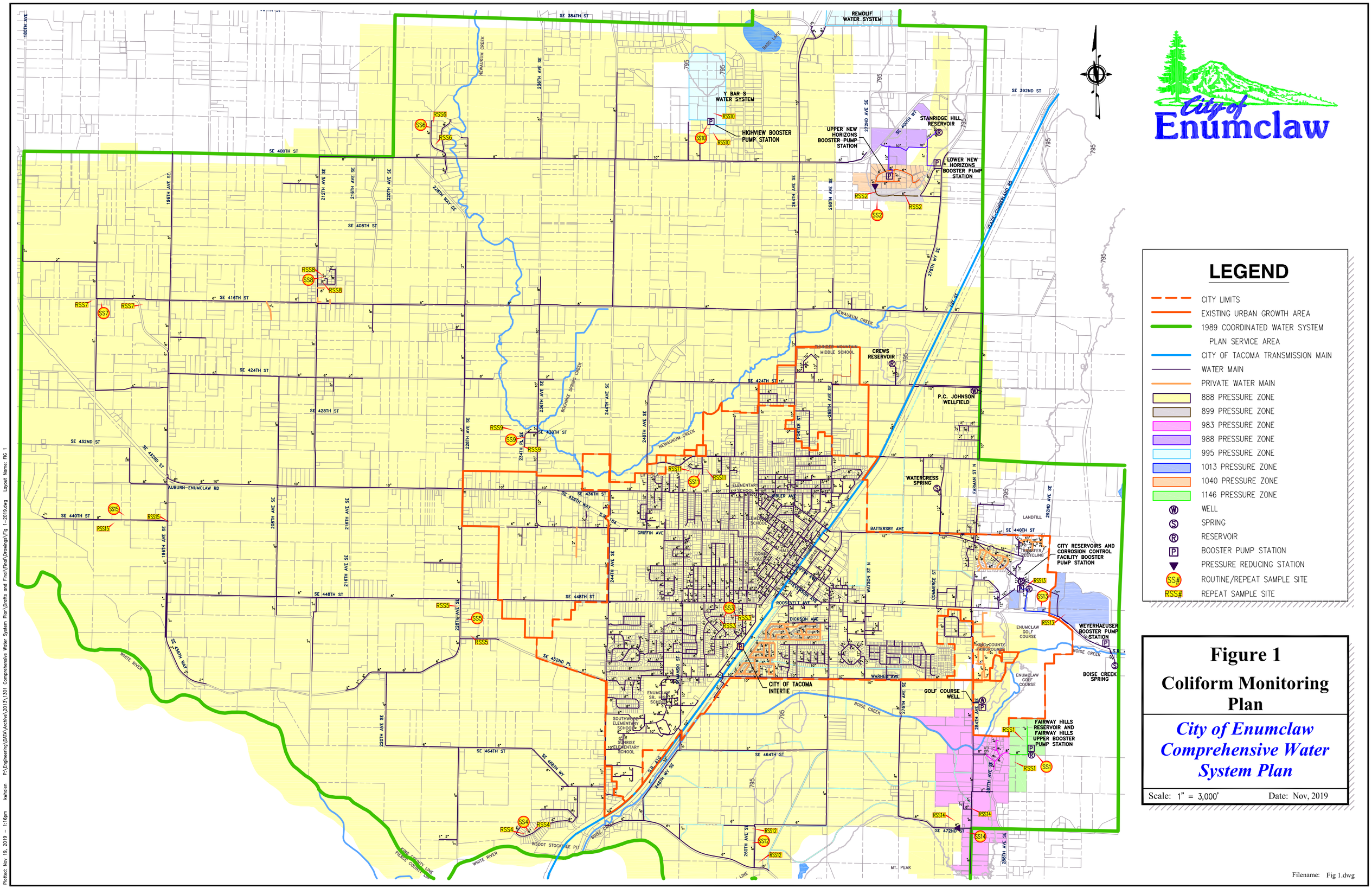
*NOTE: Sources S01, S02/S08, and S07 have continuously chlorinated 4-log virus treatment (CT 6). S07 doesn't at present have continuous chlorine residual monitoring installed.

E. coli-Present Triggered Source Sample Response Plan – Source S09

If we have *E. coli* in S09 water we will immediately:

1. Call DOH.
2. Stop using the source until corrective action has been taken, the source passes testing, and DOH has granted approval to begin using the source.

I. System Map


City of Enumclaw
LEGEND
CITY LIMITS
EXISTING URBAN GROWTH AREA
1989 COORDINATED WATER SYSTEM PLAN SERVICE AREA
CITY OF TACOMA TRANSMISSION MAIN
WATER MAIN
PRIVATE WATER MAIN
888 PRESSURE ZONE
899 PRESSURE ZONE
983 PRESSURE ZONE
988 PRESSURE ZONE
995 PRESSURE ZONE
1013 PRESSURE ZONE
1040 PRESSURE ZONE
1146 PRESSURE ZONE
WELL
SPRING
RESERVOIR
BOOSTER PUMP STATION
PRESSURE REDUCING STATION
SS# ROUTINE/REPEAT SAMPLE SITE
RSS# REPEAT SAMPLE SITE
REMOLIF WATER SYSTEM
Y BAR S WATER SYSTEM
HIGHVIEW BOOSTER PUMP STATION
UPPER NEW HORIZONS BOOSTER PUMP STATION
STANRIDGE HILL RESERVOIR
LOWER NEW HORIZONS BOOSTER PUMP STATION
CREWS RESERVOIR
P.C. JOHNSON WELLFIELD
WATERCRESS SPRING
CITY RESERVOIRS AND CORROSION CONTROL FACILITY BOOSTER PUMP STATION
WEYERHAEUSER BOOSTER PUMP STATION
BOISE CREEK SPRING
CITY OF TACOMA INTERTIE
GOLF COURSE WELL
FAIRWAY HILLS RESERVOIR AND FAIRWAY HILLS UPPER BOOSTER PUMP STATION
SE 384TH ST
SE 400TH ST
SE 408TH ST
SE 416TH ST
SE 424TH ST
SE 428TH ST
SE 432ND ST
AUBURN-ENUMCLAW RD
SE 440TH ST
SE 448TH ST
SE 452ND PL
SE 464TH ST
SE 472ND ST
SE 392ND ST
WATE-ENUMCLAW RD
NEWAUKUM CREEK
BOISE CREEK
WHITE RIVER
BASS LAKE
BATTERSBY AVE
GRIFFIN AVE
ROOSEVELT AVE
DICKSON AVE
WARNER AVE
LANDFILL
ENUMCLAW GOLF COURSE
KING COUNTY FAIRGROUNDS
THUNDER MOUNTAIN MIDDLE SCHOOL
ENUMCLAW SR. HIGH SCHOOL
SOUTHWOOD ELEMENTARY SCHOOL
SUNRISE ELEMENTARY SCHOOL
WSDOT STOCKPILE PIT
KING COUNTY LINE
PIERCE COUNTY LINE
MT. PEAK
Figure 1
Coliform Monitoring Plan
City of Enumclaw Comprehensive Water System Plan
Scale: 1" = 3,000'
Date: Nov, 2019
Filename: Fig 1.dwg

APPENDIX L

EMERGENCY RESPONSE PLAN, BOIL WATER

Emergency Response Plan 2024

INTRODUCTION

This plan provides basic information useful in responding to potential water system emergencies and contains the following elements:

- An overview of the existing water system.
- Water system personnel responsible for making decisions in emergency situations.
- Procedures for notification of water-related emergencies to water customers, the public, local health department, and the State Department of Health.
- Overview of the City's Vulnerability Assessment Plan.
- Contingency operation plan for responding to emergency events.
- Recommendations.

A separate detailed plan prepared using guidance published by the EPA is distributed on a need-to-know basis to department personnel and other emergency response team members.

The use and success of these plans depends upon the accuracy of the information. These plans are working tools that must be maintained and updated regularly as changes in the water system occur.

OVERVIEW OF EXISTING SYSTEM

The City provides service to approximately 6,350 customer connections within the City's existing water service area, which extends beyond the city limits. The city limits comprise an area of approximately 5.3 square miles, and the existing water service area is approximately 37.8 square miles. The 2021 population within the city limits was 13,030, while water service was provided to an estimated 4,320 people outside of the city limits and within the existing water service area.

The City owns and operates four water sources to the east of the City: Boise Springs, Watercress Spring and Well, PC Johnson Wellfield, and the Golf Course Well. The City also has an emergency intertie connection to the Tacoma Water pipeline that passes through the City. This connection has not been used since 2003. All the City sources are treated with chlorine for disinfection. The City of Enumclaw does not add fluoride to its sources. The City does raise the pH of the Boise and Watercress sources to reduce the potential for the water to corrode metal piping. Water storage is provided by five reservoirs that have a total maximum capacity of

5.74 million gallons (MG). In addition, the City's water system has eight pressure zones with one pressure reducing station, seven booster pump stations, and approximately 151 miles of water main.

EMERGENCY RESPONSE PERSONNEL

When water emergencies are reported to the City of Enumclaw 911 dispatch center, Water Utility on- call staff is contacted. Water worker personnel are on a call-out list Mondays through Thursdays and on a standby call-out list on a rotating basis Fridays through Sundays, as well as holidays. The worker responding to the call will assess the situation and notify the Certified Operator and/or other Water Department and City personnel to respond as necessary, depending on the severity of the situation. The Public Works Director may also be contacted to direct the efforts to respond. A list of these water system personnel and others responsible for making decisions in emergency situations is shown in **Table 1**.

Table 1
Enumclaw Water System Personnel Call-Up List

Contact Person (Name/Job Title)	Personnel Responsibilities	Cell Phone	Working Hours	Non-Working Hours
Brian Spindor Public Works Director	Final decision authority on Public Works matters. Coordinate with other department heads (police, fire, emergency operations center).	253-569-7109	360-615-5721	
Scott Woodbury Assistant Public Works Director	Water utility manager. Reports to Director. Coordinate with WDOH.	253 261-1937	360-615-5728	
Kyte Ramberg Water Supervisor	Designated water system operator. Recommend actions and implement them. Reports to Assistant Public Works Director.	253 261-6895	360 825-5541	360 825-3505
Ian Dehline Water Worker	Recommend actions and implement them. Reports to Water Supervisor.	253 266-4299	360 825-5541	360 825-3505
Derek Jones Water Worker	Recommend actions and implement them. Reports to Water Supervisor.	253 261-6919	360 825-5541	360 825-3505
Kris Campbell Water Worker	Recommend actions and implement them. Reports to Water Supervisor.	253 293-2312	360 825-5541	360 825-3505
Zach Smith Water Worker	Recommend actions and implement them. Reports to Water Supervisor.	253 569-5136	360 825-5541	360 825-3505
Connor Young Water Worker	Recommend actions and implement them. Reports to Water Supervisor.	253 561-1502	360 825-5541	360 825-3505

The Public Works Department may require outside assistance to properly respond to an emergency. For example, the City may need to hire construction contractors to assist in repairing affected facilities. Coordination with Puget Sound Energy or the City of Tacoma may be

required if the emergency is large enough to affect other water sources. A list of these and other support personnel that can assist the City during an emergency event is shown in **Table 2**.

Table 2
Water System Support Services Call-Up List

The following is a list of organizations that can assist the City during an emergency event.

Organization/ Contact Person	Type of Service	Address	Phone No.
Agencies			
WA Dept of Health *Hotline*	Emergency Response		877 481-4901
Tacoma Public Utilities	Customer Service Team		253 502-8344
Tacoma Public Utilities	Control Center		253 502-8910
Telemetry and Computer Services			
S & B Inc. *Randy Stead - 206 963-0102*	Telemetry System Contractor	13200 SE 30th Bellevue, WA 98005	425 644-1700
Advanced Industrial Automation *Andrew Esvelt - 425 445-8372*	Process and Control	617 NW 44th Street Seattle, WA 98107	206 789-1373
Quality Controls *Jon Collins - 425 967-7112*	Process and Control	5015 208th St SW Ste 1B Lynnwood, WA 98036	425 778-8280
Material and Equipment Suppliers and/or Services			
H.D. Fowler Co. Inc. *Ryan Huff - 206 255-4314*	Materials, Pipe, Valves, Etc.	1417 Thornton Ave SW Pacific, WA 98047	253 863-8600 800 487-5290
Ferguson Waterworks	Materials, Pipe, Valves, Etc.	2042 S 112th St Tacoma, WA 98444	253 538-8275 800 878-0962
Core & Main	Materials, Pipe, Valves, Etc.	602 Valley Ave NE Puyallup, WA 98372	253 840-8558
Consolidated Supply Co	Materials, Pipe, Valves, Etc.	2203 Inter Ave, Ste A Puyallup, WA 98372	253 848-9337
GC Systems *Carol Wells*	Control Valve Service	2310 Inter Ave Puyallup, WA 98372	253 939-8322 800 525-9425
Ryan Herco	CL2 & NaOH Piping / Valves	22405 72nd S Kent, WA 98032	800 848-1141
TMG Services *Brian Yarnell - 253 606-2576*	CL2 & NaOH Equipment and Service	3216 E. Portland Ave Tacoma, WA 98404	800 562-2310
PumpTech *Tom Long / Mike Dunn*	Well Equipment and Service	12020 32nd St E #2 Bellevue, WA 98005-4121	425 644-8501
Triangle Pump & Equipment *Ray Cook - 541 915-2685*	Pump Equipment and Service	7509 South 5th Street Ridgefield, WA 98642	360 887-9530
Walthers Electric *Kim Walthers*	Electrician	13023 Pioneer Way E Orting, WA 98360	360 829-5145
Apex Electric Group *Kip Wisk*	Electrician	PO Box 856 Auburn, WA 98071	206 349-6372

Table continued next page

Table 2 (continued)
Water System Support Services Call-Up List

Table continued

Organization/ Contact Person	Type of Service	Address	Phone No.
Contractors and Consultants			
Cedarock Consultants *Carl Hadley*	Fisheries Consultant	19609 244th Ave NE Woodinville, WA 98077	425 788-0961
Big Mountain Enterprises *Kyle Clerget - 206 730-2469*	Utility Contractor	1804 Garrett St Enumclaw, WA 98022	360 226-3049
Hoffman Construction *Randy Hoffman - 206 423-1261*	Utility Contractor		360 825-9797
Nordvind Company *Eric Peterson - 253 606-6467*	Utility Contractor		360 825-5704
Stafford Excavating *Aaron Stafford*	Utility Contractor		253 569-3311
Watterson Excavating *Reed Watterson - 253 332-1109*	Utility Contractor	2111 Garrett St Enumclaw, WA 98022	360 825-6333
Other			
Water Management Laboratory	Water Quality Testing	1515 80th St E Tacoma, WA 98404	253 531-3121
Cummins NW, Inc.	Generator Equipment and Service	811 SW Grady Way Renton, WA 98055	425 235-3400
Associated Petroleum Products	Propane and Diesel	2320 Milwaukee Way Tacoma, WA 98421	800 929-5243
Ferrell Gas	Propane	3611 A St SE Auburn, WA 98002	253 833-1641
Jones Chemical *James Groh - 253 405-3075*	Chlorine & Caustic Soda	1919 Marine View Drive Tacoma, WA 98422	253 274-0104

NOTIFICATION PROCEDURES

Water customers, the public, local health department, State Department of Health, and others may be notified during an emergency depending on the type and severity of the emergency. A list of organizations that may be contacted during an emergency is shown in **Table 3**. Following this table is a summary of the procedures for notification during an emergency event.

Table 3
Emergency Notification Contact List

The following is a list of organizations that may need to be notified in the event of a City emergency.

Agency	Contact Person	Location	Phone No.
Fire District 28	Operator	Enumclaw	911 or 360 825-5544
Fire District 44	Operator	Auburn	253 735-0284
Enumclaw Police Department	Operator	Enumclaw	911 or 360 825-3505
King County Police Department	Operator	Maple Valley	206 296-3883
King County Office of Emergency Management	Operator	Renton	206 396-3830
King County Dept of Public Health	Water Program	Bellevue	206 296-4932
King County Utility Inspection	Receptionist	Seattle	206 296-8122
Washington State Dept of Health	Emergency Response Hotline		877 481-4901
Washington State Dept of Health	Brietta Carter	Kent	564 999-3355
Washington State Dept of Ecology - NW Region	Receptionist	Bellevue	425 649-7000
KSTW 11 Television	Receptionist	Tacoma	866 313-5789
KCPQ 13 Television	Receptionist	Tacoma	206 674-1313
KCTS 9 Television	Receptionist	Seattle	206 728-6463
KIRO 7 TV / KIRO 710 AM	Receptionist	Seattle	206 728-7777
KING 5 Television	Receptionist	Seattle	206 448-5555
KOMO 4 TV / KOMO 1000 AM	Receptionist	Seattle	888 477-5666
Seattle Post-Intelligencer (Newspaper)	Receptionist	Seattle	206 448-8030
The Seattle Times (Newspaper)	Receptionist	Seattle	206 464-2200

Customers

Customers and the general public will be notified in the event of an emergency situation that affects either the quantity or quality of water supply. The customers will be notified of an emergency and how it affects them. If the emergency affects water quality, customers may be asked to boil water prior to drinking or cooking. If the emergency affects water quantity, customers may be asked to conserve water to prevent depletion of a potentially limited quantity of emergency supply.

Priority Customers

Priority customers that require uninterrupted water service will be notified directly. These customers could include home care kidney dialysis patients, medical facilities, and commercial customers that are especially vulnerable to loss of water service. A list of priority customers is shown in **Table 4**.

Table 4
Priority Contact List

Following is a list of priority customers that may need to be notified during an emergency event.

Person/Organization	Type of Service	Address	Phone
Northwest Kidney Center	Dialysis center	857 Roosevelt Ave E	360 825-2050
St. Elizabeth Hospital	Medical	1455 Battersby Ave	360 802-8800
Franciscan Medical Clinic	Medical	3021 Griffin Ave	360 825-6511
Franciscan Orthopedic	Medical	2820 Griffin Ave	360 825-7500
Franciscan Specialty Clinic	Medical	1818 Cole St	360 802-5760
Franciscan Surgical	Medical	1427 Jefferson Ave	360 825-2701
Enumclaw School District	Schools	2929 McDougall Ave	360 825-0377
Angel's Haven	Adult care facility	42421 264th Ave SE	360 825-7244
Cascade Caregivers	Adult care facility	2885 Elmont Ave	360 825-4514
Cascade House	Adult care facility	2000 Mt View Dr	360 226-7200
Evergreen Healthcare & Rehab	Adult care facility	2323 Jensen St	360 825-2541
Expressions at Enumclaw	Adult care facility	2454 Cole St	360 825-4565
Highpoint Village	Adult care facility	1777 Highpoint St	360 825-7780
Living Court	Adult care facility	2229 Jensen St	360 825-0280

Health Departments

The local health department and State Department of Health will be contacted directly if there are water quality problems, water shortage concerns, or any other emergency where public health is threatened.

Police and Fire

Police or fire personnel will be notified in the event of a fire or human safety emergency. The emergency phone number for these types of emergency situations is 911.

VULNERABILITY ASSESSMENT

In 2021 an updated Vulnerability (Risk and Resilience) Assessment was completed in accordance with the America's Water Infrastructure Act of 2018. The assessment included:

- Natural hazards and malevolent acts (i.e., all hazards).
- Resilience of water facility infrastructure (including pipes, physical barriers, water sources and collection, treatment, storage and distribution, and electronic, computer and other automated systems).
- Monitoring practices.
- Financial systems (e.g., billing systems).
- Chemical storage and handling.
- Operation and maintenance.

CONTINGENCY OPERATION PLAN

The following section contains contingency operation plans for responding to potential emergency conditions for each of the major system components.

Sources

Emergency Condition: Aquifer Contamination

Impact on System: Major impact is possible with water not suitable for potable use resulting in a major loss of supply. The City sources use water from aquifers formed as noted following: pre-Vashon glaciation deposits (PC Johnson), Vashon recessional outwash and ice-contact deposits covered by Osceola Mudflow deposits (Watercress and Golf Course), and perched Vashon recessional outwash (Boise).

Emergency Response

1. Shut down the well or spring that uses the aquifer.
2. Notify DOH of the aquifer contamination.
3. Notify all affected customers of the problem and instruct whether to boil the water prior to use or to not use the water at all, depending upon the contamination.

4. Analyze the quality of water within reservoirs and dispose of properly if contaminated.
5. Disinfect and/or flush reservoirs and water mains, as necessary, to remove contaminates.
6. Adjust control of system facilities, as necessary, to provide supply from storage facilities if water within them is not contaminated.
7. Monitor water quality at the affected aquifer and investigate cause of contamination.
8. Implement water use reduction measures, as necessary, to ensure an adequate supply of water until the contamination event has been rectified and normal operations restored.

Emergency Condition: Power Outage

Impact on System: Impact should be moderate depending on length of outage, area affected by the outage, and level of system demand.

Emergency Response

1. Contact Puget Sound Energy to restore power.
2. Check the well and spring sites to ensure generator sets are functioning properly.
3. Supply water demand from reservoirs and any of the other sources not affected by the power outage.
4. Contact DOH if emergency supply from the Tacoma intertie is required.
5. Implement water use reduction measures, as necessary, to ensure an adequate supply of water until normal conditions are restored.

Reservoirs

Emergency Condition: Structural Damage

Impact on System: Potentially major impact depending on the reservoir(s) damaged because of the loss of storage and reduced fire flow.

Emergency Response

1. Isolate the reservoir from the water system.
2. Notify police and nearby residents of potential danger and notify local fire districts of reduced fire fighting capabilities in areas served by the reservoir.
3. Drain reservoir, as necessary, to reduce level of damage and threat to local residents. Adjust control of other system facilities to operate system without the damaged reservoir.
4. Contact DOH if emergency supply from the Tacoma intertie is required.
5. Determine the extent of damage.
6. Implement water use reduction measures, as necessary, to ensure an adequate supply of water. Once repairs are completed return to normal operation and notify all parties

previously contacted that normal operation is restored.

Emergency Condition: Power Outage

Impact on System: There is a minor impact to staff if reservoir level data transfer is lost because pumps that supply the reservoirs must be run manually. Batteries may keep telemetry equipment sending data for generally from 12 to 24 hours after power is lost.

Emergency Response: Contact Puget Sound Energy to restore power. Exchange batteries as needed with another facility that hasn't lost power. This will maintain data transfer and recharge drained batteries until power is restored.

Pump Stations and Facilities

Emergency Condition: Power Outage

Impact on System: Moderate to severe impact depending on length and level of system demand. PC Johnson Wellfield, Tacoma intertie, and the New Horizons Booster Pump Station all depend upon hooking up a portable generator.

Emergency Response

1. Contact Puget Sound Energy to restore power.
2. Ensure standby emergency generators are operating properly.
3. As needed, connect the 200 kW portable generator to Well 2 or 3 at the PC Johnson Wellfield or to the Tacoma intertie, and connect the Wastewater Department's 40 kW portable generator to the New Horizons Booster Pump Stations.

Transmission and Distribution Mains

Emergency Condition: Water Main Break

Impact on System: Depending on severity and/or location of the break, the impact may range from minor to potentially major with loss of water from reservoirs, reduction or loss of fire protection capability, disruption of water service to customers, and potential damage to adjacent property.

Emergency Response

1. Close valves to isolate and stop loss of water from the main break while minimizing the extent of the shutdown. If possible, keep the main pressurized just enough to protect against contamination of the main. Open a fire hydrant at the upper end of the area to be isolated, if necessary, to let in air and avoid negative pressure in the main. Involve law enforcement if the break appears to have been intentional to preserve crime evidence. If the break is in a small pressure zone it may be necessary to shut the pump station down. If one of the major transmission mains must be shut down, adjustments to the control and operation of other facilities may be necessary.

2. Notify affected customers of the shutdown. Notify police dispatch and local fire districts of reduced fire fighting capabilities in areas served by the reservoir.

3. Complete repair of the main and disinfect as the situation warrants. Turn on additional sources if needed to replenish reservoirs. As necessary, notify customers prior to the restoration of service regarding whether to boil water or other use restrictions. While repair is on-going to return the system back to normal, ensure that the cause of the damage is well documented and that any collateral damage is also documented and repaired. After the necessary disinfection contact time has passed, restore water service into the isolated area in a manner that removes air and allows unidirectional flushing. Once flushing is completed open all remaining valves. If the main had to be disinfected, keep the unidirectional flow scheme in operation until lab results confirm no contamination is present and then open all remaining valves.

Emergency Condition: Water System Contamination Due to a Backflow Incident

Impact on System: Potentially major impact with water not being suitable for potable use and/or loss of supply.

Emergency Response

1. Notify the City's Cross Connection Control Specialist and Certified Operator of the incident immediately and DOH within 24 hours.

2. Shut down the affected mains to contain the affected contaminants and notify affected customers of the problem and the need to avoid water use or boil water for consumption and cooking if necessary.

3. Flush affected water mains to remove contaminants and disinfect as necessary. After the necessary disinfection contact time has passed, restore water service into the isolated area in a manner that removes air and allows unidirectional flushing. Take samples for water quality analysis in the affected mains and in other parts of the distribution system as necessary to ensure that all contaminants were removed. Keep the unidirectional flow scheme in operation until receipt of acceptable test results and concurrence from DOH to return to the system to normal operation. Ensure all valves are opened. Notify all parties previously contacted that normal operation is restored.

RECOMMENDATIONS

Safety Preparations

It is critical that a reliable communication system be available to the staff for the emergency

functions of the City. Maintenance of the City's emergency radio system is necessary to assure communication if mobile or hard wire phone networks systems are down. Staff members should call in or automatically report to work following an emergency. Emergency supplies and equipment should be kept on hand in the event of an emergency.

Since it is very likely that both power and telephone service will be incapacitated in a major earthquake, customers should be provided with emergency instructions in advance of the event of water supply loss. These instructions could be in the form of a billing insert or separate mailer. Power outages would prevent boiling of water for purification at most households. Alternative methods should be fully explained and described in sufficient detail with emergency instructions. Other necessary information might include volume and type of emergency food and water to store and other items customers should have on hand, such as a fire extinguisher, battery-operated radio, first aid kit, flashlight, and wrench for turning off gas or water service lines, if necessary. Directions for the aftermath of the earthquake should cover how and when to shut off gas, water services, and electricity, and where to go for emergency medical services, food, water, and shelter.

Design Criteria for Future Improvements

Redundancy and reliability are critical throughout all parts of the water system, including sources, storage, and distribution. The following factors should be considered in future designs for minimizing Enumclaw's vulnerability to earthquakes and other catastrophic events.

Reservoirs: Flexible piping connections, adequate anchorage and foundation.

Distribution System: Ductile iron piping generally performs much better in an earthquake than more brittle materials, such as asbestos cement and cast iron. Frequent and well-located isolation valves are beneficial in preventing damage or water loss due to leaks or breaks. Backpressure sustaining valves in pressure reducing stations reduce "draining" of upper pressure zones and subsequent low pressures when main breaks occur downstream of pressure reducing stations. Strategically placed air valves help prevent main collapse due to a water main break or prevent air binding at high points during fire flow events.

Power: Backup power to wells, springs, pump stations, and other electrically powered facilities, including emergency response stations, is critical. Power loss is expected in large earthquakes and major storms. Ideally all critical facilities would be equipped with a standby emergency generator and automatic transfer switch, but at a minimum they should be equipped with an emergency generator connection and manual transfer switch for use with a portable engine generator set.

DRINKING WATER WARNING

The Enumclaw Water System, ID 236001, located in King County
is contaminated with fecal coliform/ *E. coli* bacteria.

Fecal coliform/ *E. coli* bacteria were detected/confirmed in the water supply on _____. These bacteria can make you sick and are a particular concern for people with weakened immune systems.

DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a rolling boil for one minute. Let it cool before using. Boiled or purchased bottled water should be used for drinking, making ice, brushing teeth, washing dishes, and food preparation until *further notice*. Boiling kills bacteria and other organisms in the water.

Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems. The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care provider.

What happened? What is the suspected or known source of contamination?

The following is being done to correct the problem:

We have consulted with the Washington State Department of Health about this incident. We will notify you when you no longer need to boil the water. We anticipate resolving the problem by _____.

For more information, please contact _____ at ( )___-_____ or at _____.
(owner or operator) (phone number) (address)

Please share this notice with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distribution copies by hand or mail.

This notice is sent to you by the Enumclaw Water System on ___/___/____

10/17/08

APPENDIX M

WELLHEAD PROTECTION PLAN, DOH DETERMINATION WHPA

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
20435 72ND Ave S, Suite 200, K17-12 • Kent, Washington 98032-2358

RECEIVED
OCT 30 2000
CITY OF ENUMCLAW

October 23, 2000

MR MARK BAUER
CITY OF ENUMCLAW
1339 GRIFFIN AVE
ENUMCLAW WA 98022

Subject: Enumclaw Water System - ID# 236001
King County
Groundwater Under the Direct Influence of Surface Water (GWI) Program
Boise and Watercress Springs – Ground Water Declaration

Dear Mr. Bauer:

The department has completed review of the Microscopic Particulate Analyses (MPA) results collected from the Boise and Watercress Springs, sources S01 and S02. The results are summarized below.

Source	MPA Sample Date	MPA Result
Boise Spring, S01	March 29, 1999	0 – Low Risk
	December 20, 1999	0 – Low Risk
Watercress Spring, S02	March 29, 1999	0 – Low Risk
	August 23, 1999	11 – Low Moderate Risk
	August 7, 2000	10 – Low Moderate Risk
	August 28, 2000	4 – Low Risk

(These samples were analyzed by the Washington State Department of Health Public Health Laboratory using the Environmental Protection Agency (EPA) Consensus Method. The final two Watercress samples were also examined for the presence of *Giardia* and *Cryptosporidium* with neither organism present.)

According to the current MPA Protocols that have been developed for the department to make GWI determinations, sources that exhibit these characteristics in the MPA results are NOT considered to be influenced by surface water. The Springs are, however, in "hydraulic connection" with surface water and therefore must be disinfected in accordance with the requirements of WAC 246-290-451 that for chlorination include a minimum CT 0f 6 mg/L-min prior to the first service connection.

RECEIVED
OCT 30 2000
CITY OF ENUMCLAW

WAC 246-290-640 requires that the City obtain the services of a licensed professional engineer to evaluate the current level of disinfection provided by the City and to recommend improvements, and an implementation schedule if necessary. This evaluation should be completed within ninety days and submitted to the department for review. The department may want to modify the existing Bilateral Compliance Agreement with the City if it appears that the construction of any improvements will take a number of months.

The department reserves the right to require the City to re-evaluate one or both of these sources in the future should either the conditions affecting the water quality of the sources change or the regulatory approach to determining the influence of surface water upon ground water be modified. Thank you to you and your staff for your efforts to document the water quality of this source. Please feel free to call me at 253-395-6768 if you have any questions.

Sincerely,

Robert E. James

Robert E. James, PE
Regional Engineer
WSDOH

cc: Public Health – Seattle & King County
GWI File
Jim Nilson, DOH

City of Enumclaw

DEPARTMENT OF PUBLIC WORKS

December 10, 2022

«TaxpayerName»
«Mailing_Address»
«CityState», «State» «ZipCode»

Re: Property Located Within City of Enumclaw Wellhead Protection Area

To Whom It May Concern:

To protect the drinking water supply for the customers of the City of Enumclaw water system, we are developing a wellhead protection program as required by state law. As part of our wellhead protection program, the recharge area of our drinking water supply wells was mapped and is shown on the reverse side of this letter. This is called our wellhead protection area. You are being sent this letter as taxpayer of record for a property within the wellhead protection area to ask for your help in ensuring that activities on your property are conducted in a manner that protects against groundwater contamination. Many of you have wells of your own that use this same groundwater for your own drinking water and so are aware of the importance of protecting this resource.

While we realize you are already careful to protect the environment we hope that learning that your property is in our wellhead protection area will result in more precautions to ensure that your activities will not affect our drinking water quality. Things you can do include:

- Use and dispose of harmful materials properly and avoid disposal of any chemicals in septic systems.
- Don't overuse herbicides, pesticides or fertilizers, or preferably do not use them at all.
- Maintain fuel oil storage tanks and properly abandon them when no longer used.

More information is available at http://water.epa.gov (search for “source water protection”).

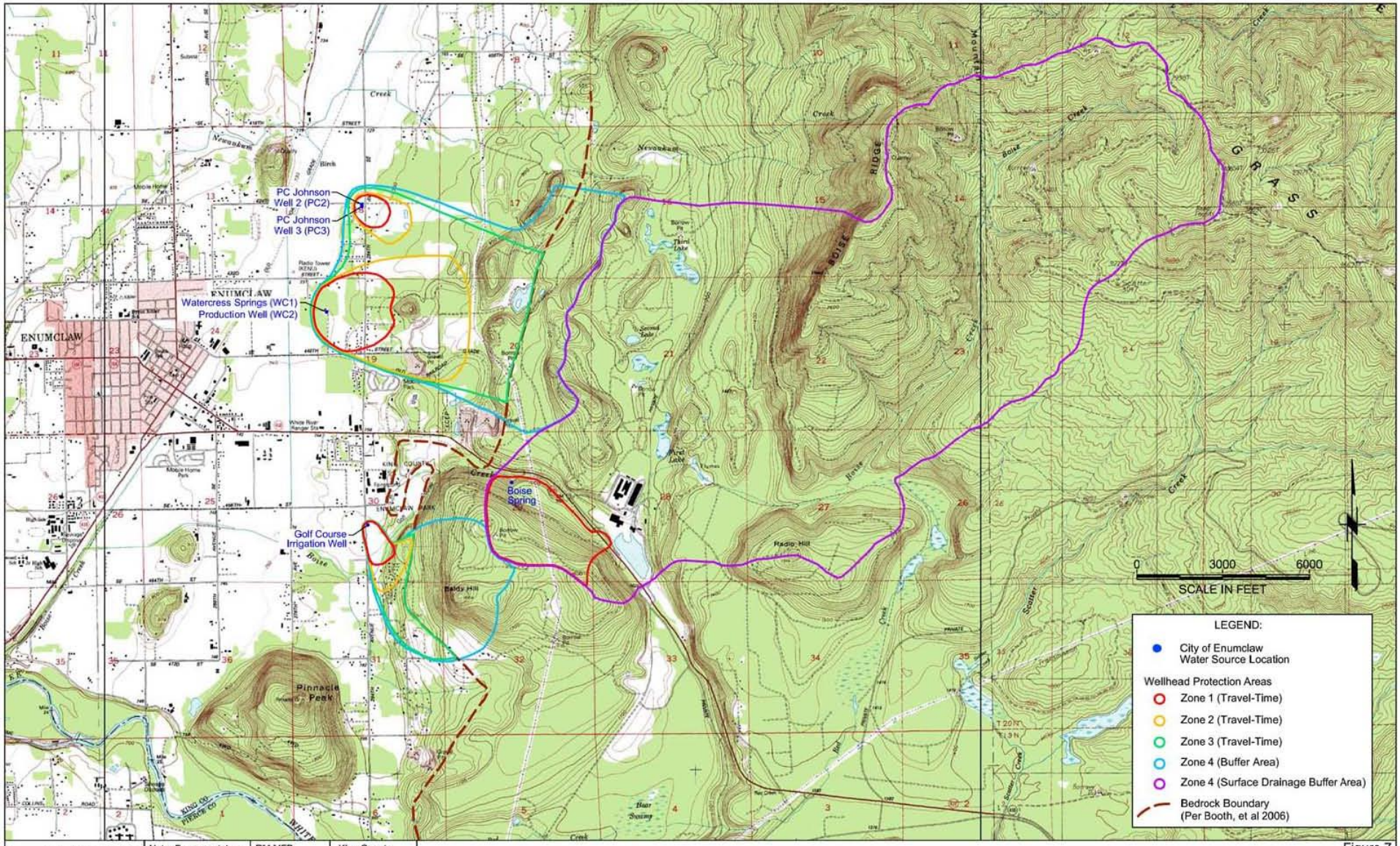
We appreciate informing anyone else who may be using your property of the importance of taking care to prevent any contamination from entering the groundwater. If you have any questions, please contact me at 360-615-5728.

Sincerely,

Scott Woodbury, P.E.
Assistant City Engineer

Attachments

1309 Myrtle Avenue, Enumclaw, Washington 98022 – 360-825-3593 – FAX 825-7232



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS

Note: Basemap taken from USGS Buckley, Enumclaw and Cyclone Creek Quads.	PM:MFP	King County
	October 2009	T 20 N/R 07 E
	1281-005A	Scale 1" = 3000'

Figure 7

Recommended Wellhead Protection Areas

City of Enumclaw: Wellhead Protection Plan

Notice Mailing List

TaxpayerName	Mailing Address	CityState	State	ZipCode
240 ACRE LLC	11250 SE 293RD ST	AUBURN	WA	98092
ADAMS ELAINE P	7683 SE 27TH ST #369	MERCER ISLAND	WA	98040
ADEN DORIS I	PO BOX 855	ENUMCLAW	WA	98022
AINSWORTH DUANE+KARI	43715 284TH AVE SE	ENUMCLAW	WA	98022
ALBRECHT ROBERT+KELLIE	27913 SE 432ND ST	ENUMCLAW	WA	98022
ALDERSON ROBERT+JOANNE M	29708 SE 472ND ST	ENUMCLAW	WA	98022
ALLEN NAOMI M	46409 287TH AVE SE	ENUMCLAW	WA	98022
AMES JOHN G	43927 283RD PL SE	ENUMCLAW	WA	98022
ANDREW DANIEL	28217 SE 430TH ST	ENUMCLAW	WA	98022
ARMSTRONG MICHAEL M+RONDA M	29030 SE 424TH ST	ENUMCLAW	WA	98022
ATKINS NOAH	42308 284TH AVE SE	ENUMCLAW	WA	98022
AUMAN STEVEN E	28712 SE 440TH ST	ENUMCLAW	WA	98022
B & N HOLDINGS	1800 ELLIS ST	BELLINGHAM	WA	98225
BAHR REGAN H	42215 284TH AVE SE	ENUMCLAW	WA	98022
BAIN JAMES H	28322 SE 430TH ST	ENUMCLAW	WA	98022
BAKER SCOTT+JOHNSTON LORI E	29020 SE 434TH ST	ENUMCLAW	WA	98022
BALLASTRASSE DAVID A	27930 SE 432ND ST	ENUMCLAW	WA	98022
BELLAH LENNY L	47306 294TH SE	ENUMCLAW	WA	98022
BENNEST KAROL L	42430 284TH AVE SE	ENUMCLAW	WA	98022
BERETTA JOSEPH P III+BOGRAN	28114 SE 430TH ST	ENUMCLAW	WA	98022
BERGGREN JOHN+DIANA	28735 SE 462ND PL	ENUMCLAW	WA	98022
BIESOLD RONALD E+DONNA F	42823 283RD SE	ENUMCLAW	WA	98022
BIRDWELL CARL A & BETTY A	43408 278TH AVE SE	ENUMCLAW	WA	98022
BLACK JASON P+JODI R	28117 SE 432ND ST	ENUMCLAW	WA	98022
BOEHM CATHERINE E	28639 SE 435TH ST	ENUMCLAW	WA	98022
BOLTON JUSTIN+RESA	28210 SE 440TH ST	ENUMCLAW	WA	98022
BRAA FRANCES	26117 SE 425TH ST	ENUMCLAW	WA	98022
BRAMLETT MORRIS H+ASHLEIGH	28102 SE 432ND ST	ENUMCLAW	WA	98022
BRANCH MARVIN E	42526 284TH AVE SE	ENUMCLAW	WA	98022
BREVIK RONALD D	28323 SE 430TH ST	ENUMCLAW	WA	98022
BRINT WENDEL E	43907 283RD PL SE	ENUMCLAW	WA	98022
BROWN CHARLES W+CATHERINE L	1420 YEW AVE NE	OLYMPIA	WA	98506
BRUHN DEANNA	29520 SE 472ND ST	ENUMCLAW	WA	98022
BRUNE FREDERICK R+JUDITH A	315 39TH AVE SW STE 10	PUYALLUP	WA	98373
BURLISON DEAN T	28003 SE 432ND ST	ENUMCLAW	WA	98022
BUSHNELL DAVID E+RENEE	28306 SE 432ND ST	ENUMCLAW	WA	98022
CALLAHAN KELLY O	28914 SE 424TH ST	ENUMCLAW	WA	98022
CARMAN RICHARD & LUCY	PO BOX 980	ENUMCLAW	WA	98022
CARTER PAUL F+MARY	47105 290TH AVE SE	ENUMCLAW	WA	98022
CASSIDY JOHN ALLEN+SUSAN E	46013 290TH AVE SE	ENUMCLAW	WA	98022
CHRISTENSON LUCAS M	46914 286TH AVE SE	ENUMCLAW	WA	98022
CLARK GARETT	43701 284TH AVE SE	ENUMCLAW	WA	98022
COPPOLA ORLANDO F JR+JEAN C	28313 SE 432ND ST	ENUMCLAW	WA	98022
CORLISS SCOTT D	PO BOX 487	SUMNER	WA	98390
COULTER CHRISTOPHER J+DARAM	42828 282ND AVE SE	ENUMCLAW	WA	98022
COWAN JOSEPH T	28326 SE 428TH PL	ENUMCLAW	WA	98022

Notice Mailing List

TaxpayerName	Mailing Address	CityState	State	ZipCode
COX CARSON L	47303 294TH AVE SE	ENUMCLAW	WA	98022
CROSSLIN CHARLES+WILLIAMS R	29029 SE 434TH ST	ENUMCLAW	WA	98022
DEPT OF NATURAL RESOURCES	PO BOX 47016	OLYMPIA	WA	98504
DIETZ DAVID H+EVA R	28116 SE 428TH PL	ENUMCLAW	WA	98022
DILLON MICHAEL A	43729 284TH AVE SE	ENUMCLAW	WA	98022
DYAR VERA M	PO BOX 601	ENUMCLAW	WA	98022
EATON DALE+LAURIE ANN	P O BOX 354	ENUMCLAW	WA	98022
EATON DELBERT H+SUSAN G	PO BOX 566	ENUMCLAW	WA	98022
EATON FREDRICK+JOYCE	46505 303RD AVE SE	ENUMCLAW	WA	98022
EATON HELEN	718 GRIFFIN AVE PMB #31	ENUMCLAW	WA	98022
ELH LLC	47014 286TH AVE SE	ENUMCLAW	WA	98022
FEUTZ JOHN + KELLY	28216 SE 432ND ST	ENUMCLAW	WA	98022
FINGERSON CODY M	46426 287TH AVE SE	ENUMCLAW	WA	98022
FRANCIS JOHN R+BARBARA L	28208 SE 440TH ST	ENUMCLAW	WA	98022
FRANZ JASON J+MELISSA	43827 284TH AVE SE	ENUMCLAW	WA	98022
G M LANDCO MGMT LTD	6800 OLDFIELD RD	SAANICHTON	BC V8	CANADA
GARDNER T JAY	45107 284TH AVE SE	ENUMCLAW	WA	98022
GIERKE SONJA I	28702 SE 436TH PL	ENUMCLAW	WA	98022
GLENN CAROLYN G	28624 SE 434TH ST	ENUMCLAW	WA	98022
GLOBE JEROME D+RENEE J	28620 SE 464TH CT	ENUMCLAW	WA	98022
GRAHAM JOHN D	PO BOX 991	ENUMCLAW	WA	98022
GRIGGS SARA MAYERS	46205 287TH AVE SE	ENUMCLAW	WA	98022
GRUSNICK SIDNEY P+ANNETTE E	46318 287TH AVE SE	ENUMCLAW	WA	98022
GUNDERSON JOHN P	2435 LEE WAY	BELLINGHAM	WA	98226
GUSMAN DENNIS N	PO BOX 1117	ENUMCLAW	WA	98022
HAMERTON ROBERT P+LOIS A	46306 284TH AVE SE	ENUMCLAW	WA	98022
HANCOCK FOREST MANAGEMENT	17700 MILL PLAIN BLVD	VANCOUVER	WA	98683
HARDING GEORGE D	43821 284TH AVE SE	ENUMCLAW	WA	98022
HARP TRAVIS & PENNY	46223 290TH AVE SE	ENUMCLAW	WA	98022
HATCHER ROBBERT D	PO BOX 1080	MAPLE VALLEY	WA	98038
HICKS DENNIS J & TEENA	PO BOX 292	ENUMCLAW	WA	98022
HOLMES RONALD C+BETTY ANN	28030 SE 440TH ST	ENUMCLAW	WA	98022
HORTA MARIA DEL CARMEN	28310 SE 430TH ST	ENUMCLAW	WA	98022
HORTON BRENT+LISA	28810 SE 424TH ST	ENUMCLAW	WA	98022
HOUSTON LEROY	42232 284TH AVE SE	ENUMCLAW	WA	98022
HOWARD CARRIE JANE	46226 287TH AVE SE	ENUMCLAW	WA	98022
HUGHES KATHLEEN MARIE	11955 SE 253RD ST	KENT	WA	98030
HUGHES WADE A & JAIME	28015 SE 432ND ST	ENUMCLAW	WA	98022
HUMMEL DAVID	43917 283RD PL SE	ENUMCLAW	WA	98022
JANICH LAURA+MICHAEL	46118 290TH AVE SE	ENUMCLAW	WA	98022
JENSEN LARRY W & BONNIE L	46728 286TH AVE SE	ENUMCLAW	WA	98022
JOHNSON ARNIE D	28229 SE 432ND	ENUMCLAW	WA	98022
JOHNSON BRUCE M	29131 SE 472ND	ENUMCLAW	WA	98022
JOHNSON RENA FORD	171 E BARNSBY PL	SHELTON	WA	98584
JOHNSON STEVEN D+JANET L	43101 284TH AVE SE	ENUMCLAW	WA	98022
KAHNE HOLDINGS INC	2001 GARRETT ST #23	ENUMCLAW	WA	98022

Notice Mailing List

TaxpayerName	Mailing Address	CityState	State	ZipCode
KASCHMITTER CHRIS L	29432 SE 472ND ST	ENUMCLAW	WA	98022
KAUPPILA DAVID P&RUTH L	46419 287TH AVE SE	ENUMCLAW	WA	98022
KAYS DAN & LISA	46410 287TH AVE SE	ENUMCLAW	WA	98022
KENNEDY ROBERT B+LARSON WEN	422 106TH AVE E	EDGEWOOD	WA	98372
KESSLER RONALD W	29206 SE 424TH ST	ENUMCLAW	WA	98022
KING COUNTY-SOLID WASTE	500 4TH AVE	SEATTLE	WA	98004
KLEIN FAMILY TRUST	28900 GLADIOLUS	CYN CITY	CA	91387
KLEMPEL LOIS E	PO BOX 338	ENUMCLAW	WA	98022
KNOTTS EARNEST L+BEVERLY E	1049 COLE ST	ENUMCLAW	WA	98022
KOCHEUAR	46305 290TH AVE SE	ENUMCLAW	WA	98022
KOVASH JOHN D+DONNA L	43804 284TH SE	ENUMCLAW	WA	98022
KROHN JANE+JANE	46225 287TH AVE SE	ENUMCLAW	WA	98022
KRUSE BRAD P+LANETTE M	28511 SE 435TH ST	ENUMCLAW	WA	98022
KRUSE DONALD P	42922 284TH AVE S E	ENUMCLAW	WA	98022
KUNTZ CHIP	27013 LOWER BURNETT RI	BUCKLEY	WA	98321
LAFANTASIE KEN A JR+DAPHNE	28126 SE 432ND ST	ENUMCLAW	WA	98022
LANE JEFF S+JENNIFER L	P O BOX 1282	ENUMCLAW	WA	98022
LANZA ROQUE A	42524 284TH AVE SE	ENUMCLAW	WA	98022
LAURNEN MATTHEW SCOTT+SUSAN	46310 290TH AVE SE	ENUMCLAW	WA	98022
LEASY LELAND	PO BOX 132	ENUMCLAW	WA	98022
LEENSTRA ROBERT L	17302 SE 236TH PL	KENT	WA	98042
LEWIS SUZANNE M	28700 SE 462ND PL	ENUMCLAW	WA	98022
LIPPARD STEVEN R+KAY M	28234 SE 430TH ST	ENUMCLAW	WA	98022
LISA INC	PO BOX 130	AUBURN	WA	98071
LITTLE CLEM & MARILYNNE	PMB 246 718 GRIFFIN	ENUMCLAW	WA	98022
LOKOVSEK MARTIN O JR	42625 284TH AVE SE	ENUMCLAW	WA	98022
LONGTINE MICHAEL E+LISA C	46209 287TH AVE SE	ENUMCLAW	WA	98022
MALLERY JOE+BETTY	24922 SE 406TH ST	ENUMCLAW	WA	98022
MARAS MICHAEL A	42824 283RD SE	ENUMCLAW	WA	98022
MARRAPODI ANTHONY D	28931 SE 434TH ST	ENUMCLAW	WA	98022
MARTIN KATHLEEN M+WAHLEN JEREMY T	28302 SE 428TH PL	ENUMCLAW	WA	98022
MARTINEZ MIKE+KATIE	43815 284TH AVE SE	ENUMCLAW	WA	98022
MAVIN JOSHUA	28115 SE 430TH ST	ENUMCLAW	WA	98022
MCCALLUM JOHN B+TRACEY L	42822 282ND AVE SE	ENUMCLAW	WA	98022
MCDONOUGH LONNIE J	46111 290TH AVE SE	ENUMCLAW	WA	98022
MCGONEGLE BRIAN K+SHARON M	28912 SE 434TH ST	ENUMCLAW	WA	98022
MCGUIRE HAROLD W	43902 284TH SE	ENUMCLAW	WA	98022
MCSWAN PATRICIA J+GARY M	46457 288TH PL SE	ENUMCLAW	WA	98022
MEADOWS MICHELLE+CURTIS	43630 284TH AVE SE	ENUMCLAW	WA	98022
MILLER MERRY D	46420 287TH AVE SE	ENUMCLAW	WA	98022
MITCHELL SHAWN & HILLARY	PO BOX 1004	ENUMCLAW	WA	98022
MONK JOHN A	28714 SE 462ND PL	ENUMCLAW	WA	98022
MOULDEN DONALD J	43713 284TH SE	ENUMCLAW	WA	98022
NIEDERLE PETER	16125 SE 156TH ST	RENTON	WA	98058
NOBLEMAN COUNTRY ESTATE	718 GRIFFIN AVE #254	ENUMCLAW	WA	98022
O'BRIEN JOHN C & MAIA	924 CENTRAL ST NE	OLYMPIA	WA	98506

Notice Mailing List

TaxpayerName	Mailing Address	CityState	State	ZipCode
OLSON GILBERT B+RENEE V-	46002 290TH AVE SE	ENUMCLAW	WA	98022
OLSON KENNET L+JODI L	42827 282ND AVE SE	ENUMCLAW	WA	98022
OLSON KRISTOPHER L	43908 283RD PL SE	ENUMCLAW	WA	98022
OLSON OPAL A	28215 SE 424TH ST	ENUMCLAW	WA	98022
OLSON PAUL D	28514 SE 464TH	ENUMCLAW	WA	98022
OPLAND FLOYD A	43726 284TH AVE SE	ENUMCLAW	WA	98022
OSBORN GREG T+JENNIFER N	28204 SE 440TH ST	ENUMCLAW	WA	98022
PARKIN RANDI+R BLACKBURN	43524 284TH AVE SE	ENUMCLAW	WA	98022
PARKINSON SARAH L NONEXEMPT	7683 SE 27TH ST #369	MERCER ISLAND	WA	98040
PARMELEE JAMES L	28619 SE 464TH CT	ENUMCLAW	WA	98022
PATRICK KYLE M+KIMBERLY J	46201 287TH AVE SE	ENUMCLAW	WA	98022
PEARSON ALVIN T+JUDY	47210 294TH AVE SE	ENUMCLAW	WA	98022
PEASE DONALD J+JEANETTE M	46216 287TH AVE SE	ENUMCLAW	WA	98022
PEDERSEN GEORGE F	43615 284TH AVE SE	ENUMCLAW	WA	98022
PEET JAMES+REBECCA B R	46728 303RD AVE SE	ENUMCLAW	WA	98022
PETERSON MATILDA	28224 SE 432ND ST	ENUMCLAW	WA	98022
PHELAN KATHLEEN+PATRICK	PO BOX 1006	ENUMCLAW	WA	98022
PIRELLO DENNIS M	28625 SW 435TH	ENUMCLAW	WA	98022
PORTILLO MAURICIO A+GLORIA	PO BOX 338	ENUMCLAW	WA	98022
PRENOVOST JUDY	29300 SE 472ND ST	ENUMCLAW	WA	98022
PRINCE EDWIN J+JUDY L	47108 290TH AVE SE	ENUMCLAW	WA	98022
PYLE ALLAN J	28218 SE 430TH	ENUMCLAW	WA	98022
PYLE DONALD R	46217 287TH AVE SE	ENUMCLAW	WA	98022
RASMUSSEN MICHAEL	38322 247TH AVE SE	ENUMCLAW	WA	98022
REAGAN ROBERT J+BARBARA A	28016 SE 440TH ST	ENUMCLAW	WA	98022
REID BARRY+BRENDA	BOX 1274	ENUMCLAW	WA	98022
RICHARDSON GREGORY L	28713 SE 462ND PL	ENUMCLAW	WA	98022
RICHTER RITA M	28831 190TH SE	KENT	WA	98042
RINKS MARIANNE L +	PO BOX 875	ENUMCLAW	WA	98022
RIVERA ROSTOMD	28407 SE 464TH	ENUMCLAW	WA	98022
SABSOWITZ THOMAS MICHAEL	28216 SE 440TH ST	ENUMCLAW	WA	98022
SAVAGE JENNIFER	38120 297TH PL SE	ENUMCLAW	WA	98022
SAWHILL WILLIAM A+SHARON A	PO BOX 134	ENUMCLAW	WA	98022
SCHAFFER CINDY+WHEELOCK PHI	46825 290TH AVE SE	ENUMCLAW	WA	98022
SCHMITT GREG J & CAROL A	PO BOX 1454	ENUMCLAW	WA	98022
SCHNYDERS JEFF S+JULIE L	211 SPRING PL	ENUMCLAW	WA	98022
SEELIG HOWARD+BEATRICE	PO BOX 6576	BELLEVUE	WA	98008
SEVON TERRY J+DE ANN K	28114 SE 432ND ST	ENUMCLAW	WA	98022
SIGNANI MICHAEL K	43928 283RD PL SE	ENUMCLAW	WA	98022
SILVERTON JAMES C+KAREN G	28621 SE 434TH ST	ENUMCLAW	WA	98022
SKORE PAUL E+NANCY J	46229 287TH AVE SE	ENUMCLAW	WA	98022
SMITH RUSSELL D+MICHELLE L	413 MICHAEL AVE	ENUMCLAW	WA	98022
SOI 42830 ENUMCLAW / HARRIS	PO BOX 8002	COVINGTON	WA	98042
STANGLAND GERALD	28210 SE 430TH ST	ENUMCLAW	WA	98022
STARK BRUCE G	43819 284TH AVE SE	ENUMCLAW	WA	98022
STEBLY GREGORY J+JOCELYN GI	43616 284TH AVE SE	ENUMCLAW	WA	98022

Notice Mailing List

TaxpayerName	Mailing Address	CityState	State	ZipCode
STEPHENS JOAN L	46430 287TH PL SE	ENUMCLAW	WA	98022
STEVENS MARK A	28622 SE 472ND ST	ENUMCLAW	WA	98022
STEVENSON NANCY L	28005 SE 432ND ST	ENUMCLAW	WA	98022
STICKNEY LORETTA+BRIAN	43922 284TH AVE SE	ENUMCLAW	WA	98022
STOLL MARK E	43210 284TH AVE SE	ENUMCLAW	WA	98022
STRALSER JAMES	28328 SE 424TH	ENUMCLAW	WA	98022
SULLIVAN PATRICK D	28129 SE 430TH ST	ENUMCLAW	WA	98022
TAMM RICHARD E	28314 SE 428TH PL	ENUMCLAW	WA	98022
TANONA DUANE T+TANONA AMY L	29408 SE 472ND ST	ENUMCLAW	WA	98022
TAYLOR JAMESSA	28115 SE 428TH PL	ENUMCLAW	WA	98022
THAYER ROBERT R	28204 SE 428TH PL	ENUMCLAW	WA	98022
TUCKER SARAH K	43900 283RD PL SE	ENUMCLAW	WA	98022
TYLER HAROLD O	28705 SE 462ND CT PL	ENUMCLAW	WA	98022
TYLER TOM & ANNETTE	42815 260TH AVE SE	ENUMCLAW	WA	98022
VANDERBILT MORTGAGE & FINAN	500 ALCOA TRL	MARYVILLE	TN	37804
VANWIERINGEN KENNETH	29218 SE 472ND ST	ENUMCLAW	WA	98022
VANWIERINGER MARK & DEBRA	46423 288TH PL SE	ENUMCLAW	WA	98022
VEREECKEN LAURENT A+WATKINS	29604 SE 472ND ST	ENUMCLAW	WA	98022
VERSCHAEVE CRIST J	43804 284TH AVE SE	ENUMCLAW	WA	98022
VILCA JOSIE L+REGINA S	28701 SE 436TH PL	ENUMCLAW	WA	98022
VOELLER ROGER L	28927 SE 472ND ST	ENUMCLAW	WA	98022
VOGE PAUL A+VERA	46608 286TH AVENUE SOU	ENUMCLAW	WA	98022
WARFORD TIMOTHY L+DEBORAH S	28311 SE 430TH ST	ENUMCLAW	WA	98022
WATTS JEREMY+JENNIFER I	PO BOX 1226	ENUMCLAW	WA	98022
WEAVER CHELSY N+CULPEPPER C	28130 SE 430TH ST	ENUMCLAW	WA	98022
WEBB MASON	707 VICTOR ST	ENUMCLAW	WA	98022
WEYERHAEUSER CO	PO BOX 9777	FEDERAL WAY	WA	98063
WIEBENGA JR HAROLD H+ANNE M	42611 284TH AVE SE	ENUMCLAW	WA	98022
WILHELM MARK E+LISA M	28209 SE 430TH ST	ENUMCLAW	WA	98022
WILKENING STEPHEN P	28615 SE 436TH PL	ENUMCLAW	WA	98022
WILSON PATRICK J+CHERYL A	46444 287TH PL SE	ENUMCLAW	WA	98022
WINTERFELD DEL & JANE	42829 283RD AVE SE	ENUMCLAW	WA	98022
WOOD DONALD L+LINDA M	29103 SE 434TH ST	ENUMCLAW	WA	98022
WOODCOCK DOROTHY JEAN	28600 SE 424TH ST	ENUMCLAW	WA	98022
WOODCOCK JEANNE M+JAMES W	43816 284TH AVE SE	ENUMCLAW	WA	98022
WORK FAMILY LLC	24707 NE 26TH ST	SAMMAMISH	WA	98074
WYLES PAUL D & ELAINE R	28704 SE 462ND PL	ENUMCLAW	WA	98022
YOHANNES ASMEROM	1616 SUMMIT AVE #102	SEATTLE	WA	98122
ZWIEFELHOFER LYN R+JUDY A	42727 284TH AVE SE	ENUMCLAW	WA	98022

City of Enumclaw

DEPARTMENT OF PUBLIC WORKS

December 22, 2022

Re: City of Enumclaw Wellhead Protection Area

To Whom It May Concern:

We are writing to let you know that land use activities you regulate, manage, and or provide assistance to are in our water system wellhead protection area. Our system has about 5600 connections and serves about 15,300 people. Water sources that we use throughout the year are rated by the Washington State Department of Health as "highly susceptible."

The enclosed map shows our wellhead protection area. Travel times for wellhead protection zones are given below. Aquifer boundaries are reached before the ten-year time of travel limit so Zone 4 represents a buffer zone rather than a true ten-year time of travel.

Zone 1	6-month time of travel
Zone 2	1-year time of travel
Zone 3	5-year time of travel
Zone 4	Buffer zone

The wellhead protection area map also shows reported and potential contamination sites with the listed numbers correlating to the table on the back of this page. Any groundwater contamination that occurs within the wellhead protection area has a high potential to reach our sources. Site 2 ceased to be a site for bio-solid application in 2008.

We appreciate your taking all reasonable steps to ensure that land use activities within this area do not contaminate our drinking water sources. Thank you for your support in protecting our drinking water. If you have any questions, please contact me at 360-615-5728.

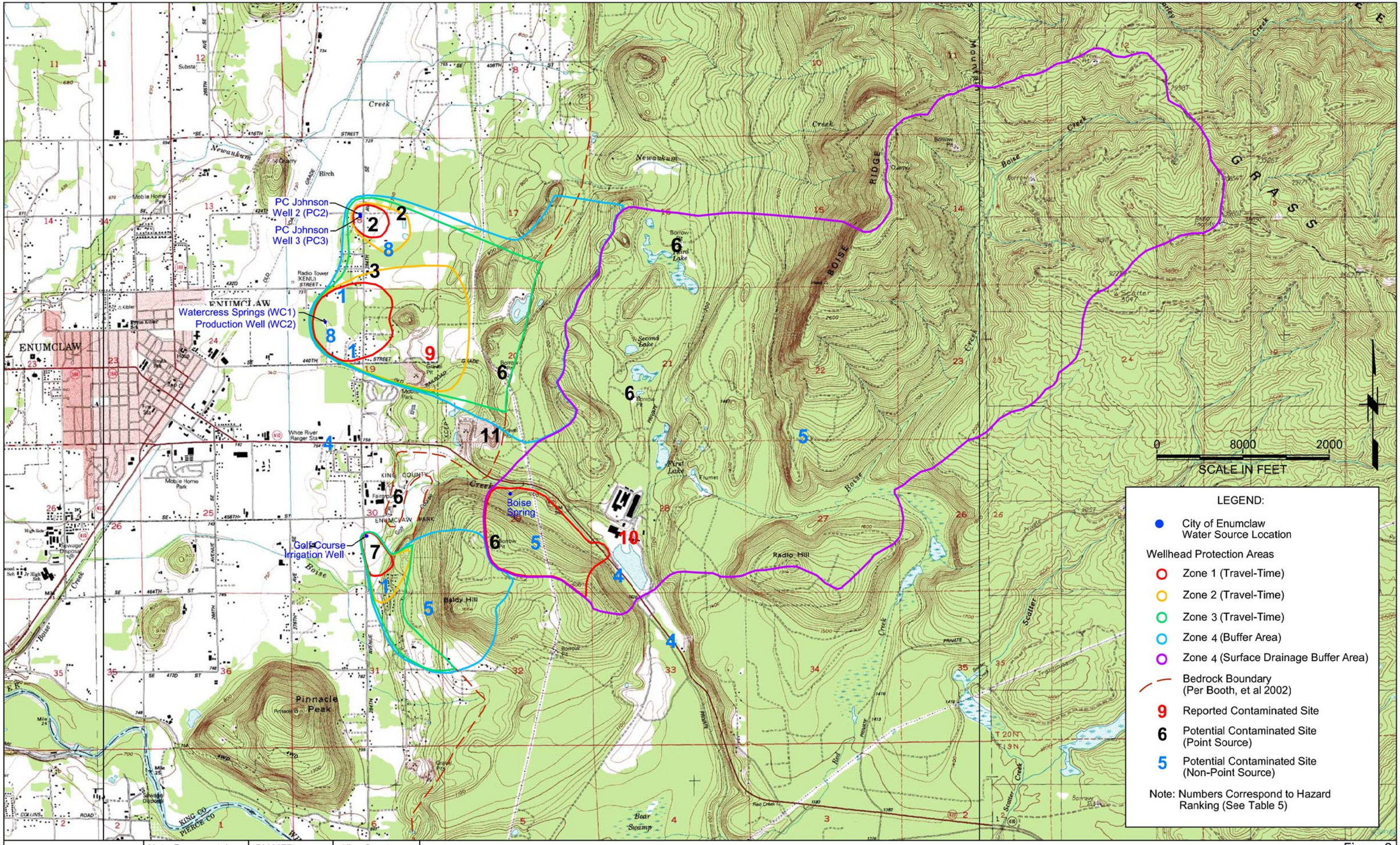
Sincerely,

Scott Woodbury, P.E.
Assistant City Engineer

Enclosures

Table 5: Reported and Potential Contamination Sites

Ranking/Map Reference Number	Site/Land Use	Address	Database	Hazard/Contaminant	WHPA Zone(s)
1	Residential land	n/a	n/a	septic tanks, pesticides	1, 2, 3
2	Land application of bio-solids	Branch Farm	n/a	nitrogen loading	1, 2
3	Dairy farms	n/a	n/a	nitrogen, animal waste	1,2
4	Highway 410	n/a	n/a	chemical/fuel spills, pesticides, herbicides	1, 4
5	Logging activities/Forest land use	n/a	n/a	fuel/chemical spills	3, 4
6	Borrow pit (multiple locations)	n/a	n/a	reduced impedance to groundwater system, illegal dumping	1, 3, 4
7	Enumclaw Golf Course	45220 288th Avenue Southeast	n/a	fertilizers, pesticides, herbicides	
8	Agricultural land	n/a	n/a	fertilizers, pesticides, herbicides	1, 2, 3
9	King Co. Solid Waste Land Fill	SE 440th St	SWLF KING, RCRA	leachates	2
10	Weyerhaeuser Facility and mill pond (closed)	31002 Highway 410	RCRA SQG, CSCSL, UST	petroleum products	4
11	Corliss Resources gravel mine	29416 Highway 410	n/a	reduced impedance to groundwater system, fuel spills	4



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Basemap taken from USGS Buckley, Enumclaw and Cyclone Creek Quads.	PM:MFP October 2009 1281-005A	King County T 20 N/R 05 E Scale 1" = 8000'

Figure 8
Hazard Inventory Map
City of Enumclaw: Wellhead Protection Plan

Agency Mailing List

Agency	Address	City, State Zip
EPA Office of Water	1200 Sixth Street, Suite 900, MS OWW-136	Seattle, WA 98101
Dept of Agriculture Rural Development	1835 Black Lake Blvd SW, Suite B	Olympia, WA 98512-5715
Indian Health Service	1220 SW Third Avenue, Room 476	Portland, OR 97204
Natural Resources Conservation Service	316 West Boone Avenue, Suite 450	Spokane, WA 99201-2348
Geological Survey	934 Broadway, Suite 300	Tacoma, WA 98402
Agriculture & Natural Resource Program	P. O. Box 646248	Pullman, WA 99164-6248
Municipal Research and Services Center	2601 4th Avenue, Suite 800	Seattle, WA 98121-1280
Dept of Agriculture Pesticide Management Div	PO Box 42589	Olympia, WA 98504-2589
Growth Management Services	PO Box 42525	Olympia, WA 98504-2525
Dept of Commerce Public Works Board	PO Box 42525	Olympia, WA 98504-2525
DOE Hazardous Waste and Toxics Reduction Program	PO Box 47600	Olympia, WA 98504-7600
DOE Water Resources Program/Well Identification	PO Box 47600	Olympia, WA 98504-7600
DOE Water Quality Program	PO Box 47600	Olympia, WA 98504-7600
DOE NW Regional Office	3190 160th Avenue SE	Bellevue, WA 98008-5452
DOE SW Regional Office	300 Desmond Drive	Lacey, WA 98503
WSDOT Environmental Services	PO Box 47331	Olympia, WA 98504-7331
Steve Hirschey, KC Water Quality Planner	201 S Jackson St Rm 512	Seattle, WA 98104
King County GIS Center	201 S. Jackson St. Rm 706	Seattle, WA 98104
King County Solid Waste Div	201 S. Jackson St. Rm 701	Seattle, WA 98104

Scott Woodbury

From: Scott Woodbury
Sent: Monday, December 17, 2012 10:36 AM
To: Joe Clow; Jim Zoll-PD; 'Rich.Tokarzewski@kingcounty.gov'; 'IncidentResponse@wsdot.wa.gov'; 'CKEE461@ecy.wa.gov'
Cc: Chris Searcy
Subject: Coordination With Emergency Responders - City of Enumclaw Wellhead Protection Areas
Attachments: Hazard Inventory Table.pdf; WHPP Figure 8.pdf; Spill Response Plan.pdf

State law requires water purveyors to coordinate with local emergency responders regarding their wellhead protection areas. The City of Enumclaw sources of supply are located on four sites east of the City and are shown on the attached WHPP Figure 8 map: Boise Spring, Watercress Spring and Well, PC Johnson Wellfield, and Golf Course Irrigation Well. The Boise Spring and Watercress sites are used throughout the year and are rated as highly susceptible while the other sources are of low susceptibility. The Golf Course well currently does not feed into the City water supply, but is planned as a future source pending sufficient funding.

The WHPP Figure 8 map shows our wellhead protection areas. Travel times for wellhead protection zones are given below. Aquifer boundaries are reached before the ten-year time of travel limit so Zone 4 represents a buffer zone rather than a true ten-year time of travel.

Zone 1	6-month time of travel
Zone 2	1-year time of travel
Zone 3	5-year time of travel
Zone 4	Buffer zone

The WHPP Figure 8 map also shows reported and potential contamination sites with the listed numbers correlating to the attached Hazard Inventory Table. Any groundwater contamination that occurs within the wellhead protection area has a high potential to reach our sources. Site 2 ceased to be a site for bio-solid application in 2008.

Lastly I have attached a copy a March 2009 Spill Response Plan that is in an appendix of our 2009 Wellhead Protection Plan Update document. We would appreciate any input that you may have with regard to emergency response coordination or to any of the attached documents. Please let us know of any training or response exercises that you feel would be important for us to attend.

Thank you.

Scott Woodbury, P.E.
City of Enumclaw
Assistant City Engineer
1309 Myrtle Ave
Enumclaw, WA 98022
360-615-5728 office
253-261-1937 cell
360-825-7232 fax

Wellhead Protection Area Potential Contaminant Sources

2009 WHPP Source and WHPA Zone	Facility Name	Interaction Description	Facility Street	Facility City	Facility Zip	Facility Status
Watercress Zone 2	AUMANS TAXIDERMY	LOCAL SOURCE CNTRL 7/09-3/12	28708 SE 440TH ST	ENUMCLAW	98022	INACTIVE
Watercress Zone 1	BALLESTRASSE LOGGING	STATE CLEANUP SITE	28015 SE 432ND ST	ENUMCLAW	98022	INACTIVE
PC Johnson and Watercress Zone 4	CORLISS ENUMCLAW GRAVEL PIT	SAND AND GRAVEL GP	29410 CHINOOK PASS HWY	ENUMCLAW	98022	ACTIVE
PC Johnson and Watercress Zone 4	CORLISS ENUMCLAW GRAVEL PIT	ENFORCEMENT FINAL	29410 CHINOOK PASS HWY	ENUMCLAW	98022	ACTIVE
PC Johnson and Watercress Zone 4	CORLISS ENUMCLAW GRAVEL PIT	SAND AND GRAVEL GP	29410 CHINOOK PASS HWY	ENUMCLAW	98022	ACTIVE
Boise Zone 4	ENUMCLAW BARK	CONSTRUCTION SW GP	31002 SE ENUMCLAW CHINOOK PASS RD	ENUMCLAW	98022	ACTIVE
Watercress Zone 2	ENUMCLAW RECYCLING & TRANSFER STATION	INDUSTRIAL SW GP	1650 BATTERSBY AVE E	ENUMCLAW	98022	ACTIVE
Watercress Zone 2	KING CNTY SOLID WASTE DIV ENUMCLAW TRANS	INDUSTRIAL SW GP	1650 BATTERSBY AVE E	ENUMCLAW	98022	INACTIVE
Watercress Zone 2	KING CNTY SOLID WASTE DIV ENUMCLAW TRANS	HAZARDOUS WASTE GENERATOR	1650 BATTERSBY AVE E	ENUMCLAW	98022	INACTIVE
Watercress Zone 2	KING CNTY SOLID WASTE DIV ENUMCLAW TRANS	HAZ WASTE MANAGEMENT ACTIVITY	1650 BATTERSBY AVE E	ENUMCLAW	98022	ACTIVE
Watercress Zone 2	KING CNTY SOLID WASTE DIV ENUMCLAW TRANS	EMERGENCY/HAZ CHEM RPT TIER2	1650 BATTERSBY AVE E	ENUMCLAW	98022	ACTIVE
Watercress Zone 2	KING CNTY SOLID WASTE DIV ENUMCLAW TRANS	STORAGE & HANDLING	1650 BATTERSBY AVE E	ENUMCLAW	98022	ACTIVE
Watercress Zone 2	KING CNTY SOLID WASTE DIV ENUMCLAW TRANS	URBAN WATERS	1650 BATTERSBY AVE E	ENUMCLAW	98022	ACTIVE
Boise Zone 4	WA PARKS FEDERATION FOREST STATE PARK	UNDERGROUND STORAGE TANK	49201 ENUMCLAW CHINOOK PASS RD	ENUMCLAW	98022-8015	INACTIVE
Boise Zone 1	WEYERHAEUSER ENUMCLAW FLOOD CONTROL DAM	DAM SITE		ENUMCLAW	98022	ACTIVE
Boise Zone 4	WEYERHAEUSER ENUMCLAW MILLPOND	HAZARDOUS WASTE GENERATOR	31002 CHINOOK PASS HWY	ENUMCLAW	98022	INACTIVE
Boise Zone 4	WEYERHAEUSER ENUMCLAW MILLPOND	EMERGENCY/HAZ CHEM RPT TIER2	31002 CHINOOK PASS HWY	ENUMCLAW	98022	INACTIVE
Boise Zone 4	WEYERHAEUSER ENUMCLAW MILLPOND	HAZ WASTE MANAGEMENT ACTIVITY	31002 CHINOOK PASS HWY	ENUMCLAW	98022	INACTIVE
Boise Zone 4	WEYERHAEUSER ENUMCLAW MILLPOND	INDUSTRIAL NPDES IP	31002 CHINOOK PASS HWY	ENUMCLAW	98022	INACTIVE
Boise Zone 4	WEYERHAEUSER ENUMCLAW MILLPOND	INDUSTRIAL NPDES IP	31002 CHINOOK PASS HWY	ENUMCLAW	98022	INACTIVE
Boise Zone 4	WEYERHAEUSER ENUMCLAW MILLPOND	HAZARDOUS WASTE PLANNER	31002 CHINOOK PASS HWY	ENUMCLAW	98022	INACTIVE
Boise Zone 4	WEYERHAEUSER ENUMCLAW MILLPOND	UNDERGROUND STORAGE TANK	31002 CHINOOK PASS HWY	ENUMCLAW	98022	ACTIVE
Boise Zone 4	WEYERHAEUSER ENUMCLAW MILLPOND	VOLUNTARY CLEANUP SITES	31002 CHINOOK PASS HWY	ENUMCLAW	98022	INACTIVE
PC Johnson and Watercress Zone 3	KRUSE FAMILY LP	DAIRY	42922 284TH AVE SE	ENUMCLAW	98022-9226	ACTIVE

Sources:
WA Ecology Facility Sites (https://fortress.wa.gov/ecy/gispublic/DataDownload/ECY_ENV_FacilitiesSites_FacilitiesSites.htm)
City of Enumclaw WHPP, Robinson Noble, October 2009

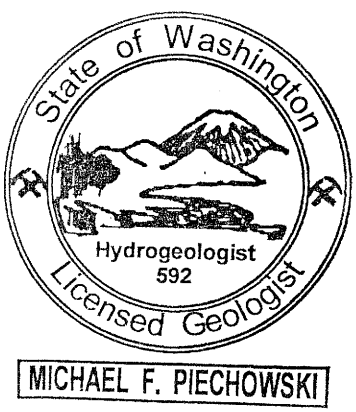
ROBINSON NOBLE SALTBUSH INC. Established 1947
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

WELLHEAD PROTECTION PLAN UPDATE
CITY OF ENUMCLAW

OCTOBER 2009

by

Michael F. Piechowski, LHG
Senior Hydrogeologist



3011 South Huson Street, Suite A Tacoma, Washington 98409 ▪ (253) 475-7711 ▪ Fax: (253) 472-5846
e-mail: mail@robinson-noble.com

WELLHEAD PROTECTION PLAN UPDATE
CITY OF ENUMCLAW
OCTOBER 2009

TABLE OF CONTENTS

1.0 Executive Summary 3
1.1 EXISTING AND POTENTIAL CONTAMINATION HAZARD IDENTIFICATION 3
1.2 PROTECTION STRATEGIES AND IMPLEMENTATION TASKS 4
2.0 Introduction 4
2.1 WELLHEAD PROTECTION PLAN 4
2.2 SCOPE OF CITY WELLHEAD PROTECTION PLAN 5
3.0 Hydrologic Assessment 6
3.1 INTRODUCTION 6
3.2 GEOLOGY AND HYDROLOGY 6
3.2.1 Geologic Units 7
3.2.2 Boise Spring Hydrology 8
3.2.3 Watercress Spring Hydrology 10
3.2.4 PC Johnson Wellfield Hydrology 11
3.2.5 Golf Course Well Field Hydrology 12
3.3 CONCEPTUAL MODEL 13
3.3.1 Hydrostratigraphic Units 13
3.3.2 General Recharge and Discharge 14
3.3.3 General Flow System Patterns 14
3.3.4 Model Description 14
4.0 WHPA Delineation 15
4.1 INTRODUCTION 15
4.2 MODEL DESCRIPTIONS 16
4.3 UNCERTAINTY 18
4.4 WELLHEAD PROTECTION AREAS 19
4.4.1 Boise Spring 19
4.4.2 Watercress Spring and Production Well 20
4.4.3 PC Johnson 21
4.4.4 Golf Course 21
5.0 Hazard Inventory and Risk Assessment 22
5.1 INTRODUCTION 22
5.2 CONTAMINANT SOURCE INVENTORY METHODOLOGY 22
5.2.1 Field Survey 24
5.3 LAND USE 24
5.3.1 Residential Land Use 24
5.3.2 Commercial and Industrial Land Use 24
5.3.3 Agricultural Land Use 24

5.3.4 Forest Land Use 25
5.3.5 Undeveloped Areas 25
5.4 METHODOLOGY FOR ESTABLISHING RISK PRIORITY 25
5.5 HAZARD INVENTORY 27
5.5.1 Identified Contaminant Sources 28
5.5.2 Potential Groundwater Concerns 28
5.6 POTENTIAL CONTAMINATION PATHWAYS 31
6.0 Management Strategies and Implementation Tasks 32
6.1 WELLHEAD PROTECTION MANAGEMENT STRATEGIES 32
6.1.1 Long-Term Management and Cooperation 32
6.1.2 WHPP Land Use Strategies 32
6.1.3 WHPP Regulatory Strategies 32
6.1.4 Planning Strategies 33
6.1.5 Data Management Strategies 33
6.1.6 Education Strategies 34
6.2 WELLHEAD PROTECTION IMPLEMENTATION TASKS 35
7.0 References 37

FIGURES

1. WATER SOURCE LOCATION MAP
2. BOISE SPRING DETAIL MAP
3. WATERCRESS SITE DETAIL MAP
4. PC JOHNSON WELLFIELD DETAIL MAP
5. GOLF COURSE IRRIGATION WELL DETAIL MAP
6. CONCEPTUAL DIAGRAM
7. WELLHEAD PROTECTION AREAS
8. HAZARD INVENTORY MAP

APPENDIX

A. WELL LOGS
B. GROUND WATER CONTAMINATION SUSCEPTIBILITY ASSESSMENT SURVEY FORM
C. PARCEL INSIGHT REPORTS
D. HAZARD INVENTORY LIST
E. SPILL RESPONSE PLAN

ATTACHMENT (on CD)

COMPLETE WHPP REPORT AS PDF AND IN ORIGINAL FORMAT
COMPLETE GROUNDWATER MODELS IN ORIGINAL FORMAT
COMPLETE PARCEL INSIGHT REPORT

WELLHEAD PROTECTION PLAN UPDATE
CITY OF ENUMCLAW
OCTOBER 2009

1.0 Executive Summary

A wellhead protection area (WHPA) is a management zone around a groundwater source designed to protect the quality of the source water. It is based upon the horizontal representation of capture zones, which describe the area of an aquifer (and all overlying material) that may contribute water to the well or other groundwater source within a given period of time. In the preparation of a Wellhead Protection Plan, capture zones are typically defined for time-of-travel periods of one-half, one, five, and ten years. When the City's 1998 Wellhead Protection Plan was prepared, the wellhead protection areas were defined for Boise Spring, Watercress Spring, and the PC Johnson Wells through the use of groundwater models. The basic groundwater models used did not account for the heterogeneous nature of the region's geology or the interactions with surface water.

In this update to the Wellhead Protection Plan, wellhead protection areas were delineated for each of the City's groundwater sources. The considerable amount of recent work at the Boise and Watercress sites as well as the recent development of the new production and irrigation well at the Enumclaw Golf Course provided a more detailed understanding of the subsurface at these locations. Two analytical element models were developed for this project, one including Watercress and the golf course and one for the PC Johnson Wellfield. Boise Spring wellhead protection areas were determined through hydrogeologic analysis and time of travel calculations.

1.1 Existing and Potential Contamination Hazard Identification

The inventory of potential contamination sources within the WHPA was performed according to the Washington State Department of Health publication, "*Inventory of Potential Contaminant Sources in Washington's Wellhead Protection Areas (1993)*." Parcel Insight (PI), an environmental database research company, reviewed 27 federal and state databases for any known or potential contaminant sites within a one-mile radius of each City water source (or group of sources in the case of the PC Johnson Wells and Watercress Springs). This area included the time-of-travel based capture zones for the sources but not the entire buffer area. An evaluation of various land-use categories and activities was also performed. The results of the contamination source inventory include a list of potential and known environmental hazards in proximity to the Enumclaw water sources. From this process, six sites or categories of land-use activities were identified as known or potential hazards to the City's wells. These were prioritized and ranked such that the Wellhead Protection implementation process can address each site or land use in a systematic manner. Each site was ranked according to three factors. The factors are: 1)

proximity of potential hazard to the WHPA, 2) type of contamination, and 3) the straight-line distance from the source to the potential hazard.

1.2 Protection Strategies and Implementation Tasks

The completion of wellhead protection planning provides no safeguards unless effective management strategies are implemented to prevent potential contamination of groundwater sources. With the hazards identified, the Wellhead Protection Plan provides for six strategic strategies and 18 specific tasks suggested for the City to undertake to complete the process. A spill response plan (included as Appendix E) was also prepared. Additionally, the City's contingency plan, presented in the City's 2007 Water System Comprehensive Plan, was reviewed to ensure it adequately addresses the possible loss of one or more of the City's water sources.

2.0 Introduction

2.1 Wellhead Protection Plan

In response to the 1986 Amendments to Section 1428 of the Federal Safe Drinking Water Act, the Washington Administrative Code (WAC) was modified in July 1994 to include mandatory wellhead protection measures[1] for Group A public water systems (WAC 246-290). The overall goal of the state wellhead protection program is to prevent the contamination of ground waters used by Group A public water systems. This is to be accomplished by the definition of management zones around public wells, detection of any existing groundwater contamination sources, and management of potential sources of groundwater contamination prior to their entry into the drinking water system. The state requires that a Wellhead Protection Plan (WHPP) shall, at a minimum, include the following aspects:

- A completed susceptibility assessment
- A delineated wellhead protection area
- An inventory of potential contamination threats
- Distribution of findings to required entities
- Contingency plans for alternative sources of drinking water
- Appropriate spill/incident response measures

Under the WAC, local public water systems have primary responsibility for developing and implementing local wellhead protection programs. Due to the limited jurisdictional and regulatory authority afforded most purveyors, it is essential that they work with other local, state, and federal agencies possessing the appropriate authority. The State Department of Health (Health) oversees the wellhead protection program.

[1] The legislative authority to require wellhead protection planning can be found in the Revised Code of Washington (RCW) Chapters 43.20.050, 70.119A.060, and 70.119A.080.

2.2 Scope of City Wellhead Protection Plan

The City of Enumclaw is located on a relatively flat plain at the base of the Cascade foothills, on the upland between the Green and White Rivers (located north and south of the City, respectively). Figure 1 shows the locations of the City's water sources and the approximate study area. The plain on which the City sits was formed by the deposition of the Osceola Mudflow. The City of Buckley is located to the southwest of the City, across the White River. The land north of the City is generally rural, with small farms or homes on large lots. According to the most recent census, completed in 2000, the population of Enumclaw is 11,116 residents.

The City of Enumclaw currently relies upon three wells and two spring collection facilities to supply their customers' water needs. A fourth well at the City's golf course has been drilled and is planned to be made operational in the near future once the new well facility has been constructed. In case of an emergency, the City is able to pump water from the City of Tacoma's Pipeline 1. The City's Public Works Department is responsible for the maintenance of the City's water and sewer utilities, along with many other important parts of the City's infrastructure. Approximately 15,950 retail water customers are served through 5,350 connections. Similarly, the City currently serves approximately 3,350 sewer customers.

The City of Enumclaw began operating its water system in 1912. Boise Creek Spring was developed sometime earlier by the Weyerhaeuser Company. The Watercress Spring source was first developed for use by the City in 1953. In 1977, the City secured an emergency connection with the City of Tacoma. In 1980 and 1986, the City installed new wells at the PC Johnson property. Throughout the years, the system has expanded to the point where the City serves not only the incorporated area, but also a sizable portion of nearby unincorporated King County. The City completed a new water system plan in 2007. This plan included the preliminary design to connect the replacement well that was drilled at the City's golf course in 2007. This well was constructed to improve water supply to the golf course and to provide additional supply to the City's potable water system. In 2007, the City constructed a replacement well project to restore production capacity at the Watercress facility. Past water quality testing has allowed the City's spring sources to be classified as groundwater sources. Thus, with the exception of the emergency Tacoma supply, groundwater constitutes the City's primary and most economical guaranteed source of supply.

This wellhead protection plan focuses on four primary areas:

1) The review of previous characterizations for the City of Enumclaw's water sources, including those from the following studies:
   - GeoEngineers, Inc., 1998, Wellhead Protection Plan Enumclaw, Washington
   - Hart Crowser & Associates, 1980, Enumclaw Test Well, King County, Washington
   - Pacific Groundwater Group (PGG), 2008, City of Enumclaw – Boise Spring Phase III Field Investigations and Hydrogeologic Interpretation (DRAFT)
   - Robinson & Noble, Inc., 1986, Construction Report for P.C. Johnson Well 2 for the City of Enumclaw

- Robinson, Noble & Saltbush, 2006, City of Enumclaw Watercress Springs Water Resource Evaluation Report
- Robinson, Noble & Saltbush, 2006, City of Enumclaw Golf Course Test Well Construction Report
- Robinson, Noble & Saltbush, 2007, City of Enumclaw Construction and Testing of the Golf Course and Zone 888/1002 Replacement Production Well
- Robinson, Noble & Saltbush, 2007, City of Enumclaw Construction and Testing of Watercress Springs Production Well
- Robinson, Noble & Saltbush, 2009, City of Enumclaw PC Johnson Wellfield Management Plan,

2) The delineation of appropriate capture zones and Wellhead Protection Areas for the City's water sources,
3) An inventory of potentially hazardous materials inside the delineated WHPAs for the City, and
4) The development and/or review of management, spill response, and contingency plans.

3.0 Hydrologic Assessment

3.1 Introduction

The City of Enumclaw produces its water supply from three different aquifer systems. These three aquifers are known as the perched Vashon recessional outwash (Qvr) aquifer, the semi-confined Vashon recessional outwash (Qvr) aquifer, and the deeper, confined, pre-Vashon (Qpv) aquifer. The purpose of this study is to provide the City with a plan that allows it to protect its water resources from these aquifers.

The initial step in the development of a Wellhead Protection Plan (WHPP) is the determination of zones that have the greatest potential to allow contaminants to reach the groundwater system. These zones surround each source and are collectively referred to as a Wellhead Protection Area (WHPA). To accurately define the WHPAs, information about the geology and hydrology of the aquifer systems contributing to the wells and other groundwater sources needs to be analyzed. Once available geologic and hydrologic information is analyzed, a conceptual model for the hydrologic system that immediately encompasses the wellheads is formed. The conceptual model is used to develop analytical models used to delineate the time-of-travel zones, known as capture zones, for each groundwater source. Finally, the WHPA can be defined based on the delineated capture zones. For this revision to the City of Enumclaw's Wellhead Protection Plan, capture zones were determined though the use of an analytic element model for the Watercress, PC Johnson, and Golf Course facilities and a time-of-travel calculation based on hydrogeologic mapping for the Boise Spring. Further refinement of the capture zones was accomplished based on the local geology and topography.

3.2 Geology and Hydrology

The City of Enumclaw is located on the upland between the Green and White Rivers, at the base of the Cascade foothills, in eastern King County, Washington. The City is built on a relatively

flat plain formed by the deposition of the Osceola Mudflow over glacial outwash deposits. Typically, the surficial material is a brown loamy, silty soil formed on the mudflow deposits, though there are knobs of volcanic bedrock forming hills in the area. The most recent geologic mapping in the area was completed in 2006 by Booth, et al. in the Geologic Map of King County (Pacific Northwest Center for Geologic Mapping Studies, 2006). The nomenclature presented in Booth, et al. has been used for the preparation of this document.

3.2.1 Geologic Units

Besides the sedimentary and crystalline bedrock forming the Cascades, there are six geologic units in the Enumclaw area which together form four hydrostratigraphic units. The geologic units, from youngest to oldest, are:

Osceola Mudflow (Qom): a heterogeneous mixture of silt, clay, sand, rock, and wood deposited as mudflow debris from Mount Rainier. Typical thicknesses range from 0 to 80 feet. Deposits typically have low permeability.

Vashon recessional outwash (Qvr): predominantly well sorted, permeable, sand, and gravel deposited by meltwaters off the Vashon glacier as it retreated. May include or grade into ice-contact deposits. Thicknesses range to over 80 feet.

Vashon ice-contact deposits (Qvi): poorly sorted sand and gravel which may include silt and/or large boulders. These sediments were deposited in the Enumclaw area in a strong fluvial environment by meltwater from the Vashon glacier and drainage off the Cascades and, therefore, are generally coarse and permeable (Luzier, 1969). Thicknesses in the Enumclaw area are highly variable; the unit may reach a thickness of 100 feet or more.

Vashon till (Qvt): gray compact mixture of clay, silts, sand, and gravel with occasional boulders. Deposited beneath the Vashon glacier, this unit typically has a low permeability. Thicknesses vary, but generally it is less than 80 feet thick.

Vashon advance outwash (Qva): compact sand and gravel unit deposited by meltwaters in front of the advancing Vashon glacier. Though it can be up to 300 feet thick elsewhere in the Puget Sound region, in the Enumclaw area the unit is apparently relatively thin, being less than 20 feet thick at the PC Johnson site. Drilling at the Boise Spring site identified 46.5 feet of material interpreted to be the Qva, though the upper 15 feet was dry.

Pre-Vashon, undifferentiated (Qpvu): for the purposes of this study, no further differentiation of unconsolidated geologic units was made below the Vashon Drift. This unit includes all sediments below the Vashon Drift and above bedrock and includes both permeable and low permeability zones.

Hydrostratigraphic units are generally defined as being either aquifers or confining layers. In the Enumclaw area, the hydrostratigraphic units of importance to this project are:

Osceola Mudflow confining unit is a low-permeability confining unit at the surface (at least in the Enumclaw area) formed by the Osceola Mudflow. This unit impedes downward infiltration of water to underlying water-bearing units. The confinement that results from this unit causes water levels in the uppermost aquifer to rise to near surface, thereby allowing springs to form where "windows" occur in the unit. The original, natural Watercress Spring likely formed in a small window or in a weak zone in the mudflow deposits that allowed water to percolate through the mudflow, similar to many of the other springs found on the plain. The recently compiled geologic map of King County (Pacific Northwest Center for Geologic Mapping Studies, 2006) indicates this unit is at the surface west of Watercress Springs, but is absent most of the area east of the springs. Drilling at the Watercress site found the unit to be 11 to 16 feet thick; the thickness was 45 feet at the golf course well site.

Vashon recessional aquifer is formed by water-bearing zones within the Qvr and Qvi. Where covered by the Qom confining unit, this aquifer is confined. Where Qvr or Qvi is at the surface, the aquifer is unconfined and forms a water table. The unit is confined at its base by the Qvt. At the Watercress site, the aquifer is confined with water levels within several feet of ground surface. Further east, the unit is likely unconfined. At Watercress, the aquifer was found to be 8 to 30 feet thick during drilling. The golf course well penetrated a thickness of 86 feet. The test well at Boise Spring found a thickness of 64 feet, though only the lower 17 feet were saturated.

Vashon till confining unit provides a base for the Qvr aquifer and confines the next regionally significant aquifer (in which the PC Johnson wells are completed). The upper portion of the confining unit is formed by Vashon till, but it also includes low permeability portions of the Qpvu deposits.

Drilling at the Watercress site did not fully penetrate this confining unit. It was found at depths of 19 to 46 feet. Drilling near Boise Spring found a Qvt thickness of 9 to 11 feet with up to 46.5 feet of Qva present as well beneath the till. Though the Qva forms an aquifer where the saturated thickness is sufficient to supply a well, it is not considered a significant aquifer for the City, as none of the City's sources are supplied by the Qva.

Pre-Vashon aquifer supplies the PC Johnson wells. It was identified as part of the Salmon Springs Drift by GeoEngineers (1998). The aquifer occurs at a depth of approximately 190 feet at the PC Johnson site. Its presence has not been confirmed at Watercress (approximately 0.5 miles south of PC Johnson) nor at the golf course site. It is believed to be absent at Boise Spring.

3.2.2 Boise Spring Hydrology

The Boise Spring facility has been a water source for the City since the early 1900s. The facility is located to the east of the City, south of Highway 410 on the northern flank of Baldy Hill, in the

SW ¼ of the NE ¼ and the SE ¼ of the NW ¼ of section 29, Township 20 North, Range 7 East (figure 2). The spring collection system is located on City-owned property and is surrounded by a fenced sanitary setback. The area surrounding the City's property is privately-owned timber land. The City has certificated municipal water rights for the site that authorize an instantaneous rate of 898 gpm (Qi) and an annual quantity of 1,270 acre feet (Qa).

Based on a review of records provided by the City, the Boise Spring source was constructed in the early 1900s. The structure has been updated several times. The facility currently consists of an "L"-shaped, below-ground vault constructed of concrete and stacked rock, with a concrete lid supported by concrete pillars. The longer arm of the L measures approximately 20 feet by 6 feet and has two 12-inch lateral collector lines entering its end. The short arm of the L measures 14 feet by 7 feet and houses the overflow and water system inlet. The long arm of the L is generally oriented to the southeast, the short leg to the southwest. An investigation of the facility in 2007 by Robinson, Noble & Saltbush indicated that the facility is in generally good condition. However, based on testing accomplished as part of the 2007 site investigation, there does not appear to be a significant amount of additional water production capacity available from this site in its current configuration as the head losses in the piping leading to the City's distribution system limit the amount of flow from the facility.

Recent test drilling at the City's Boise Spring property determined that unconsolidated material at the site is 57 feet thick (Pacific Groundwater Group, 2008). The spring is formed in the uppermost sequence of the coarse permeable deposits, interpreted as the Vashon recessional outwash. Underlying these sediments is approximately ten feet of Vashon till, which is sufficient to create a low permeability layer to perch the spring. The till caps approximately 40 feet of Vashon advance outwash sands which are deposited directly on the Tertiary bedrock. A test well and monitor well drilled to the east of the spring indicate that the recessional outwash thickens considerably to the east. Water level responses observed at the spring during drilling and testing of the test well imply continuity between the Vashon recessional outwash aquifer observed at the test well and Boise Spring. Figure 2 presents a diagram of the Boise Spring property with the location of the new test and monitor wells added. Available water well reports are presented in Appendix A.

The Vashon recessional outwash, while less than five feet thick at the spring location, is considerably thicker in the two wells drilled to the east of the spring. These wells penetrated 65 feet of Vashon recessional outwash material, though the upper 48 feet was dry. Pumping tests indicate an average aquifer transmissivity of 7,400,000 gpd/ft, and the average storage coefficient of 0.12 (dimensionless ratio), which indicates the aquifer is unconfined. GeoEngineers (1998) identified a northwest gradient for the Boise Spring site consistent with that indicated by the recent drilling and testing by Pacific Groundwater Group.

The Vashon recessional outwash is truncated to the north and west of the spring where it has been eroded away. The southern limit of the aquifer is the bedrock or lower permeability sediments on the flank of Baldy Hill. The eastern boundary is not clear from available

information, but the deposits appear to extend to a point where the recessional outwash sediments are in continuity with Boise Creek. Based on the elevation of the underlying till surface, it is believed a losing reach of Boise Creek (a reach where the net discharge to groundwater is greater than the recharge from groundwater) is recharging the aquifer. This presumption is supported by the fact that the small topographic catchment where the spring facility is situated is insufficient to provide the volume of discharge observed at the spring. Discharge from this aquifer forms springs along the valley wall where the aquifer is truncated. Larger springs (such as Boise Spring) form where the shape of the underlying till surface focuses flow into a smaller discharge area.

3.2.3 Watercress Spring Hydrology

The Watercress Spring site is located approximately one mile east of the City in the NW ¼ of section 19, Township 20 North, Range 7 East. The facilities at the site include a spring collection facility, a monitoring well network, and the new replacement well (Figure 3). The springs in this area are fed by the semi-confined Vashon recessional aquifer which is locally covered to varying degrees by the Osceola Mudflow deposits. The Vashon recessional aquifer overlies the Vashon till which provides a low permeability layer for the base of the aquifer. The spring collection system is surrounded by a sanitary setback, and the area surrounding this is undeveloped land. The City has certificated municipal water rights for the site that authorize an instantaneous rate of 2,287 gpm (Qi) and an annual quantity of 2,487 acre feet (Qa).

Historically, Watercress Spring was capable of producing the full instantaneous water right, but this rate could not be sustained for prolonged periods. In an effort to address this deficiency of the Watercress Spring source facility, Robinson, Noble & Saltbush recently completed an investigation of the hydrogeologic conditions at the facility for the City of Enumclaw (Robinson, Noble & Saltbush, 2006a). During this investigation, five monitoring wells were installed around the spring collection facility to characterize the shallow aquifer that feeds the spring and monitor water level responses to production from the spring facility.

As a result of this investigation, a 20-inch replacement well was drilled to a depth of 50 feet at this location (Robinson, Noble & Saltbush, 2007b). This well is screened in a coarse gravel deposit (Vashon recessional outwash) present from 20 to 40 feet below ground. This deposit was also encountered throughout the monitoring network. Subsequent testing indicates that the unit is the same geologic unit supplying the nearby spring system.

The new well was constructed with a sanitary surface seal of hydrated bentonite. It is better protected than the spring collection facility nearby because this seal is installed through the entire 20-foot cover of mudflow deposits between the aquifer and land surface. Refer to Appendix A for a construction diagram and a geologic log of the well. During testing, the Watercress Well was pumped at rates of up to 4,300 gpm. The Watercress Well is rated for production at 2,287 gpm (which correlates with the instantaneous withdrawal rate under the City's existing water rights for Watercress Spring).

The Vashon recessional outwash varies in thickness in the vicinity of the Watercress facility. Monitor well drilling identified aquifer thicknesses ranging from 8 to 30 feet. In fact, the aquifer was not encountered at the initial drilling location for the replacement well (to a depth of 35 feet). The location was moved less than 50 feet and 20 feet of aquifer was encountered. The outwash gravel was deposited directly on the eroded surface of the Vashon till, forming an irregular base. Drilling records indicate that the upper surface of the gravel deposit is also irregular, either as a result of depositional processes or subsequent erosion.

The recessional outwash aquifer responds in a channel-like fashion rather than as an extensive and uniform deposit of gravel. Significant boundary effects were apparent in the water levels recorded during the pumping tests of the replacement well. The hydraulic conductivity of the aquifer materials are among the highest seen in the region, with implied values as high as 26,700 ft/day. The very early test data at the replacement well itself (prior to the serious reflection of the aquifer boundaries) indicate an aquifer transmissivity of approximately 4,000,000 gpd/ft. The calculated storage coefficient for the recessional outwash aquifer is 0.12 (dimensionless ratio). Even with the limited lateral extent and channel-like nature of the aquifer, it can support substantial production given such highly permeable material.

3.2.4 PC Johnson Wellfield Hydrology

The PC Johnson Wellfield is located approximately two miles to the northeast of the City at the intersection of Southeast 424th Street and 284th Avenue Southeast in the SW ¼ of section 18, Township 20 North, Range 7 East. Three wells have been drilled at this location: PC1, PC2, and PC3. All of these wells were completed in a confined pre-Vashon sand and gravel aquifer (Hart Crowser, 1980; Robinson & Noble, 1986; Robinson, & Noble, 1997). A diagram of the PC Johnson wellfield is presented in Figure 4. Please refer to Appendix A for the construction diagrams and geologic logs of the three wells.

Test drilling by Hart Crowser in 1980 identified 59 feet of permeable sand and gravel present below 171 feet at this location. Subsequent drilling at the site (Wells PC2 and PC3) encountered the brown sand and gravel aquifer somewhat deeper (205 and 195 feet below surface, respectively). These permeable sands and gravels are interbedded with lower permeability silty sands and gravels. In the initial work by Hart Crowser, these sediments were referred to as the Salmon Springs aquifer. The actual type section for the Salmon Springs formation is located approximately 10 miles to the west of Enumclaw on the valley wall east of Sumner at an elevation of approximately 250 feet. This elevation is approximately 300 feet lower than bottom of the formation forming the aquifer at the PC Johnson Wellfield. Recent mapping and interpretation in the Puget Lowland has resulted in a significant revision to the stratigraphic nomenclature. Based on this stratigraphic re-interpretation, the aquifer supplying the PC Johnson Wellfield is not likely correlative with the Salmon Springs deposits, which have recently been dated to approximately 1 million years in age. Based on the reviewed information and without age dating of the deposits or overlying/underlying units, it is not possible to confidently determine the formation name for the aquifer supplying the PC Johnson wellfield.

A recent analysis of the wellfield provides a detailed chronology of the development of this source and the efforts at maintaining the individual wells since their installation (Robinson, Noble & Saltbush, 2008). In summary, PC2 has undergone multiple redevelopment attempts in order to regain lost productivity. Due to a loss in production as a result of encrustation and fouling problems, Holt Drilling decommissioned PC1 in 1997. Well PC3 was drilled in 1997 to replace PC1. Per the recent review of the City's water rights at this location, it has been determined that the City has certificated municipal water rights for the site that authorize an instantaneous rate of 1,500 gpm (Qi) and an annual quantity of 1,680 acre feet (Qa).

The permeable pre-Vashon deposits that supply the PC Johnson Wellfield are found from 175 to 231 feet below land surface at the wellfield where, according to the driller's log for PC1, bedrock was encountered. Other than the information at the wellfield, there is limited information regarding the extent or thickness of these deposits. Clearly, the bedrock of the Cascade foothills bounds the aquifer to the east. The valleys of the White and Green Rivers are incised through these sediments and truncate the aquifer materials forming effective boundaries to the north, south, and west. Pumping tests indicate an aquifer transmissivity of 50,000 gpd/ft, and the measured storage coefficient of $2.5X10^{-4}$ indicates the aquifer is confined. The recharge to the aquifer results from the downward percolation of precipitation through the overlying aquifers and confining units. Discharge points include reaches of the White and Green Rivers, springs along the valley sides, and the lower reaches of Newaukum Creek.

3.2.5 Golf Course Well Field Hydrology

In 2004, the City was deeded the Enumclaw Golf Course, formerly owned and operated by the King County Parks department. The golf course has historically relied upon a well to provide irrigation water. The irrigation well was drilled in the 1950s. The irrigation well is located near the 16th tee box, on the western edge of the golf course. An investigation of this well in 2006 suggested that, while the well produces a considerable amount of water, the general condition of the well house and wellhead are poor. A test well was drilled approximately 200 feet to the south of the golf course irrigation well in June 2006 (Robinson, Noble & Saltbush, 2006b). The test well confirmed the presence of a significant thickness of aquifer material at the location and served as a monitoring point during a pumping test of the golf course irrigation well.

Based on these test results, a replacement for the irrigation well was drilled in 2007 (Robinson, Noble & Saltbush, 2007a). The replacement production well is located at 45224 284th Avenue SE in the SE ¼ of section 30, Township 20 North, Range 7 East, near the Enumclaw Golf Course and the Enumclaw Expo Center (formerly the King County Fairgrounds). The well was drilled to 137 feet below ground surface and is screened from 81 to 131 feet below ground surface (see Appendix A for well construction and geologic log). Figure 5 presents a diagram showing the locations of the old irrigation well, the monitoring well, and the new Golf Course Replacement Production Well.

The aquifer in which the irrigation well, test well, and replacement well are completed has a transmissivity of over 1,000,000 gpd/ft. Data collected during the pumping test of the

replacement well identified a negative aquifer boundary (an apparent transmissivity decrease to 488,000 gpd/ft after five hours of pumping). Clearly, the aquifer is bounded to the east where it is truncated by the bedrock outcrops forming Baldy Hill and the Cascade foothills. The valley of the White River also forms an effective boundary to the south as it cuts completely through the aquifer deposits. The western extent of the aquifer has not yet been determined.

Recharge to this aquifer is a result of infiltration of precipitation through the overlying sediments. Discharge points may include the lower reaches of Boise Creek and springs formed in the valley of the White River where the valley truncates the aquifer. The City has certificated water rights for the site that authorize an instantaneous rate of 676 gpm (Qi) and an annual quantity of 516 acre feet (Qa).

3.3 Conceptual Model

The geology of the Enumclaw area is quite complex, varying from volcanic and sedimentary bedrock to highly permeable glacial outwash deposits. The area can generally be described as an alluvial upland extending westward from the Cascade foothills, truncated by the valleys of the Green and White Rivers. Sediments forming the upland consist of recent alluvial deposits, glacial outwash and till deposits, older interglacial and glacial sedimentary deposits, and lahar or mudflow deposits from Mt. Rainier. Aquifers form in the higher permeability sand and gravel unconsolidated deposits that are present below the water table. Confining units are formed by lower permeability deposits such as mudflow and till.

As delineated by the Cascade Foothills and the two rivers, the upland is generally triangularly shaped. Bedrock forms an effective eastern boundary for aquifers in the area. The White and Green Rivers form discharge boundaries on the other two sides of the triangle.

A conceptual model of the hydrogeologic system was developed for this study based on known and available information. Aquifers were defined based on the geology of the area as presented by the Pacific Northwest Center for Geologic Mapping Studies (2006), the subsurface information available from water well reports, and the boundary conditions created by the upland and foothills. Aquifer parameters were defined at the locations of the production wells where detailed testing information was available. The extents of the aquifers were defined based on information from geologic mapping, water well reports, and geographic features. A diagram of the conceptual model is presented on Figure 6.

3.3.1 Hydrostratigraphic Units

The geologic and hydrostratigraphic units of the area are described in Section 3.2. The hydrostratigraphic units of the conceptual model are essentially the same as presented with some minor simplifications. The Vashon recessional and the ice contact deposits are lumped together as a single hydrostratigraphic unit. Bedrock is not differentiated by type, but represented as a single hydrostratigraphic unit. The aquifer units were defined at the locations of the sources and refined based on additional subsurface data and observations. Thicknesses

and hydraulic conductivities for the aquifers were established at each known location. The areal extent of each aquifer was based on additional well logs, well testing, and geologic mapping.

3.3.2 General Recharge and Discharge

The Enumclaw area received an average of over 56 inches of precipitation per year for the period from 1999 to 2007, most of this falling as rain. The foothills to the east of the City receive even higher amounts of rain and snow. Recharge to the aquifers is a result of the direct infiltration of precipitation into the aquifer sediments (particularly for the Vashon recessional outwash aquifer), runoff from bedrock and its subsequent infiltration along the edge of the foothills, infiltration of runoff in losing reaches of local streams (reaches where water from the stream percolates into the subsurface), and indirect infiltration of precipitation through overlying confining units. Septic return flow also provides a minor source of recharge in some areas. Discharge from the aquifers occurs in gaining reaches of streams and rivers (where groundwater percolates into the streams), as well as at springs, seeps, and wells. Evapotranspiration may also be an important discharge mechanism of the Vashon recessional outwash aquifer.

3.3.3 General Flow System Patterns

Generally speaking, water flows from the foothills of the Cascades toward the discharge points. The ice contact deposits along the foothills capture precipitation (both directly and as runoff) and recharge the aquifer systems. The balance between the recharge and the rate of discharge through springs and seeps creates a gradient with a westerly pattern. Local bedrock outcrops and geologic changes influence the gradient, as does recharge from or discharge to the streams.

3.3.4 Model Description

At Watercress and the golf course locations, the two major, nearby boundaries for the Vashon recessional aquifer are bedrock (on the east) and local creeks (Newaukum Creek for Watercress and Boise Creek for the golf course site). The bedrock bounds the aquifer and the creeks form a line of discharge for the aquifer. The White River forms a more distant discharge boundary further to the west and southwest. Recharge to the Vashon recessional aquifer system is largely from precipitation. Discharge is by several mechanisms.

Water from precipitation enters the aquifer via four distinct routes: direct infiltration where the mudflow deposits do not cover the Vashon recessional aquifer, direct infiltration of runoff from the bedrock foothills, leakage out of losing stream reaches, and leakage of infiltration through the overlying mudflow deposits. Water levels in the aquifer are higher near the bedrock foothills in part because the recharge rate is higher in this area. This is where the aquifer at least partially lacks a confining layer (the mudflow deposits are partially absent in this area) so that the permeable sediments containing the aquifer receive direct infiltration of precipitation. Further, this is where runoff from the bedrock can also directly recharge the aquifer. A smaller source of recharge is septic system return flow in areas not connected to sanitary sewer systems.

The main discharge from the Vashon recessional aquifer is to local (and regional) surface waters, through water production (wells), and as leakage to deeper hydrostratigraphic units. The aquifer provides baseflow to Newaukum Creek and Boise Creek either directly or through springs (such as Watercress). To the west and south of Enumclaw, the Vashon recessional aquifer likely discharges to the White River. To the north, the aquifer likely discharges as spring flow above and tributary to the Green River. Leakage out the base of the aquifer, through the confining layer formed by the underlying Vashon till, also forms a major discharge for the Vashon recessional aquifer (and provides considerable recharges to the deeper aquifers). Water production from the City's facilities at Watercress and the golf course (and to a lesser extent by domestic wells) also serves as a large aquifer discharge, though not at the scale of the other two outflow mechanisms. Where the water table is near the ground surface, evapotranspiration can become an important discharge mechanism.

Generally,water flows through the Vashon recessional aquifer from the bedrock highlands toward discharge points along Newaukum Creek and the White River. This makes the flow generally in a western direction. GeoEngineers (1998) identified a northwest trending gradient for the Vashon recessional aquifer through the Watercress site (toward Newaukum Creek). Measurements collected from the monitoring network at the Watercress site during the Watercress study completed in 2006 indicate the gradient is to the west-northwest (Robinson, Noble & Saltbush, 2006a).

The deeper, pre-Vashon aquifer that the PC Johnson Wellfield is completed in receives recharge via the infiltration of water from overlying saturated materials as described above. The flow pattern is somewhat easier to describe, as there is less of an influence on the aquifer system from the shallower creeks and springs. Discharge points include reaches of the White and Green Rivers with elevations below approximately 550 feet above sea level, springs along the valley sides below this elevation, and the lower reaches of Newaukum Creek. In a general sense, water flows through this aquifer system from the bedrock highlands of the east toward discharge points along the Green River, the lower reaches of Newaukum Creek, and the White River. This makes the flow generally in a west to northwest direction. GeoEngineers (1998) identified a northwest trending gradient for the aquifer at the PC Johnson site.

4.0 WHPA Delineation

4.1 Introduction

Wellhead protection areas are based on capture zones. Capture zones are the area around a groundwater source that contributes flow to the source during a specified period of time. Capture zones are typically presented as boundaries on a map, though this mode of presentation does not account for the vertical component of the system. Water applied to the ground surface within the travel-time capture zone may or may not reach the source within the indicated travel time, as the aquifer supplying the source in question may be at depth beneath the surface, or may be protected from surficial impacts by a low permeability deposit between the top of the aquifer supplying the source and the land surface.

Travel-time boundaries of capture zones can be determined by either technical or non-technical methods, although technical methods are preferred so that the WHPP better protects the actual area contributing water to the source. There are four delineation methods approved by the Health for the development of a WHPP. They are, from generally least to generally most accurate: the calculated-fixed-radius method, analytical modeling, hydrogeologic mapping, and numerical modeling. The particular method employed (and the accuracy of that method) depends largely on the availability of hydrogeologic data. Numerical modeling, for example, can be highly accurate but also typically requires a relatively large amount of data. For areas with typical data availability, time-of-travel boundaries are commonly delineated by hydrogeologists through the use of analytical modeling, hydrogeologic mapping, or a combination of these two methods. These methods typically provide a reasonably technical level of delineation.

4.2 Model Descriptions

For this study, two techniques were employed to delineate the capture zones for the City's wellfields, analytic element modeling, and hydrogeologic mapping. Analytic element modeling is a specialized form of analytical model that allows considerably more flexibility than standard analytical modeling. While analytic element modeling is typically limited to a single layer, it is well suited to modeling areas where there is considerable interaction between groundwater and surface water, such as the springs and shallow aquifers that supply the City of Enumclaw. Analytic element modeling is not as intensive an approach as numerical modeling. However, unlike simple analytical modeling, the analytic element modeling approach can address complex boundary conditions and heterogeneities in subsurface materials and recharge.

An analytic element model was developed for an area that included both the Watercress and golf course locations; another somewhat simplified analytic element model was developed for the PC Johnson wellfield. After review of the PGG's Boise Spring investigation (PGG, 2008), it was concluded that the perched sequence of the Vashon recessional that forms Boise Spring is heavily influenced by flow in Boise Creek. Analytic element modeling was found to not be appropriate for the definition of capture zones for Boise Spring due to the short residence time of water in the aquifer. As a result, the capture zone delineation for Boise Spring was accomplished by hydrogeologic mapping using existing maps, topographic data, and evaluation of the recently completed work (PGG, 2008). The capture zones were evaluated and analyzed to define appropriate wellhead protection areas. The WHPAs defined for the City's sources by this project are shown on Figure 7.

Analytic element models were generated with the program GFLOW 2000, version 2.1.2, by Haitjema Software. This modeling code divides a modeled domain into near-field and far-field regions. Generally, modeled features in the near-field region can directly be recharge or discharge points. Features in the far-field region do not directly provide recharge or discharge to the model, but provide head control for the near-field area. Thus, modeled streams within the near field gain or lose water to the aquifer, while streams in the far field only provide head

control. Boise Creek and Newaukum Creek have both near-field and far-field reaches defined. The White and Green Rivers were represented by elevation-controlled line sinks[2] in the far field as a means for water to exit the model. The elevations of the streams were determined based on elevation information on U.S. Geological Survey topographic maps of the area.

Recharge from precipitation was applied over the entire modeled domain. It was assigned a value of 0.0064 feet per day (28 inches per year) based on calculations detailed in Woodward and others (1995). Additional recharge was applied in areas representing the unconfined portions of the Vashon recessional and Vashon ice contact deposits at a rate of 0.0032 feet per day (an additional 14 inches per year). The additional recharge provided in these areas was also based on calculations from Woodward and others (1995). The confined and semi-confined Vashon recessional aquifer did not have additional recharge applied to it, as the overlying Osceola Mudflow confining unit (which was the basis for the primary recharge coverage) controls the amount of recharge reaching the aquifer.

The model used for the calculation of the Watercress and golf course capture zones was built based on the considerable amount of recent subsurface work in the area (Robinson, Noble & Saltbush, 2006a, 2006b 2007a, and 2007b). The recent drilling and testing provided accurate aquifer thicknesses and hydraulic conductivity information as well as accurate gradients and head values. Aquifer thickness was set at 50 feet for the Watercress area and 95 feet for the area around the golf course. Hydraulic conductivities were 2,430 and 1,575 feet per day for the near-field aquifer areas, respectively. Bedrock forming the Cascade foothills was defined as an aquifer inhomogeneity with a very low hydraulic conductivity and porosity using the mapped geology (Pacific Northwest Center for Geologic Mapping Studies, 2006). Smaller bedrock features (such as Pinnacle Peak southwest of the golf course well and the smaller, unnamed bedrock knob near Watercress) were represented by no-flow boundaries. Ice contact deposits and lower-permeability aquifer regions were represented by aquifer inhomogeneities with lower conductivity values bordering the higher conductivity areas. Shapes of these inhomogeneities were controlled by subsurface information where available, and adjusted as appropriate to create the observed head patterns.

The model for the PC Johnson wellfield used the same bedrock boundary as was defined in the Watercress version, as well as the same recharge and drain configurations. The aquifer was modeled with a thickness of 200 feet and a hydraulic conductivity of 250 feet per day. Similar to the Watercress/golf course model, the PC Johnson model included several regions with differing thicknesses and hydraulic conductivities around the aquifer as the model transitions to the background values. The shapes and characteristics of these inhomogeneties were adjusted to calibrate the head pattern and levels in the model.

The model that was used for the investigation of Boise Spring was defined based on the geology presented by PGG in the recent Boise Spring study (PGG, 2008). Modeling was approached in a similar fashion, but a smaller region was considered. As in the Watercress/golf course model

[2] A line sink is a model element with defined water elevations.

and the PC Johnson model, the hydrogeology of the region was represented by several regions of differing hydraulic conductivity. The aquifer thickness varied based on the location in the model, as the Vashon recessional is unconfined. Hydraulic conductivity was set at 5,000 feet per day, somewhat less than the value measured by PGG. Boise Creek was modeled in the near field and provided head control as well as discharge and recharge. Similar to the other models, shapes and characteristics of the model's inhomogeneties were adjusted to calibrate the head pattern and levels in the model.[3]

While an analytic element model is not generally calibrated in the way a numerical model can be, the calibration of the models used in this effort was accomplished through the adjustment of the base model hydraulic conductivity, the conductivity of the line sinks, and the thicknesses and hydraulic conductivities of the inhomogeneities bordering the aquifers. Calibration targets were the observed water levels at the respective wellfields, general gradient patterns, and estimated water levels in areas without sufficient field-supported data.

4.3 Uncertainty

As with any sort of method used to delineate capture zones, the methods used in this effort contain an inherent amount of uncertainty. Modeling can accurately delineate capture zones when the system involved is well defined and relatively simple. Unfortunately, real-world groundwater systems are typically not simple, and hydrologic information is often sparse. While the models used herein were specifically designed to simulate the systems and were developed based on available geologic information, the information used is by no means comprehensive.

With the exception of the bedrock boundaries that were based on observation of the outcrops, the stratigraphic boundaries used were inferred based on interpretations of the geologic information available, particularly that presented by the Pacific Northwest Center for Geologic Mapping Studies (2006). Subsurface information and aquifer parameters are only available at limited locations, requiring an interpretative approach for the generation of the models. Application of detail where information is available and interpretation of the remainder of the subsurface (based on the site-specific information) helps to mitigate uncertainty in the models resulting from the variability of the subsurface. Generally speaking, the effects of localized heterogeneities in the aquifer "average out" as the modeled domain gets larger and as one moves further from the production points.

Gradient has a significant control on the location and shape of the delineated capture zones. The gradients modeled are similar to the measured values for the Watercress site as presented in Robinson, Noble & Saltbush (2006a). Unfortunately, no such time-synchronous data sets are available for the golf course or PC Johnson sites to determine gradients for these locations. For these sites, the modeled gradients are generally consistent with what was presented in

[3] While a model was made for Boise Spring, it was not used to determine WHPAs when analyses indicated the residence time for water in the aquifer supplying the spring was less than six months.

GeoEngineers (1998). Capture zones were slightly broadened to account for gradient uncertainty when defining the wellhead protection areas.

4.4 Wellhead Protection Areas

Wellhead protection areas are typically presented as zones based upon the horizontal time of travel for water captured by a well (or other groundwater source) to move through the aquifer. Typically, they are defined for periods of six months, one year, five years, and ten years. In all cases for the City's groundwater sources, aquifer boundaries are reached before the ten-year time of travel limit, so Zone 4 represents a buffer zone rather than a true ten-year time of travel. Defining travel times for wellhead protection Zones 1 to 4 are given below. Collectively, the zones for a specific source form the wellhead protection area for that source.

Zone 1	6-month time of travel
Zone 2	1-year time of travel
Zone 3	5-year time of travel
Zone 4	Buffer zone

4.4.1 Boise Spring

The Boise Spring capture zone and wellhead protection area were determined through hydrogeologic mapping of the catchment area and time-of-travel calculations. Initial calculations of the catchment area and precipitation indicate that precipitation falling within the probable catchment (the topographically defined basin contributing water to the spring) is inadequate to supply all of the discharge observed from Boise Spring. This indicates that the spring is supplied by an area of contribution larger than the valley in which the spring is located. An analytical element model of the Vashon recessional aquifer in this area supports this calculation.

The Vashon recessional aquifer supplying the spring is unconfined locally and will readily accept recharge resulting from the infiltration of precipitation on the north-eastern side of Baldy Hill. Further to the east, the Vashon recessional is covered with lower permeability deposits from the Osceola mudflow. As discussed in Section 3.2.2, the spring is formed within the Vashon recessional and is perched on top of the Vashon till. According to the information presented in PGG (2008), the surface of the till slopes downward from the north and west toward the location of the spring. The shape of the till surface serves to direct water in the overlying Vashon recessional outwash to the spring. Additionally, a reach of Boise Creek flows across the Vashon recessional outwash to the east of the spring. An analysis of the elevation relationships between the spring, the water levels in the test and monitoring wells, and the creek suggests that this reach of Boise Creek may be a losing reach, providing recharge to the aquifer supplying the spring.

The recent drilling and testing at the Boise Spring property (PGG, 2008) observed groundwater seepage velocities (average linear velocity of water traveling through the aquifer) that approached 1,500 feet per day based on the impact to water quality at the spring due to drilling.

With such a high velocity, a volumetric analysis of the local spring catchment suggests that it has a residence time of less than 6 months. This analysis is based on constant production from the spring set to the maximum instantaneous water right flow of 898 gpm (approximately 14% more than the average flow allowed on an annual basis) and an average annual recharge falling on the catchment area. This analysis, as well as the PGG study, determined that Boise Spring is fed by the Vashon recessional aquifer.

With the short residence time described above, water travels from recharge to discharge in this system within a 6-month period. Consequently, the WHPA for Boise Spring is formed solely by Zones 1 and 4. Zone 1 of the Boise Spring wellhead protection area forms an irregular "rectangular" shape trending from the southeast to the northwest on its long axis. This zone extends to the top of Baldy Hill, approximately 3,000 feet from the spring facility. The first topographic ridge to the west of the spring forms part of the western boundary of Zone 1, the remainder of the western boundary is formed by the edge of the recessional outwash deposits which also forms the northern edge. The southeastern boundary of Zone 1 occurs along the topographic ridge extending northward from the easternmost peak of Baldy Hill, approximately 3,500 feet from the spring facility. The eastern boundary of Zone 1 was established based on the location of the topographic ridge to the east of the spring. Due to the complexities of the interaction between the Vashon recessional aquifer and Boise Creek, the remainder of the Boise Creek drainage basin has been delineated as Zone 4, a buffer zone, for Boise Spring.

4.4.2 Watercress Spring and Production Well

Capture zones for the Watercress Spring facility were calculated using the analytic element model described earlier. Production from this facility was modeled at a rate of 2,287 gallons per minute from the Watercress Well, which corresponds to the maximum withdrawal rate allowed under the water rights for the facility. Were the instantaneous rate produced continuously, the total withdrawal would exceed the total annual production rate allowed under the City's water rights. Use of the instantaneous pumping rate is a conservative approach for the delineation of capture zones and is generally consistent with the methodology used in the previous wellhead protection plan (GeoEngineers, 1998).

Due to the modeling software and technique used, the modeled capture zones extended past the bedrock forming the Cascade foothills that truncate the aquifer. This is an artifact of the modeling method, as bedrock was not modeled as a no-flow boundary but rather was modeled as an aquifer material with a low porosity and hydraulic conductivity. The capture zones will be effectively truncated at the bedrock boundary, though the aquifer may receive recharge from precipitation falling on the western side of the divide at the top of the ridge. The modeled capture zones were evaluated and interpreted to form the wellhead protection areas presented on Figure 7.

The wellhead protection area for the Watercress Spring facility forms an ellipsoid that extends to the east and intercepts the wellhead protection area for the PC Johnson Wellfield. Zone 1 of

the Watercress Spring WHPA forms a rough circle that extends 2,300 feet to the east of the facility and 500 feet to the west. Zone 2 for Watercress Spring reaches 5,000 feet to the east, almost to the bedrock boundary formed by the Cascade foothills. Zone 3 intersects with Zone 3 of the PC Johnson Wellfield, creating a roughly rectangular combined wellhead protection area that reaches the limits of the aquifer where it is truncated by the bedrock located 6,700 feet to the east of the facility. Zone 4 (the buffer zone) extends eastward to the first topographic divide east of Zone 3 and represents the topographically defined area that drains into Zone 3.

4.4.3 PC Johnson

Capture zones for the PC Johnson Wellfield were calculated using the analytic element model described earlier. Production from the two wells was set at 900 gallons per minute for PC2 and 600 gallons per minute for PC3. These rates correspond to the combined 1,500 maximum instantaneous pumping rates allowed from the wellfield by the City's water rights. This rate of production would exceed the annual production rate allowed under the wellfield water rights by approximately 44% if operated continuously at these rates. Because a portion of the annual quantity allowed on the wellfield water rights is defined as supplemental to the annual quantity on the City's Watercress and Boise Springs water rights, the total production assumed for PC Johnson in this analysis would never be produced concurrent with the maximum annual water production allowed for Watercress. However, for simplicity and conservatism in defining the WHPAs, the maximum instantaneous water right production rates were assumed to be produced concurrently at both the wellfield and at Watercress in the modeling effort.

The PC Johnson Wellfield (PCJ) Zone 1 forms an ellipsoid that reaches 1,100 feet to the east of the wells. PC Johnson Zone 2 intercepts the Watercress Spring Zone 2, forming an irregular shape as described above. Zone 3 is fully combined with Zone 3 from the Watercress facility and is truncated by bedrock approximately 6,500 feet to the east of the site. Zone 4 (the buffer zone) extends to the first topographic divide to the east of Zone 3.

4.4.4 Golf Course

The Golf Course Replacement Production Well has an irregularly shaped capture zone that wraps around the southern end of Baldy Hill. Similar to the other areas, bedrock truncates the aquifer before a ten-year time of travel is reached. The production rate of the Golf Course Production Well was set at 676 gallons per minute, which corresponds to the instantaneous rate allowed under the City's water rights but is approximately twice the allowed annual water right quantity.

The Zone 1 of the WHPA for the Golf Course Replacement Production Well extends 1,500 feet to the southeast from the wellhead, reaching Boise Creek. As the water in the creek is at a higher elevation than the water in the aquifer, it is possible that surface water from the creek may be recharging the aquifer at this location, and therefore, that the well may potentially capture any contaminant introduced to the creek. However, the geology of the area is mapped as mudflow deposits which are expected to have a low vertical permeability, likely and substantially mitigating this risk. Regardless, the potential for impact to the well due to a surface spill

reaching the creek is something to be aware of. Zone 2 extends nearly to the base of Baldy Hill, approximately 2,000 feet to the southeast of the wellhead. Zone 3 is truncated by the bedrock forming Baldy Hill and extends to the south for approximately 5,500 feet. Zone 4 (the buffer zone) extends to the top of Baldy Hill.

5.0 Hazard Inventory and Risk Assessment

5.1 Introduction

The inventory of potential contaminant sources within the wellhead protection areas was performed according to the December 1993 Washington Department of Health guidance document entitled, "Inventory of Potential Contaminant Sources in Washington's Wellhead Protection Areas." This section summarizes the basic steps for conducting an inventory, including:

- Review and identification of potential and known contaminant sources
- Data management
- Prioritizing risks to the WHPA

A summary of potential contaminant sources presented in the Health document is reproduced in Table 1. These sources were considered when performing the contaminant inventory for the Enumclaw WHPA. The inventory was completed for the area surrounding Enumclaw and its four water sources.

5.2 Contaminant Source Inventory Methodology

Parcel Insight, Inc. (PI), an environmental database research company, reviewed federal and state environmental databases for any known or potential contaminant sites within a designated area surrounding Enumclaw. The area researched can be found in the PI report presented in Appendix B. Identified hazard locations within and proximal to the wellhead protection areas can be found on the hazard inventory map (Figure 8). The identified hazard inventory list can be found in Appendix C. The following Washington State Department of Ecology and EPA databases were reviewed in order to locate sites of known or potential soil and groundwater contamination. Definitions of these databases can be found in the PI report.

- NPL
- RCRA CORRACTS
- RCRA TSD
- CERCLIS
- CERCLIS NFRAP
- ERNS
- RCRA LQG
- RCRA SQG
- RCRA CESQG
- LUST ACTIVE TRIBAL
- LUST INACTIVE TRIBAL
- BROWNFIELDS
- HMIRS
- TRIS
- CSCSL
- CSCSL HSL
- CSCSL NFA
- LUST
- UST
- SWLF SEA
- SWLF KING
- SWLF STATE
- DECISIONS
- INST ENG CONTROLS
- RCRA ND

Table 1: Potential Contaminant Sources Listed by Type

Category I

Sources Designed to Discharge Substances

Subsurface Percolation (e.g. septic tanks and cess-pools)
Injection Wells
- Hazardous waste
- Non-hazardous waste (e.g. brine disposal and drainage)
- Non-waste (e.g. enhanced recovery, artificial recharge solution mining, and in situ mining)

Land Application
- Wastewater (e.g. spray irrigation)
- Wastewater by-products (e.g. sludge)
- Hazardous waster
- Non-hazardous waste

Category II

Sources Designed to Store, Treat, and/or Dispose of Substances; Discharge through Unplanned Release

Landfills
- Industrial hazardous waste
- Industrial non-hazardous waste
- Municipal sanitary

Open Dumps, Including Illegal Dumping (Waste)
Residential (or Local) Disposal (Waste)
Surface Impoundments
- Hazardous waste
- Non-hazardous waste

Waste Tailings
Waste Piles
- Hazardous waste
- Non-hazardous waste

Materials Stockpiles (Non-waste)
Graveyards
Animal Burial
Above-ground Storage Tanks
- Hazardous waste
- Non-hazardous waste
- Non-waste

Underground Storage Tanks
- Hazardous waste
- Non-hazardous waste
- Non-waste

Containers
- Hazardous waste
- Non-hazardous waste
- Non-waste

Open Burning Sites
Detonation Sites
Radioactive Disposal Sites

Category III

Sources Designed to Retain Substances during Transport or Transmission

Pipelines
- Hazardous waste
- Non-hazardous waste
- Non-waste

Materials Transport and Transfer Operations
- Hazardous waste
- Non-hazardous waste
- Non-waste

Category IV

Sources Discharging Substances as a Consequence of Other Planned Activities

Irrigation Practices (e.g. return flow)
Pesticide Applications
Fertilizer Applications
Animal Feeding Operations
De-Icing Salt Applications
Urban Runoff
Percolation of Atmospheric Pollutants
Mining and Mine Drainage
- Surface mine-related
- Underground mine-related

Category V

Sources Providing Conduit or Inducing Discharge through Altered Flow Patterns

Production Wells
- Oil (and gas) wells
- Geothermal and heat recovery wells
- Water supply wells

Other Wells (non-waste)
- Monitoring wells
- Exploration wells

Construction Excavation

Category VI

Naturally Occurring Sources whose Discharge is Created and/or Exacerbated by Human Activity

Ground Water - Surface Water Interactions
Natural Leaching
Saltwater Intrusion/Brackish Water
- Upconing (or intrusion of other poor-quality natural water)

5.2.1 Field Survey

A windshield survey was performed by Robinson, Noble & Saltbush, Inc. on November 29, 2007 in order to verify the location of sites identified in the regulatory database review as well as locate potentially unregulated or unknown sites of potential contamination. This survey consisted of a drive-by reconnaissance of all known public roads in the study area in order to accurately map the location of known and potential sites for the inventory. Mail and telephone surveys, door-to-door surveys, and personal interviews were not performed. For each physically located site, notes, photos, and GPS data were recorded.

5.3 Land Use

In addition to site-specific hazards identified by the PI report or the field survey, certain land uses present potential hazards.

5.3.1 Residential Land Use

Certain types of residential land use can form a potential hazard. Residential land use is found within and surrounding the City limits. This includes low-density to high-density housing. Residential homes within the City limits are typically connected to the City's sewer system and do not typically pose a threat to groundwater quality. However, residential homes outside City limits typically rely on septic systems for sewage treatment and dispersal, creating a recognized hazard to groundwater quality. As a result of the presence of septic systems, residential land use areas that are outside City limits and fall within the City's WHPAs pose a risk to the City's groundwater sources. Besides septic effluent, other pollutants found in residential land use areas that can have a negative affect on groundwater quality including herbicides, pesticides, and common household chemicals (introduced to the environment through improper disposal methods including dumping into a septic system).

5.3.2 Commercial and Industrial Land Use

Commercial and industrial land use can form a variety of potential hazards. Commercial and industrial land uses are generally limited to the center and eastern portions of the City. The highest pollution hazard results from the use of underground storage tanks (UST) to store fuels or other hazardous chemicals. There is a small industrial sector on the east side of the city. Most of the businesses in this area are manufacturing operations. These sites may store/use hazardous chemicals for manufacturing.

5.3.3 Agricultural Land Use

Agricultural land use can also present potential hazards. A large portion of the area surrounding the City of Enumclaw is zoned for agricultural land use. Within this land use area there are two sources of pollution in addition to the residences also present on some agricultural properties. One source of pollution originates from ranching and the other is from farming. Livestock ranching is a source of nitrogen loading into shallow soils, surface waterways, and groundwater. Farming typically relies on many different chemical pesticides and herbicides to protect crops. Fertilizers are also commonly applied to crops to increase

yields. These fertilizers typically contain nitrogen, phosphorous, and potassium as primary nutrients, as well as smaller amounts of other chemicals. Additionally, a typical farm or ranch uses tractors or other large equipment, requiring use and storage of petroleum products and other chemicals on site for maintenance and repair of the equipment.

5.3.4 Forest Land Use

The foothills of the Cascade Mountains rise up to the east of the City of Enumclaw. Portions of these foothills are zoned as forest land use. This land use presents a minimal, but possible, threat for pollution. Possible sources of pollution include vehicle accidents involving fuel or oil spills, illegal dumping of waste, and mechanical failure of logging equipment that result in the release of hydraulic fluids, lubricating oils, or fuel.

5.3.5 Undeveloped Areas

All of the delineated WHPAs are within officially zoned areas, but not all of these zoned areas are currently developed. Undeveloped areas in the WHPA are expected to have the lowest potential for contamination due to the nature and low impact of activities occurring there.

5.4 Methodology for Establishing Risk Priority

The methodology for prioritizing risks in the City's WHPA was partially based on the EPA Guidance document entitled "Managing Ground Water Contamination Sources in Wellhead Protection Areas: a Priority Setting Approach" (1991). The ranking effort was also based on the level of confidence in data and information that is currently available for known and potential contamination sites.

Each site was ranked according to three decision levels. The decision levels are listed below in Table 2 (Level I represents the highest hazard risk criteria, Level III is the lowest).

Table 2: Overall Risk Prioritization

Decision Level	Available Data and Information
I	Proximity of potential hazard to the WHPA
II	Type of contamination per DOE/EPA database or land use
III	Straight-line distance from the wells to the potential hazard

Each known or potential hazard was first scored and then ranked using decision level one. Sites with equal level one rankings were then further scored and ranked using decision level two. If sites were still equal in priority, they were further sub-prioritized under decision level three. Once sites were differentiated in priority, no further ranking was necessary. The criteria for scoring sites within each level are discussed below.

Decision Level I –Proximity to WHPA

For the first decision level, the sub-prioritization of contaminated sites was based on their location in the WHPA zones; the shorter the travel time, the higher the priority. Scores for each site and hazard category are summarized on Table 3.

Table 3: Decision Level I: Proximity to Source

Sub-Priority Score	Proximity to Source
1	½-year time-of-travel from the source, Zone 1
2	1-year time-of-travel from the source, Zone 2
3	5-year time-of-travel from the source, Zone 3
4	10-year time-of-travel from the source (no zone designation for Enumclaw)
5	Within the WHPA Buffer Zone, Zone 4

Decision Level II –Type of Contamination

For the second decision level, the sites were ranked as either known contamination or potential contamination sites. Known contamination sites were defined as those with known releases of contaminants according to the environmental database survey results. Potential contamination sites are sites or land areas that are used in ways that could pose a risk to the groundwater. This category's scoring is summarized on Table 4.

Table 4: Decision Level II: Type of Contamination

Sub-Priority Score	Known or Suspected Contamination	Type of Site	Assumption
1	Known	Confirmed and Suspected Contaminated Sites (CSCSL) and Comprehensive Environmental Response, Compensation, and Liability Information (CERCLIS)	As a worst case scenario, contamination is assumed to be comprised of the most toxic chemical identified for the site, based on information contained in the Ecology and EPA databases.
2	Known	Leaking Underground Storage Tanks (LUST)	All contamination sites assumed to contain petroleum products.
3	Known	Washington Independent Cleanup Report (WA ICR)	Since not confirmed as totally cleaned, assumes cleanup not 100% effective.
4	Potential	Septic Systems, Surface Impoundments, Land Applications of Biosolids	Nitrates and bacterial contamination are assumed to be health risks, along with potential chemical hazards, but it is not known whether there is likelihood to contaminate the City's groundwater sources.
5	Potential	Resource Conservation and Recovery Act Sites (RCRA)	It is assumed that hazardous chemicals may be stored on site, but contamination has not necessarily occurred. FINDS sites are included with this category.
6	Potential	Underground Storage Tanks (UST)	It is assumed that petroleum products are stored in underground storage tanks on site, but contamination is not imminent.
7	Potential	Accidental Spills	This category includes highways and railroad tracks that pass through the WHPA. The risk is based on the possibility of hazardous material spill (e.g., gasoline).
8	Potential	Pesticide Application	Pesticide use appears to be concentrated along transportation corridors and power lines, but may also occur in farmed areas.

Sub-Priority Score	Known or Suspected Contamination	Type of Site	Assumption
9	Potential	Storm Water	This category includes the potential release of lead, petroleum products, and/or solvents.
10	Potential	Fertilized Sites	This category is predominantly represented by fertilized lawns and farms.

Decision Level III – Straight–line Distance from Wells

For potentially hazardous sites with similar characteristics for prioritization decision levels I and II, the straight-line distance from the site to the closest City well or spring source was used to further rank the sites. Those sites closest to the wells or springs were given a higher priority.

5.5 Hazard Inventory

A total of eleven sites and land uses were identified as potential hazards. These sites are listed in ranking order on Table 5. Two listings represent sites of known contamination, these sites rank as the ninth and tenth top hazards. The remaining nine listings are identified as sites with potential contamination or are hazards related to land use.

Table 5: Reported and Potential Contamination Sites

Ranking/Map Reference Number	Site/Land Use	Address	Database	Hazard/Contaminant	WHPA Zone(s)
1	Residential land	n/a	n/a	septic tanks, pesticides	1, 2, 3
2	Land application of bio-solids	Branch Farm	n/a	nitrogen loading	1, 2
3	Dairy farms	n/a	n/a	nitrogen, animal waste	1,2
4	Highway 410	n/a	n/a	chemical/fuel spills, pesticides, herbicides	1, 4
5	Logging activities/Forest land use	n/a	n/a	fuel/chemical spills	1, 3, 4
6	Borrow pit (multiple locations)	n/a	n/a	reduced impedance to groundwater system, illegal dumping	1, 3, 4
7	Enumclaw Golf Course	45220 288th Avenue Southeast	n/a	fertilizers, pesticides, herbicides	1, 2
8	Agricultural land	n/a	n/a	fertilizers, pesticides, herbicides	1, 2, 3
9	King Co. Solid Waste Land Fill	SE 440th St	SWLF KING, RCRA	leachates	2
10	Weyerhaeuser Facility and mill pond (closed)	31002 Highway 410	RCRA SQG, CSCSL, UST	petroleum products	4
11	Corliss Resources gravel mine	29416 Highway 410	n/a	reduced impedance to groundwater system, fuel spills	4

5.5.1 Identified Contaminant Sources

There are only two confirmed contaminant sources located within or near the WPHA. These are the closed King County Solid Waste Land Fill and a closed Weyerhaeuser facility that lies outside the travel-time portion of the WHPA but within the buffer zone.

Ranked ninth, the closed King County landfill near Enumclaw reportedly began operations as early as 1939 and has been under investigation for groundwater contamination since 1983. Partial closure activities at the site were initiated in 1988; the landfill was completely closed in 1993. During the investigation of the landfill, a number of reports have been completed by the King County Department of Public Works Solid Waste Division. These reports present water quality information and gradients in the immediate vicinity of the landfill site. Despite some of the samples collected from monitor wells exceeding water quality standards, the monitoring reports reviewed for the preparation of this Wellhead Protection Plan suggest the overall trend in the contaminant concentrations has decreased during the last 25 years. The monitoring efforts should continue as planned per the recommendation of the King County Department of Natural Resources and Parks, Solid Waste Division, Engineering Services Section.

The closed Weyerhaeuser facility and former millpond area off Highway 410 is ranked tenth. This site has undergone considerable remediation due to surface and subsurface contamination from a number of chemicals that were formerly stored or used on site. The main operations area has been completely remediated and is no longer listed on a government database. However, during the remediation of the site, sediments at the bottom of the former millpond were determined to be contaminated with petroleum hydrocarbons. The contaminated sediments were removed from the millpond and mounded near where they were collected. The sediment mound was capped with layers of pit run, flume sand, HDPE, and construction fabric. With the contaminated sediments capped, the risk posed to ground and surface water by the potential of these chemicals leaching into the underlying soil is considered to be low. In addition, this site is outside the time-of-travel zones for all of the City's WHPAs, though still within the buffer zone. Weyerhaeuser has applied for a No Further Action letter from the Washington State Department of Ecology, but the application was denied due to insufficient documentation during the application process and the possibility that groundwater monitoring may be needed to monitor water quality around the site.

5.5.2 Potential Groundwater Concerns

For wellhead protection planning, it is important to understand the potential sources and types of contamination, as well as actual contamination sites. The potential contaminant sources were ranked in the same manner as the confirmed contamination sites.

A primary concern to the City's water system is the presence of septic systems in residential and agricultural land use areas. Septic systems are designed specifically to disperse wastewater directly into the ground. As such, this wastewater has a very high potential to reach groundwater systems. Wastewater from septic tanks carries nitrogen, bacteria, phosphorous, pharmaceuticals, as well as a number of other compounds of concern. However, it is the

nitrogen in the wastewater that has the potential to have the most negative impact on groundwater quality. When nitrogen in septic effluent is dispersed through a drain field, it is typically present as ammonium or ammonia. In the presence of soil bacteria and oxygen, it is rapidly converted into nitrate. Nitrate is highly soluble and remains mobile in groundwater systems. High levels of nitrate are detrimental to human health. Several factors control the rate of nitrogen contribution into the ground from septic systems. These factors include housing density of the area, the average number of people to a household for the area, the age of the septic systems, the types of septic systems, and whether or not the septic systems receive maintenance according to the manufacturer's specifications. The use of residential septic systems within Zone 1 makes residential land use the number one ranked hazard.

The use of pesticides and related chemicals in residential land use areas is of lesser concern compared to septic systems but still pose a risk to groundwater resources. Homeowners use pesticides to treat home gardens and lawns. Similarly, herbicides are used to kill weeds and nuisance plants in gardens and lawns. The City also uses these types of chemicals at city parks, schools, and municipal buildings. Furthermore, herbicides are applied along Highway 410 (ranked fourth) by the Department of Transportation to control vegetation along the shoulder of the highway.

Land application of biosolids is included on the list as item two. According to discussions with the City, Branch Farm, a property located near the corner of 424th street and 284th Ave, had biosolids applied as recently as 2005. This property falls within Zones 1 and 2 of the PC Johnson wellfield. Discussions with the City indicate that biosolids application has not occurred on this property since they were last applied in 2005. If applied at rates exceeding the soil's capacity to consume the nutrients present, biosolids may result in elevated nitrate concentrations in groundwater.

Dairy farms located in the six-month travel time zones are ranked third due to their location and types of contaminants. Dairy farms pose a risk because they are a potential source of nitrogen loading and bacterial contamination in groundwater. Typically, animal waste is stored on site in large above-ground ponds and then spray-applied to the land to water and fertilize the local grass crop that the cattle browse.

The Highway 410 corridor, ranked fourth, is the main east-west corridor through Enumclaw and a major highway to Crystal Mountain. Although it is not a major transportation corridor such as Interstate 5 with major industry centers situated upon it, it still carries the potential for a major spill due to an accident involving a tanker truck. Spills reaching Boise Creek have a potential to impact the Golf Course Replacement Production Well and Boise Spring, as Boise Creek flows through Zone 1 for the golf course well and the buffer zone for the spring.

The operation of logging equipment in the timber lands of the Cascade foothills requires refueling and servicing during logging operations. There is a potential for the release of fuels, lubricating oils, or hydraulic oils as a result of the operation and servicing of the equipment,

equipment malfunctions, or accidents. Recreational off-road driving is also a potential source of pollution. Unfortunately, illegal dumping is also commonplace in areas such as these and must be considered a threat, albeit low, to groundwater quality. For these reasons, logging and forest land use ranks fifth.

Locations that have been mined or excavated are considered a hazard to groundwater resources because they typically result in the formation of a closed or semi-closed depression that may also be a path of least resistance into the underlying soils. Several borrow pits (ranked sixth) and the Corliss Resources gravel mine (ranked eleventh) are examples of surface mining within or very near to the delineated WHPAs. Normally, liquids that are released onto a relatively undisturbed ground surface will run off the surface in a down-gradient direction or infiltrate into the surficial material and percolate through the vadose zone. Depending on the nature of the subsurface material, infiltrating liquids may reach groundwater. Areas where mining has removed the uppermost soils and created closed or semi-closed depressions can increase the rate of infiltration, increasing the risk to the aquifers. Further, borrow pits are often preferential locations for illegal dumping, though active operations such as the Corliss Resources facility do not typically have this issue.

The Enumclaw Golf Course is included on the potential contaminant source list (in the seventh spot) because of the use of fertilizers, pesticides, and herbicides to maintain the course. A significant portion of the Enumclaw Golf Course lies within Zone 1 for the Golf Course Replacement Production Well. While application rates are carefully monitored by golf course staff, the regular watering that the fairways and greens require may cause chemicals applied to the turf to filter down into soils at a greater rate than normal rainfall would produce. An old domestic well situated near the 14th hole tee box that is reported to be 60 feet deep was constructed for the original homestead (date unknown) that existed near the well before the golf course was expanded in 1973 and the residence was moved. The well has not been in use for many years and was not properly decommissioned when the course was constructed. Wells such as these present a serious risk to the groundwater system since they are a direct conduit to the aquifer.

One site that was not ranked is the former landfill located at the north end of the Enumclaw Golf Course. According to Seattle-King County Department of Public Health's April 30, 1985 *Abandoned Landfill Study in King County*, this landfill served the City and the surrounding area until 1939, the year the King County landfill on SE 440th Street opened. According to this study, the landfill was located to the south of 448th street and east of 288th street. Sampling completed in 1984 indicated low levels of methane gas in the soil and no evidence of leachate reaching Boise Creek. The landfill is not considered a significant threat to groundwater because it was closed before the time hazardous chemicals came into heavy production and widespread use (around the time of WWII) and because it does not fall within or directly upgradient of any of the WHPAs, though it is situated between the City's wellfields. If this site poses major concern to the City, the City could install a set of monitoring wells surrounding the location of the former landfill and monitor groundwater levels and quality.

5.6 Potential Contamination Pathways

It is important to understand the potential pathways for contaminant migration since these contaminant pathways can increase the vulnerability of an aquifer by decreasing travel time from a source to a wellhead. The following section will briefly summarize the main mechanisms for transport of contaminants to the subsurface.

Discharge onto the ground surface: Direct discharge to the ground surface occurs when products or waste materials are spilled onto the ground. With the help of rainfall infiltration, the materials percolate into the subsurface and, if a sufficient volume of material is released, they eventually reach the water table and migrate down gradient within the shallow aquifer. In large enough quantities, spills can even impact the relatively deep aquifer where the PC Johnson wells are completed.

Direct discharge to the subsurface: Discharge to the subsurface occurs from septic systems and dry wells. Discharge into the subsurface is a more direct mechanism for transport because contaminants are discharged closer to the water table and because subsurface discharge bypasses the upper layers of soil that have the ability to absorb and disperse many types of contaminants.

Abandoned wells: Old, improperly constructed, or improperly abandoned wells[4] can act as direct conduits for contaminant transport to the aquifer. In such wells, transport can occur between the ground surface and aquifer zones because of a lack of a well seal or inadequately constructed seal.

Stormwater runoff: Rainfall onto the ground either induces infiltration into the subsurface or occurs as runoff. The quality of the water that infiltrates or runs off is dependent on the type of land use and the potential presence of contaminants, which may be located on the ground surface. Stormwater infiltration issues are similar to those of discharge to the ground surface. Stormwater runoff is considered differently because it runs over the surface of the ground, picking up and dissolving potential contaminants and may eventually discharge these contaminants to groundwater via infiltration from ditches or ponds designed to percolate water or into nearby surface-water bodies.

The potential concerns due to water infiltration or runoff are diverse and reflect the land use activities in the area of interest. Paved roadways, parking areas, and residential developments can contribute heavy metals and petroleum hydrocarbons that originate primarily from vehicle-related emissions. Industrial and commercial operations commonly process and release a variety of organic pollutants (e.g., solvents, paints, and dry cleaning solutions), as well as petroleum products, which are potential hazards to WHPAs.

[4] Washington State has standards for construction and abandonment of wells, WAC 173-160.

6.0 Management Strategies and Implementation Tasks

The completion of wellhead protection planning provides no safeguards unless effective management strategies are implemented to prevent potential contamination of groundwater sources. The City of Enumclaw does not own or control all of the land within its WHPA. Maximum effectiveness can be achieved in implementing the WHPP through a cooperative effort between the City, neighboring property owners/residents, and state and local agencies which regulate potentially harmful activities within a WHPA. A key component to its management of the area will be the notification of the existence and extent of the management area to the proper agencies and to local property owners/residents.

6.1 Wellhead Protection Management Strategies

The following sections detail proposed strategies developed to protect the integrity of the City's water sources.

6.1.1 Long-Term Management and Cooperation

This WHPP program strategy is designed to be a continuing management activity to meet the City's future planning needs or to adapt to changes in the physical conditions of the aquifer system. As such, the management strategies and practices outlined within this study provide a general direction but will periodically need to be refined to fit specific conditions. Additional adaptations may be needed to address future activities and regulations or changes in current regulations that may affect the WHPAs.

6.1.2 WHPP Land Use Strategies

The City of Enumclaw has no authority to directly control land use for those areas of the WHPA that are outside the city limits. Therefore, the City must develop a cooperative relationship with those state and local agencies that administer land use management programs.

<u>Special Protection Area Designations:</u> At the present time, a recommended strategy for the City is to seek special designations for the WHPA from pertinent agencies. The City should evaluate and seek the different designations that may be most beneficial, including

- A *Special Protection Area* designation under the state groundwater quality standards (WAC-173-200),
- A *Special Use Area* by the Department of Agriculture, and
- An *Environmentally Sensitive Area* under various County-level programs

<u>Land Management Activities:</u> The City should seek to ensure that owners or agencies responsible for land parcels and developments use and monitor best management practices (BMP) for control, reduction, and restriction of potential contaminants into the WHPA.

6.1.3 WHPP Regulatory Strategies

This WHPP is designed to use the existing statutory rules and regulations to protect groundwater quality. The City, in coordination with state and local agencies having statutory

authority in the area, could monitor regulated activities within the WHPA. The following regulatory strategies are recommended.

Well Drilling inside the WHPA: The City should encourage more frequent well construction inspection than currently occurs and seek to ensure regulatory requirements are complied with.

Washington State Environmental Policy Act (SEPA)/Development Permits: The City should work to secure notification of all proposed SEPA/development permit actions within WHPAs from responsible agencies such as the King County Departments of Development and Environmental Services and Health. Depending upon the development proposal, the City may request that King County require hydrogeologic evaluations that specifically address impacts to groundwater quality and quantity parameters for any development within the WHPA.

Septic Systems: The City should obtain as-builts of all septic systems within the WHPAs and coordinate with King County to ensure proper inspection and maintenance occurs. Any septic systems that are deemed to pose unacceptable risk to the WHPAs should be identified and a plan of action developed for rectifying any concern. Currently, the City's municipal code Section 17.08.110.A gives the City Engineer authority to allow use of septic systems on short plat lots of over one acre if there is "acceptable percolation capabilities." As a policy, the City Engineer could not allow use of the septic system option within WHPAs unless a licensed geologist or hydrogeologist determines whether or not the site can safely utilize a septic system.

6.1.4 Planning Strategies

A substantial degree of future protection for the WHPA will be achieved through present-day planning and coordination. In order to accomplish the required level of future protection, the following strategies are recommended.

Comprehensive Land Use Planning: In October 2008, King County adopted an updated comprehensive land use plan for the county. The City should participate in future updates to seek the incorporation of policies, land use designations, and regulatory directives in the County comprehensive plan that help to protect the City's WHPAs.

Emergency Response: The City should notify the appropriate emergency response organizations of the location of the WHPA and establish formal communication protocols with the first-response emergency units.

6.1.5 Data Management Strategies

One of the principal goals of the WHPP is the development of a data collection network and analysis plan capable of providing the City with advance warning of contamination to the City's water supply. The following data management strategies seek to establish and maintain scientific data upon which future WHPP actions can be based.

Sentinel Wells: The City should consider the installation of sentinel monitoring wells up gradient of each wellhead or wellfield to provide early warnings regarding potential aquifer contamination, particularly for the shallow sources at Watercress, Boise Spring, and the golf course. Regular sampling of this network would provide time for the City to prepare to allocate additional water sources if one or more wells are required to be temporarily shut down due to aquifer impact. The most strategic locations to install the sentinel wells are the six-month and/or one-year zone boundary of the WHPAs for each water source. In addition, a small number of monitor wells could be installed down gradient of the Weyerhaeuser mill pond sediment mound to monitor groundwater quality.

Abandoned Well Inventory: The City could locate and inventory decommissioned, abandoned, and unused wells. Owners of these wells could be notified of the potential liability such wells cause and be educated on the benefits of well decommissioning.

Underground Storage Tanks Inventory: The City could inventory and locate underground storage tanks (USTs). Besides those presently identified by the current hazard inventory, this inventory should include new tanks placed after the hazard inventory was finished, residential home heating-oil USTs, and/or other tanks that were not previously identified.

Drywell and Storm Water Systems Monitoring: The City should encourage King County Water and Land Resources Division to develop an evaluation and monitoring plan for dry wells within the WHPA. The City, in coordination with the responsible agencies, should evaluate the adequacy of stormwater facilities including proper routing, retention, and detention. A balance should be found that allows optimum recharge of storm water to groundwater systems while adequately protecting the water quality of the aquifers.

6.1.6 Education Strategies

Education of the public and residential/non-residential occupants of the WHPA concerning groundwater protection is a critical portion of the WHPP. Through proper education, the degree and potential for future contamination can be greatly reduced; therefore, the following recommendations are made.

If not already in place, the City should develop educational programs regarding groundwater protection for the residents and businesses located near or within the City's WHPAs. Topics could include septic-tank maintenance, fuel-oil storage tank maintenance and abandonment, proper use of herbicides and pesticides, and hazardous material use, disposal and storage. The King County Health Department, the Washington Department of Health, and the United States Environmental Protection Agency all have programs in place to assist water purveyors with their WHPPs. These programs include educational materials that will support this process.

In addition to City-run programs, the City could participate in and support small-quantity waste disposal programs and actively work with state and local government in developing and creating public education programs concerning groundwater.

6.2 Wellhead Protection Implementation Tasks

In order to accomplish the protection of the WHPA, it is recommended that the City implement the WHP tasks listed below. These tasks have been ordered in their recommended priority of implementation. The City may institute all or a portion of these tasks, depending upon available funding, time, or other concerns.

1. Ensure that the City's Emergency Response Plan includes WHP planning. The City should also:
   A. Promote adoption of the WHPA into the Comprehensive Plan of King County,
   B. Focus the applicable state and local programs to the area,
   C. Review management strategies,
   D. Incorporate new data ,
   E. Evaluate new requirements,
   F. Oversee educational programs, and
   G. Evaluate new approaches to WHP.

2. Establish formal communication with first responders; send WHPA notification letter to first respondents.

3. The City should also notify the Health and Planning/Land-Use departments of the county of the existence of the City's WHPAs and seek designation of the WHPA as a special protection area. The City should request that:
   A. The County health department assist with wellhead protection by ensuring wells are properly constructed, and
   B. King County planning department consider the WHPAs in their designations of critical areas regulations, susceptibility mapping, and development permitting.

4. It is recommended that the City seek to create awareness of the wellhead protection area by posting metal "WATER SUPPLY PROTECTION AREA" signs at the borders of Zone 2 or Zone 3 of the PC Johnson, Watercress, and golf course WHPAs and along Highway 410 where it enters the Boise Spring Zone 4 WHPA.

5. Communicate the location of the WHPA, explain basic WHP concepts, and address specific WHP concerns to industrial/commercial site owners and local gravel mine owners.

6. Increase the public awareness regarding groundwater susceptibility and protection for residents living within the WHPA. This notification letter should be given to homeowners either at the time of service hookup or as part of property escrow. The letter could be sent to existing homeowners with the current billings or as a part of regular notifications.

   The City should deliver a copy of the wellhead protection plan to the King County library system and possibly post it on the City's website. This will allow interested residents to learn more about the wellhead protection program of the water system.

In addition, inform local residents of the WHPA through a press release sent to the Enumclaw Courier-Herald.

7. Promote public education programs concerning proper septic tank maintenance and proper hazardous waste disposal. The City could continue to regularly sponsor household hazardous waste disposal events and co-sponsor regular visits of the King County Solid Waste Division's Wastemobile to help prevent improper disposal of wastes in the WHPA. In addition, the City should require a licensed geologist or hydrogeologist to approve sites for the installation of new septic systems within the WHPA.

8. Assure that potential water quality and hydrogeologic impacts of surface development within WHPAs are adequately evaluated during the SEPA/development permitting process. Ensure appropriate regulations are in place outside the City limits to address the potential impact of storm water runoff and infiltration on WHPAs.

9. Request that King County include the City on the distribution list for any monitoring or cleanup reports for the closed King County Solid Waste Land Fill. Furthermore, request to have regular meetings with a scientist working on the monitoring project so they can debrief the City on the newest round of water quality sampling. This will allow the City to re-evaluate the risk the landfill poses to the water system every few years until it is deemed that the landfill no longer poses a risk to the City's water system.

10. Request that Weyerhaeuser and the Department of Ecology include the City on the distribution list for any monitoring or cleanup reports for the closed Weyerhaeuser Enumclaw Sawmill Site (located in Zone 4 for Boise Spring). This will allow the City to re-evaluate the risks to the City's Boise Spring source as new information becomes available.

11. The City has identified the location of a former residential well located on the golf course that was never properly abandoned when the residence it served was moved for the development of the golf course. This well and the original golf course irrigation well may both be direct avenues for surface water to reach the aquifer (since the condition of the surface seals is unknown and presumed to be compromised). These two wells should be properly retrofitted as monitoring locations or formally decommissioned as soon as reasonably possible.

12. On a semi-annual basis, review the CSCSL, LUST, and other significant environmental database listings within the WHPA for new listings.

13. The City should develop data on the number and size of exempt underground storage tanks within the 1-year WHPA (Zone 2). Also, the City could promote and coordinate public education programs concerning underground tank hazards, leak detection methods, and

proper removal and closure procedures. These programs should target owners of exempt underground tanks.

14. Encourage development and use of best management practices during the development and maintenance of property, including herbicide and pesticide use. This effort should emphasize transportation corridors and large land units including the City's golf course, Expo Center/parks, gravel mining operations, and forest parcels. Drywells and stormwater facilities should be mapped and evaluated for risk to the WHPAs.

15. Encourage thorough analysis of groundwater impacts for siting, operation, and reclamation of gravel quarries and mines. Seek to have the proper agencies require mine operators to install monitoring wells. These wells should be capable of monitoring for potential impacts from site operations for mines within and adjacent to the WHPA. Seek to have the owners document the use of hazardous materials in mining activities within and near the WHPA.

16. The City should inventory wells located in WHPA Zones 1 to 3 (six-month, one- and five-year time of travel). This inventory should include accurate location information, available Water Well Reports or construction information, and the current status of the well. In cases where the well has been decommissioned, abandoned, or is otherwise unused, the owners of these wells should be informed about proper well decommissioning procedures.

17. The City should consider installing sentinel monitoring wells up gradient of several of the City's wells. Sentinel wells should be considered at the following locations, in order of priority:
    1. Boise Spring, near east end of Zone 1 south of Highway 410
    2. Watercress, at Zone 1 border near 440th Street (down-gradient from the Landfill)
    3. Golf Course Replacement Well, at the southern end of Zone 2

18. Identify and update all City design standards and codes that relate to WHP. Ensure adequate inspection to verify compliance with requirements for WHP. Design standard updates may include special requirements for sewer pipe construction and stormwater infiltration and pretreatment.

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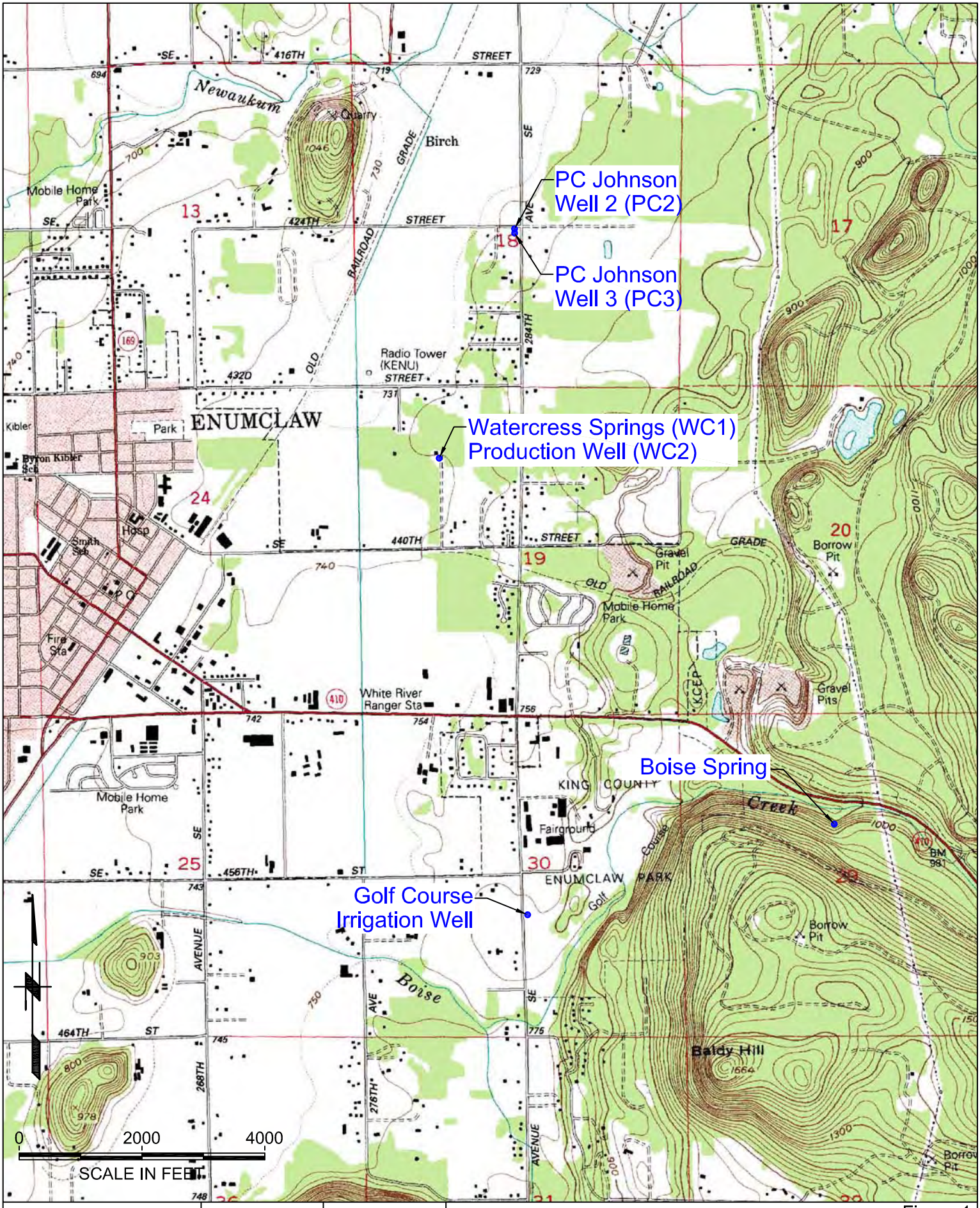
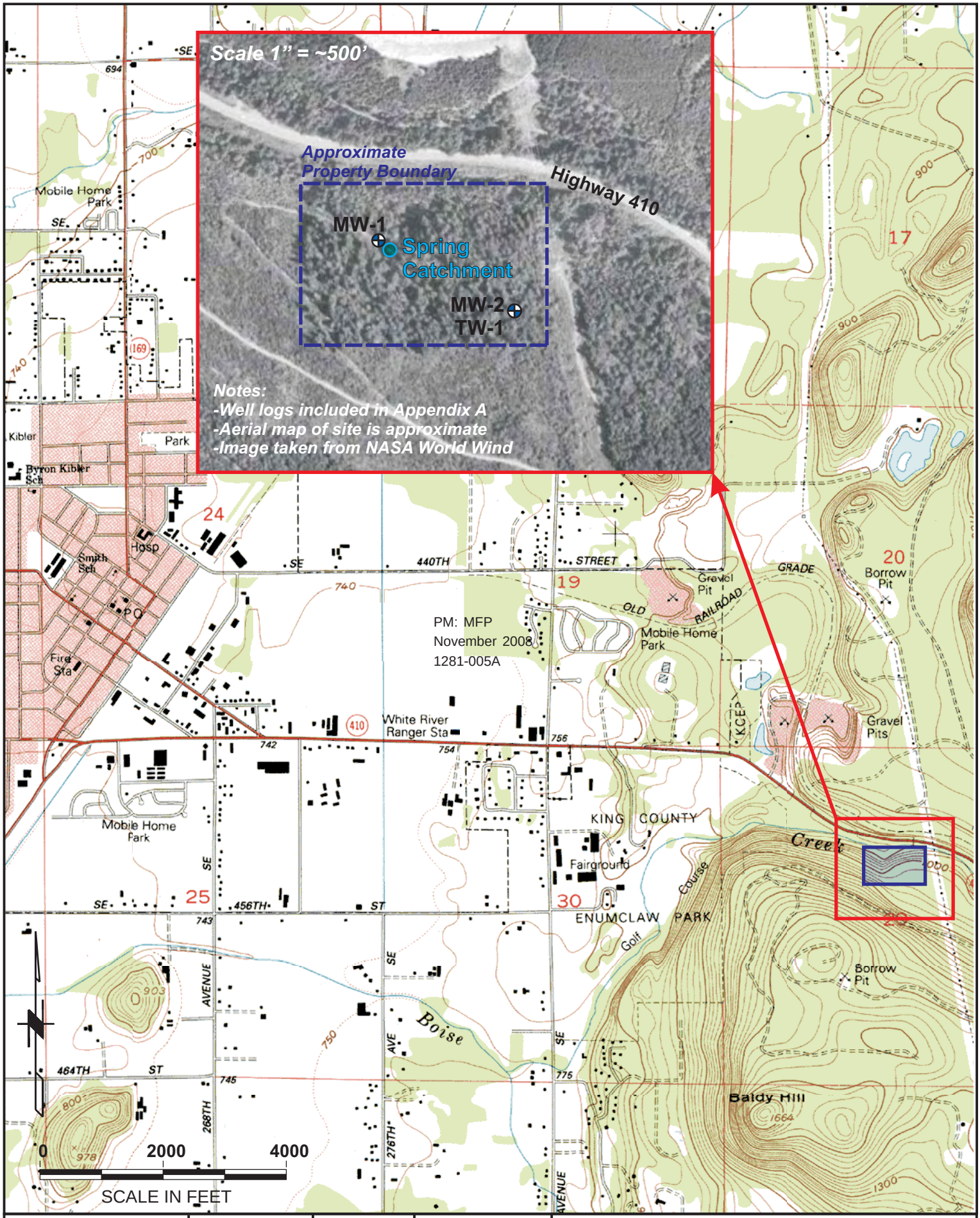
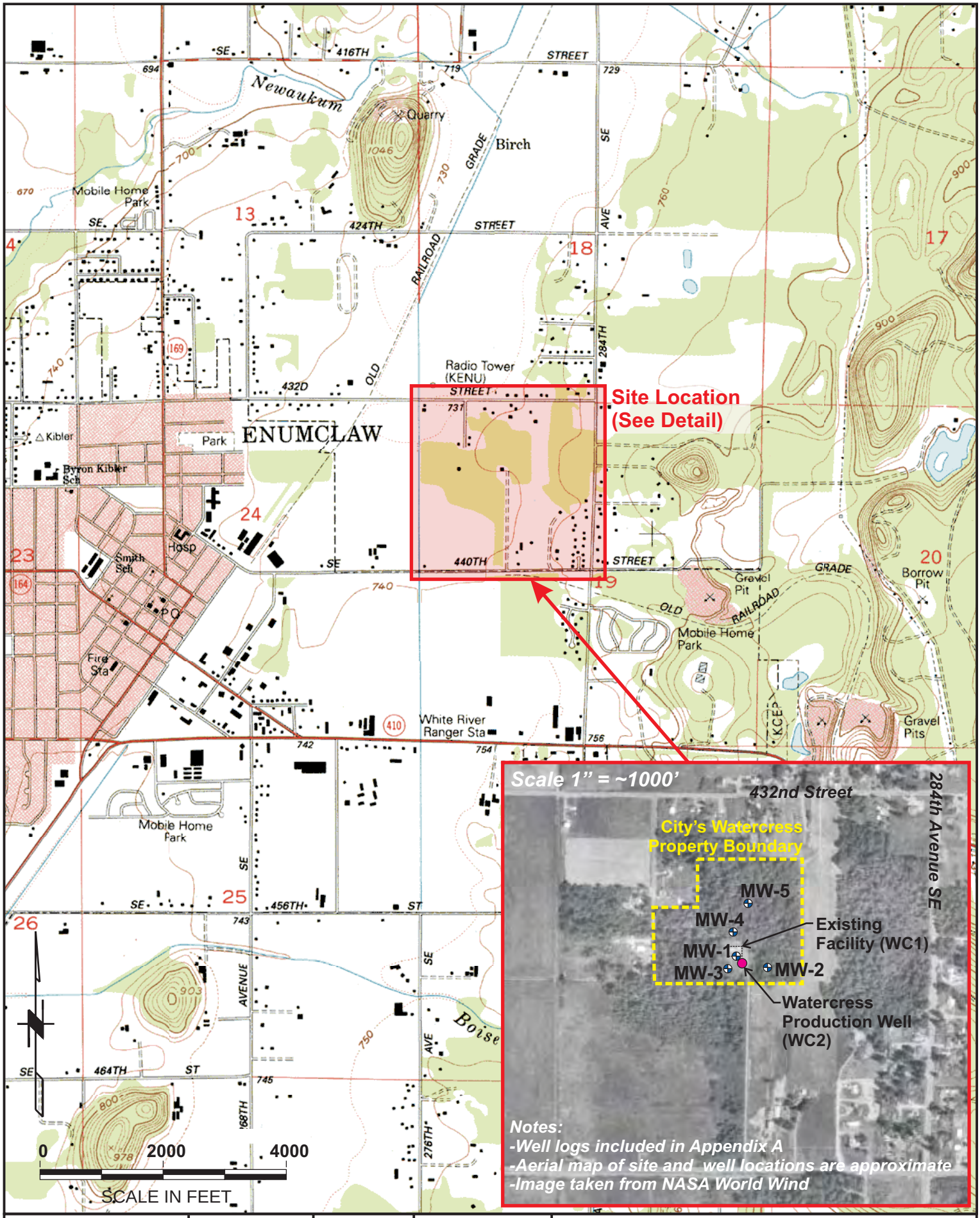
The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted hydrogeologic and environmental practices and are the result of analysis by Robinson, Noble & Saltbush, Inc. staff. This report, and any attachments to it, is for the exclusive use of the City of Enumclaw. Unless specifically stated in the document, no warranty, expressed or implied, is made. We do not warrant the absence of non-visible mold and we do not accept any liability for the presence of mold, visible or otherwise.



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	PM: MFP October 2009 1281-005A	King County T 20 N/R 07 E Scale 1" = 2000'	Figure 1 Water Source Location Map City of Enumclaw: Wellhead Protection Plan



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Basemap taken from USGS Enumclaw Quad.	PM: MFP October 2009 1281-005A	King County T 20 N/R 07 E - 29 Scale 1" = 2000'	Figure 2 Boise Spring Detail Map City of Enumclaw: Wellhead Protection Plan



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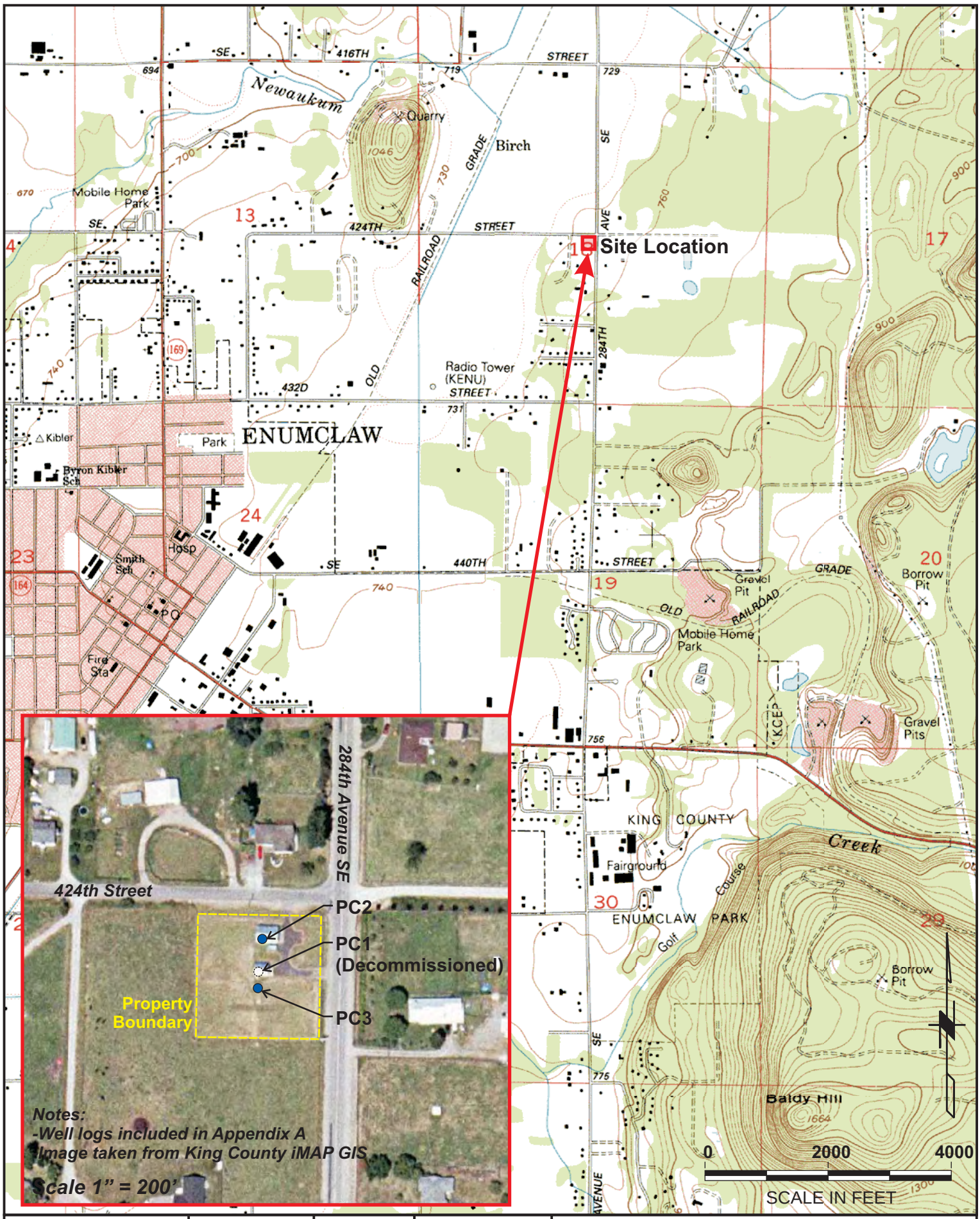
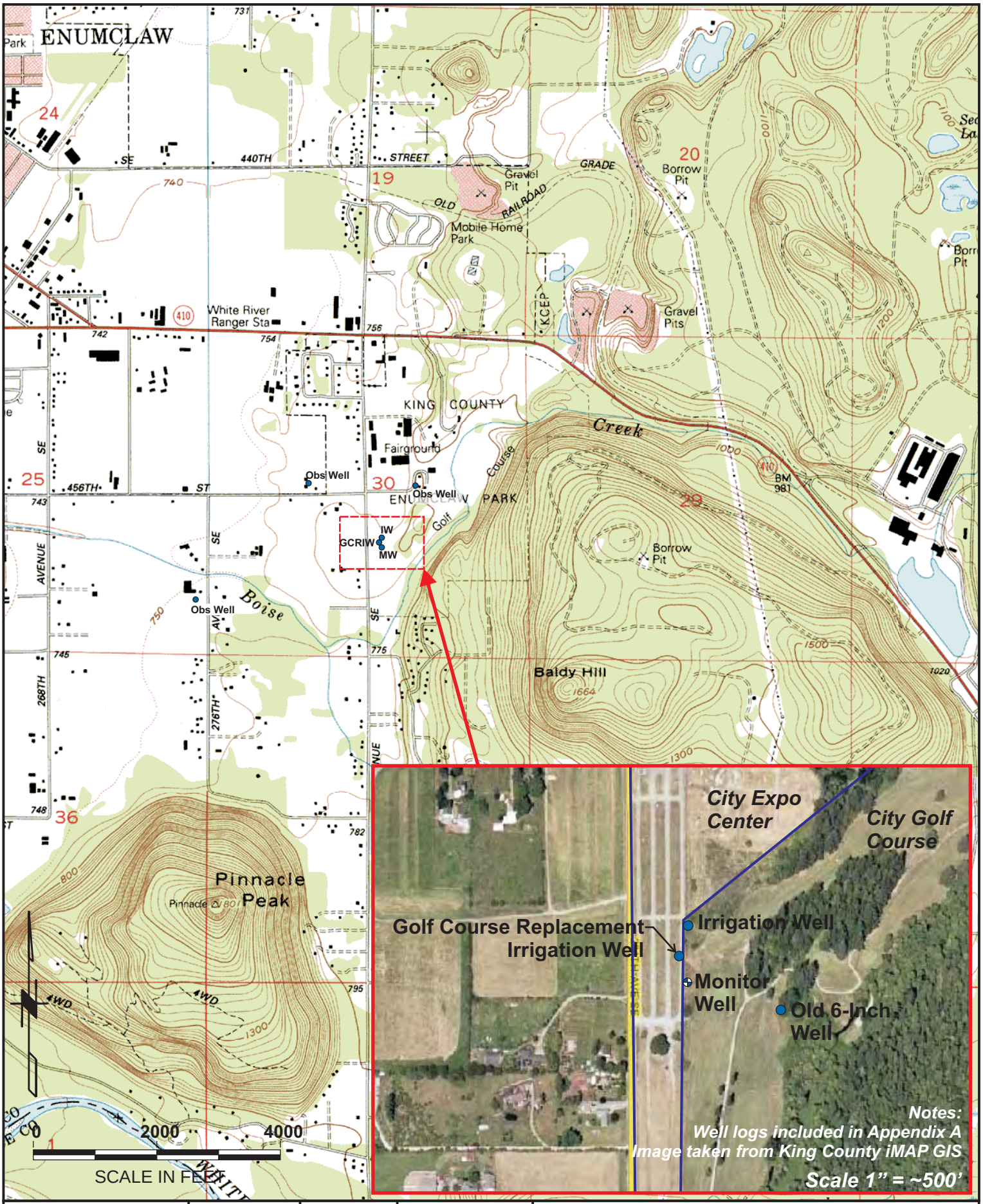
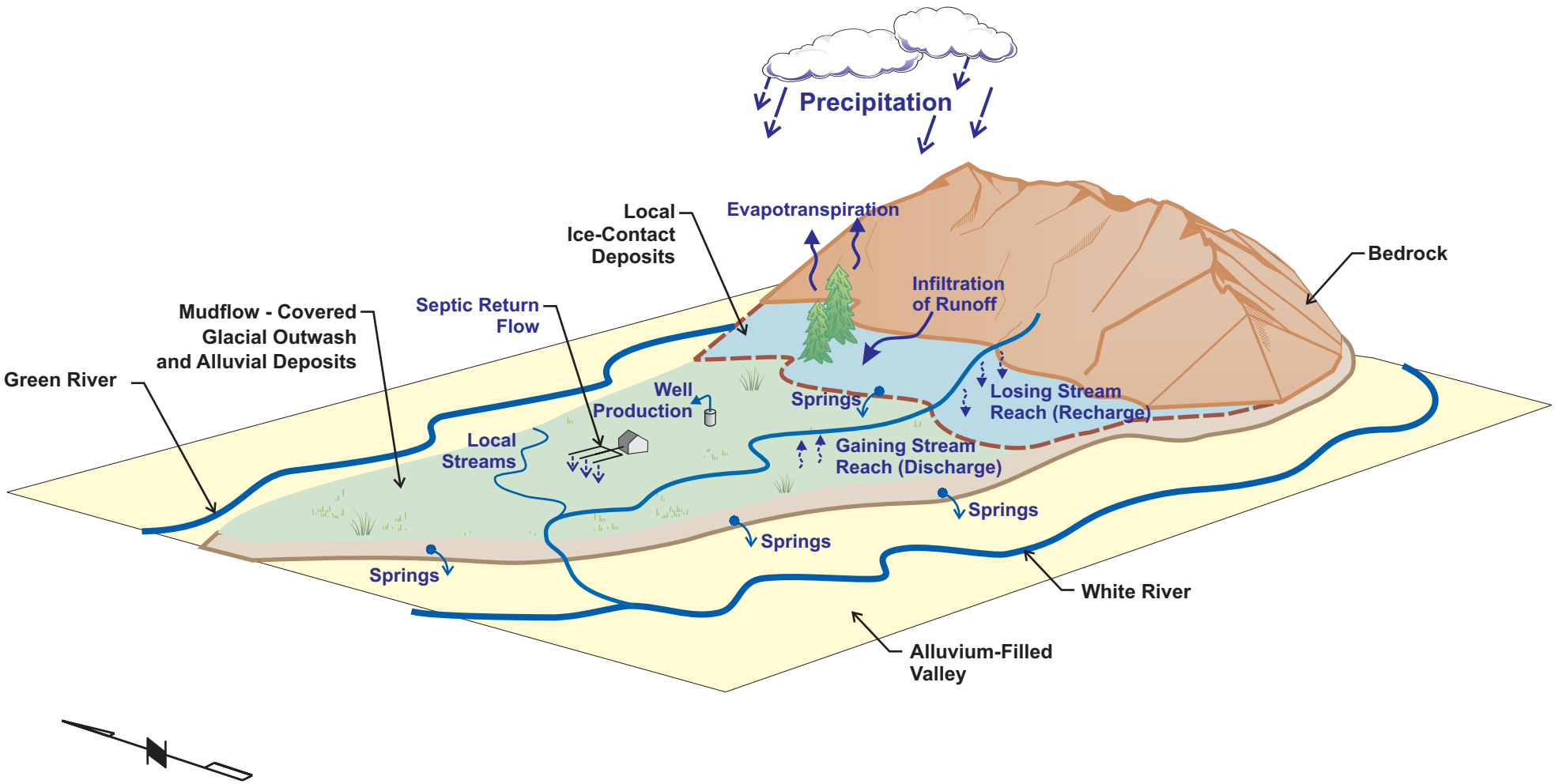


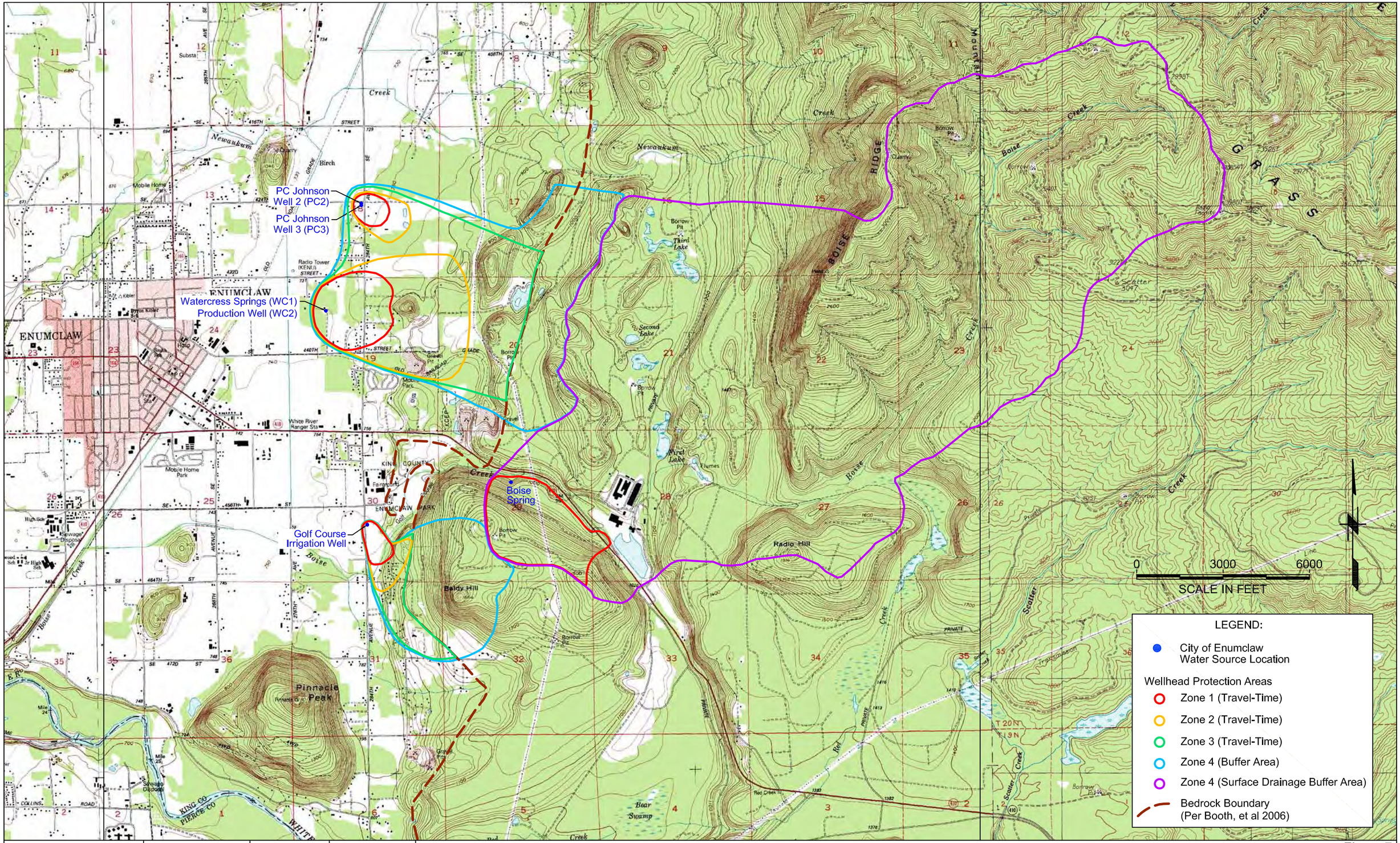
ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Basemap taken from USGS Enumclaw Quad.	PM: MFP October 2009 1281-005A	King County T 20 N/R 07 E - 18 Scale 1" = 2000'	Figure 4 PC Johnson Wellfield Detail Map City of Enumclaw: Wellhead Protection Plan



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Basemap from USGS Enumclaw Quad.	PM: MFP October 2009 1281-005A	King County T 20 N/R 07 E - 30 Scale 1 " = 2000'	Figure 5 Golf Course Irrigation Well Detail Map City of Enumclaw: Wellhead Protection Plan



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	PM: MFP October 2009 1281-005A	King County T 20 N/R 07 E Not To Scale	Figure 6 Conceptual Diagram City of Enumclaw: Wellhead Protection Plan



ROBINSON NOBLE SALTBUSH INC.
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

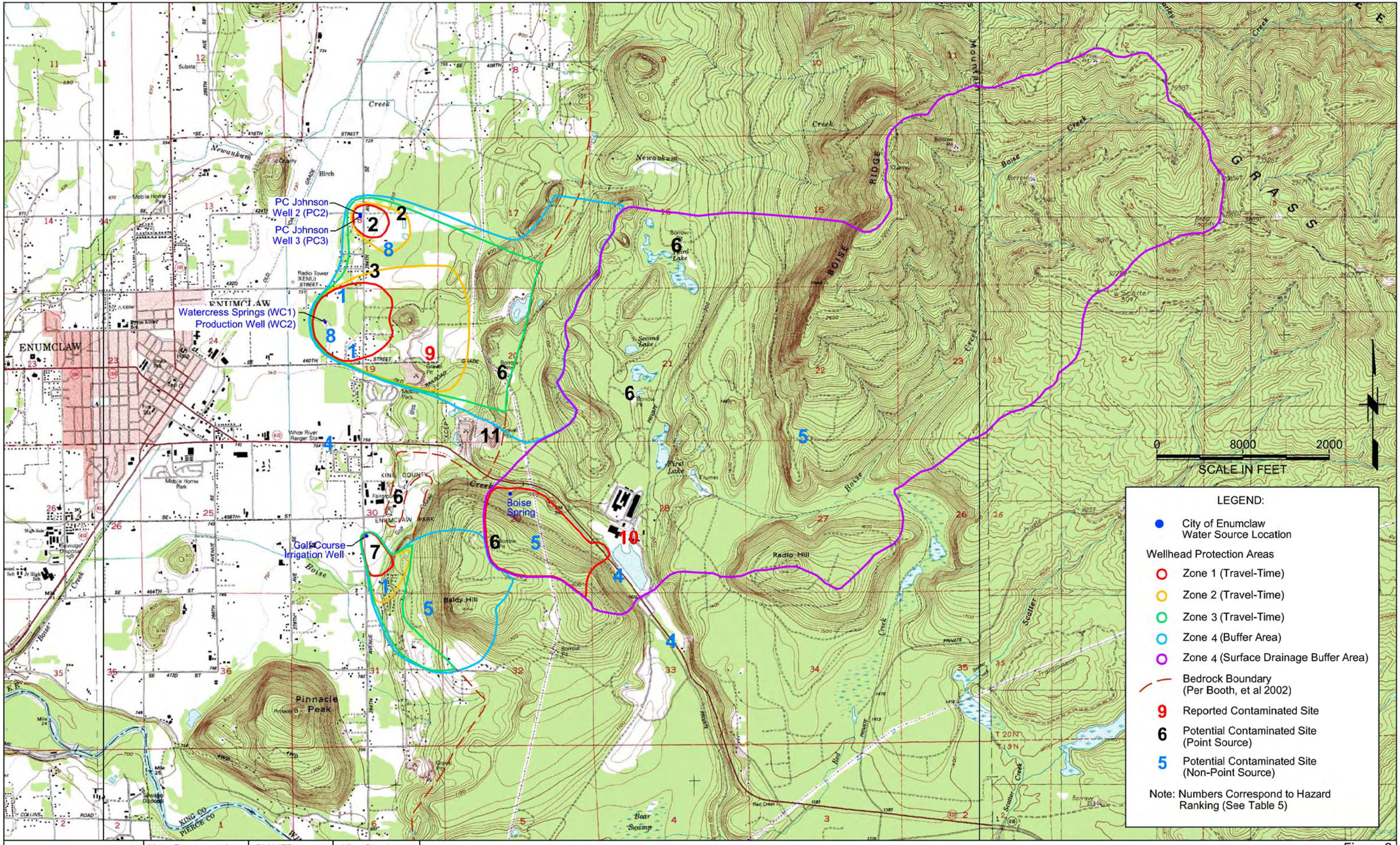
Note: Basemap taken from USGS Buckley, Enumclaw and Cyclone Creek Quads.

PM:MFP	King County
October 2009	T 20 N/R 07 E
1281-005A	Scale 1" = 3000'

Figure 7

Recommended Wellhead Protection Areas

City of Enumclaw: Wellhead Protection Plan



ROBINSON NOBLE SALTBUSH INC.
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

Note: Basemap taken from USGS Buckley, Enumclaw and Cyclone Creek Quads.

PM:MFP
October 2009
1281-005A

King County
T 20 N/R 05 E
Scale 1" = 8000'

Figure 8
Hazard Inventory Map
City of Enumclaw: Wellhead Protection Plan

PC Johnson Well Logs

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

WATER WELL REPORT

STATE OF WASHINGTON

Application No. .....
Permit No. .....

(1) OWNER: Name Town of Enumclaw Address c/o Hart-Crowser

(2) LOCATION OF WELL: County KING — NW ¼ SW ¼ Sec 18 T 20N N., R 7E W.M.

Bearing and distance from section or subdivision corner

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

(4) TYPE OF WORK: Owner's number of well (if more than one) ....

New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 12" to 8" inches.
Drilled 230'6" ft. Depth of completed well 230'6" ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 12" Diam. from 0 ft. to 104'8"
Threaded ☐ 8" Diam. from 104'8" ft. to 230'6"
Welded ☒ ..." Diam. from ... ft. to ... ft.

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

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type stainless steel Model No. ....
Diam. 8" Slot size 150 from 171' ft. to 230' ft.
Diam. ... Slot size ... from ... ft. to ... ft.

20' of & extension

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

Surface seal: Yes ☒ No ☐ To what depth? 18' ft.
Material used in seal Bentonite 500 lbs.
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? .... Depth of strata ....
Method of sealing strata off ....

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

(8) WATER LEVELS: Land-surface elevation above mean sea level .... ft.
Static level 42'6" ft. below top of well Date ....
Artesian pressure ... lbs. per square inch Date ....
Artesian water is controlled by .... (Cap, valve, etc.)

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

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

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....
Bailer test 60 gal./min. with -0- ft. drawdown after 1½ hrs.
Artesian flow ... g.p.m. Date ....
Temperature of water .... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

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

MATERIAL	FROM	TO
Brown & gray silty gravely-sand	0	72
Color changing to silty gray	72	77
Less muddy here, still hard	77	83
Gray clay binder, gravel	83	88'6"
Brown color here, hard grvl.	88'6"	103
Boulders, stopped at 104'8"	103'	104'8"
*NW DRILLING CO. ROTERY RIG		
NW drilled through 30" boulder, then into material approx. the same as above material to 230'7" then hit bed rock. Drilled to 234' and quit. Harbor Pump installed screen and developed well, filled well up to 230'6".		230'6'

Work started June 12, 19 80 Completed July 30, 19 80

WELL DRILLER'S STATEMENT:

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

NAME HARBOR PUMP & DRILLING CO., INC. (Person, firm, or corporation) (Type or print)

Address 11302 Burnham Dr. NW Gig Harbor, W

[Signed] Jim Miller (Well Driller) By: P. Mill

License No. 223-01-8455 #0311 Date Jan. 12, 19 81

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 060-1-20

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

WATER WELL REPORT

STATE OF WASHINGTON

Application No. ....

Permit No. ....

(1) OWNER: Name CITY OF ENUMCLAW Address 1339 GRIFFIN ENUMCLAW WA. 98022

(2) LOCATION OF WELL: County KING — NE ¼ SW ¼ Sec. 18 T. 20 N., R. 7E W.M.

Bearing and distance from section or subdivision corner APPROX 2500'E AND 2500'N OF SW COR SEC 18

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

(4) TYPE OF WORK: Owner's number of well (if more than one) PC JOHNSON WELL 2

New well ☒ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16 inches.

Drilled 229 ft. Depth of completed well 227.2 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 16 " Diam. from +2.3 ft. to 203.2 ft.

Threaded ☐ " Diam. from ft. to ft.

Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒

Type of perforator used

SIZE of perforations in. by in.

perforations from ft. to ft.

perforations from ft. to ft.

perforations from ft. to ft.

Screens: Yes ☒ No ☐

Manufacturer's Name JOHNSON

Type S.S. WATERMARK Model No.

Diam. 14 PS Slot size .125 from 203.6 ft. to 224 ft.

Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:

Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 50 ft.

Material used in seal NEAT CEMENT

Did any strata contain unusable water? Yes ☐ No ☒

Type of water? Depth of strata

Method of sealing strata off

(7) PUMP: Manufacturer's Name N.A.

Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level APPROX 745' ft.

Static level 42.65 ft. below top of well Date 4/11/86

Artesian pressure lbs. per square inch Date

Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☒ No ☐ If yes, by whom? ROBINSON + NOBLE

Yield: 1500 gal./min. with 95.05 ft. drawdown after 24 hrs.

" " " "

" " " "

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

Time	Water Level	Time	Water Level	Time	Water Level
0	95.05	12	58.2	1533	44.23
1.2 min	68.45	30.5	56.1	1738	43.95
5	61.35	180	50.3		

Date of test 4/11-12/86

Bailer test gal./min. with ft. drawdown after hrs.

Artesian flow g.p.m. Date

Temperature of water 49 Was a chemical analysis made? Yes ☒ No ☐

(10) WELL LOG:

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

MATERIAL	FROM	TO
ALTERNATE LAYERS OF GRAY + BROWN CLAY WITH GRAVEL, WATER AT 23, 37, AND 45'.	0	58
BROWN AND GRAY CLAY WITH ANGULAR GRAVEL.	58	83
GRAY VOLCANIC ASH, BROWN + GRAY CLAY WITH GRAVEL.	83	105
BROWN SAND, GRAVEL, WITH LAYERS OF BROWN CLAY.	105	116
GREEN, GRAY AND BROWN CLAY WITH ANGULAR GRAVEL.	116	140
BROWN SAND AND GRAVEL, W.B.	140	156
GREEN SILTY CLAY AND GRAVEL.	156	163
GREEN, GRAY, AND BROWN SAND AND GRAVEL.	163	170
GREEN SILTY CLAY BOUND GRAVEL.	170	193
BROWN SAND AND GRAVEL, W.B.	193	198
GREEN SILTY CLAY BOUND GRAVEL	198	205
BROWN SAND AND GRAVEL, W.B.	205	210
GREEN SAND AND GRAVEL, W.B.	210	213
BROWN SAND AND GRAVEL, W.B.	213	228
YELLOW, GRAY AND BROWN CLAY WITH GRAVEL AND BOULDERS.	228	229

RECEIVED MAY 5 1986

PREPARED BY DEPARTMENT OF ECOLOGY NORTHWEST REGION

ROBINSON + NOBLE, INC.

MBS

Work started FEB 24, 1986 Completed APRIL 17, 1986

WELL DRILLER'S STATEMENT:

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

NAME HOLT DRILLING (Person, firm, or corporation) (Type or print)

Address 12515 32nd Street East

[Signed] Randy Holt (Well Driller)

License No. 1099 Date 5-19, 1986

ORIGINAL SIGNED BY DRILLER

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

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

ENTERED

WELL REPORT
STATE OF WASHINGTON

Start Card No. W072125
UNIQUE WELL I.D. # ACS 963
Water Right Permit No. 20-7E-18L

(1) OWNER: Name City of Enumclaw Address 1309 Myrtle Ave

(2) LOCATION OF WELL: County King NE 1/4 SW 1/4 Sec 18 T. 20 N.R. 7 E.W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) PC Johnson Well 424th + 284th

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

(4) TYPE OF WORK: Owner's number of well (if more than one) PC Johnson #1
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☒ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16" inches.
Drilled 230 feet. Depth of completed well 229 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed: 16" Diam. from +2 ft. to 196 ft.
Welded ☒ " Diam. from ft. to ft.
Liner Installed ☐ " Diam. from ft. to ft.
Threaded ☐

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

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type 304 Stainless Model No.
Diam. 14 Slot size 125 from 225 ft. to 195 ft.
Diam. Slot size from ft. to ft.

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

Surface seal: Yes ☒ No ☐ To what depth? 55 ft.
Material used in seal Cement Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

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

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 42 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Holt
Yield: 820 gal./min. with 121 ft. drawdown after 24 hrs.
" " " "
" " " "

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

Time	Water Level	Time	Water Level	Time	Water Level

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

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

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

MATERIAL	FROM	TO
Brown silty gravels	0	15
Gray silty gravels	15	24
Brown silty gravels	24	32
Brown silty gravels and sand weeping water	32	73
Brown silty gravel cobbles	73	174
Gray gravelly silty clay	174	181
Brown sand + gravel cobbles some silt water	181	230

RECEIVED
JUN 14 1999
DEPT OF ECOLOGY

Work Started 4-24-97, 19. Completed 7-10, 19 97

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Holt Drilling Inc (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 10621 Todd Rd E
(Signed) [signature] (WELL DRILLER) License No. 1099
Contractor's Registration No. HOLDI*136OG Date 8-6-97, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (9/93)

Watercress Spring Well Logs

1st Attempt

20-7E-19D

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

Construction/Decommission ("x" in circle) 281968

☒ Construction

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

CURRENT

Notice of Intent No. W238924

Unique Ecology Well ID Tag No. NA

Water Right Permit No. _____

Property Owner Name Enumclaw

Well Street Address 28014 SE 440th St.

City Enumclaw County King

Location NW 1/4-1/4 NW 1/4 Sec 19 Twn 20N R 7 (EWM) or WWM circle one

Lat/Long (s, t, r Still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____

☐ New well ☐ Reconditioned ☐ Deepened

Method: ☐ Dug ☐ Bored ☐ Driven ☒ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 24 inches, drilled 34 ft.

Depth of completed well 0 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded _____" Diam. from _____ ft. to _____ ft.

☐ Liner installed _____" Diam. from _____ ft. to _____ ft.

☐ Threaded _____" Diam. from _____ ft. to _____ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used _____

SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: ☐ Yes ☒ No ☐ K-Pac Location _____

Manufacturer's Name _____

Type _____ Model No. _____

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand _____

Materials placed from _____ ft. to _____ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 34 ft.

Material used in seal Bentonite Chip

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

PUMP: Manufacturer's Name _____

Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.

Static level _____ ft. below top of well Date _____

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? _____

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

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

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____

Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.

Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Fill	0	3
Silt Sand Gravels	3	34

RECEIVED
DEC 19 2007
DEPT. OF ECOLOGY

Start Date 3-29-07 Completed Date 4-4-07

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Wade Iversen

Driller/Engineer/Trainee Signature Wade Iversen

Driller or trainee License No. 0597

Drilling Company Boart Longyear

Address Po Box 1890

City, State, Zip Milton WA 98354

Contractor's Registration No. BOARTLCO55P2 Date 7-25-07

If TRAINEE, Driller's Licensed No. _____

Driller's Signature _____

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05) **The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.**

20-7E 19D

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

Construction/Decommission ("x" in circle) 269087

☒ Construction

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

CURRENT
Notice of Intent No. W 238924

Unique Ecology Well ID Tag No. ALK 139

Water Right Permit No. G1-9339C/6894-A

Property Owner Name City of Enumclaw

Well Street Address 28014 SE 440th St

City Enumclaw County King

Location NW 1/4-1/4 NW 1/4 Sec 19 Twn 20 R 7 E EWM or WWM (circle one)

Lat/Long (s, t, r Still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 1920079028

PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____
☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☐ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 24 inches, drilled 52 ft.
Depth of completed well 50' ft.

CONSTRUCTION DETAILS
Casing Installed: ☒ Welded 20" Diam. from +2 ft. to 20 ft.
☐ Liner installed _____" Diam. from _____ ft. to _____ ft.
☐ Threaded _____" Diam. from _____ ft. to _____ ft.

Perforations: ☐ Yes ☒ No
Type of perforator used _____
SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: ☒ Yes ☐ No ☒ K-Pac Location _____
Manufacturer's Name _____
Type Johnson Model No. _____
Diam. 20 Slot size 100 from 40' ft. to 20' ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: ☒ Yes ☐ No ☒ Size of gravel/sand 3/8
Materials placed from 40 ft. to 52 ft.

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

PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 2' ft. below top of well Date _____
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☐ No If yes, by whom? _____
Yield: 4300 gal./min. with 14' ft. drawdown after 24 hrs.
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

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

Time	Water Level	Time	Water Level	Time	Water Level

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

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Gray Cobbs Gravel & sand Silty	0	30
Brown Sand & Gravel water Bearing	20	40
Gray Till	40	52

RECEIVED
JUL 18 2007
DEPT. OF ECOLOGY

Start Date 3-29-07 Completed Date 5-2-07

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☐ Driller ☐ Engineer ☐ Trainee Name (Print) Wade Iversen
Driller/Engineer/Trainee Signature [signature]
Driller or trainee License No. 0597

If TRAINEE,
Driller's Licensed No. _____
Driller's Signature _____

Drilling Company BOART ~~LONGYEAR~~ Longyear
Address PO Box 1890
City, State, Zip Milton WA 98354
Contractor's Registration No. BOARTLC055PZ Date 5-7-07

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05) **The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.**

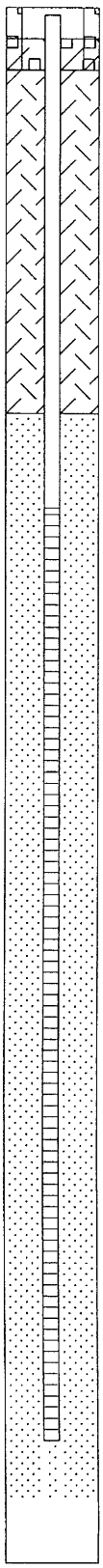
Monitoring Well 1

CONSTRUCTION DETAILS

SAMPLE NO.
BLOW COUNTS
SAMPLE RECOVERY

GEOLOGIC LOG

Flush Mount, No Stickup, top of casing 0.48' below top of monument



CONCRETE 0' - 2'

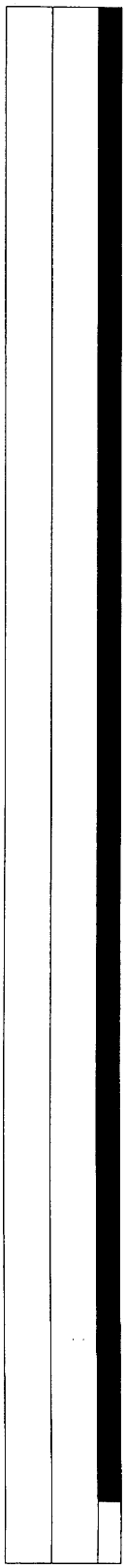
BENTONITE 2' - 13'

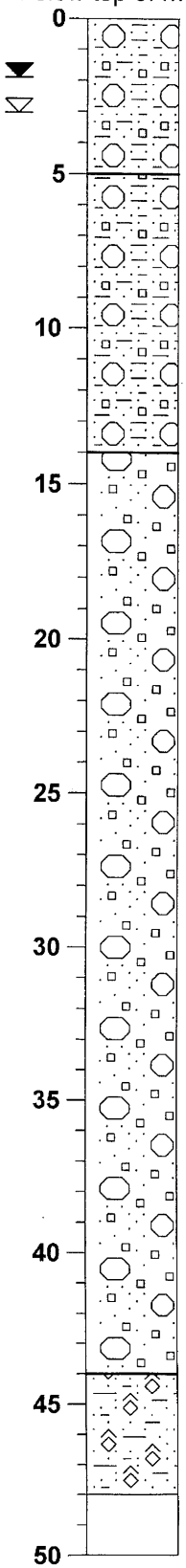
2 INCH PVC RISER 0.49' - 16'

10 X 20 COLORADO SILICA SAND 13' - 48'

2 INCH PVC SCREEN 16' - 46'

BOTTOM OF BOREHOLE 48 FEET BELOW GROUND





BROWN SILTY SANDY GRAVEL

(Static Water Level 1.91 feet below ground 5/18/2006)
(Max drawdown 1.60 feet, 3.05 feet below ground 6/1/2006)

5 GRAY SANDY SILT WITH GRAVEL (MOIST)

14 BROWN GRAVEL WITH SAND, WET

44 GRAVEL AND CLAY, BOUND/COMPACT (TILL)

48

Project:	**Enumclaw**	Drilling Info:	**Prosonic**	Total Depth:	**48 feet**
Location:	**Watercress Springs**		**Limited Access Sonic**	TOC Elevation:	**738.36**
Job Number:	**1281-002A**		**Continuous Sample**	Township/Range:	**20 N 7 E**
Date:	**5/9 - 5/11**	Logged By:	**MFP**	Section:	**19**

ROBINSON NOBLE SALTBUSH INC.
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

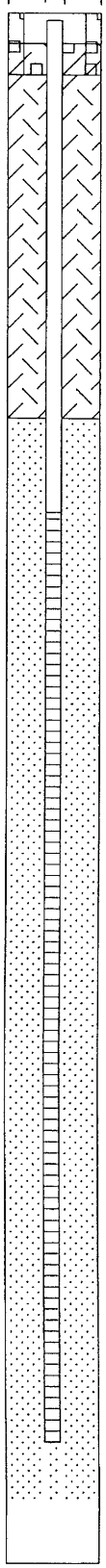
Monitoring Well 2

CONSTRUCTION DETAILS

SAMPLE NO.
BLOW COUNTS
SAMPLE RECOVERY

GEOLOGIC LOG

Monument Stickup 3.42', top of casing 0.38' below top of monument



CONCRETE 0' - 3'

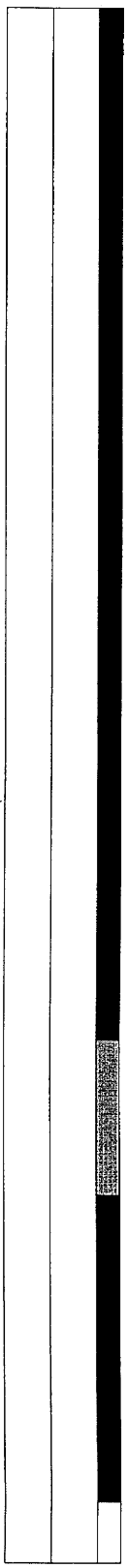
BENTONITE 3' - 13'

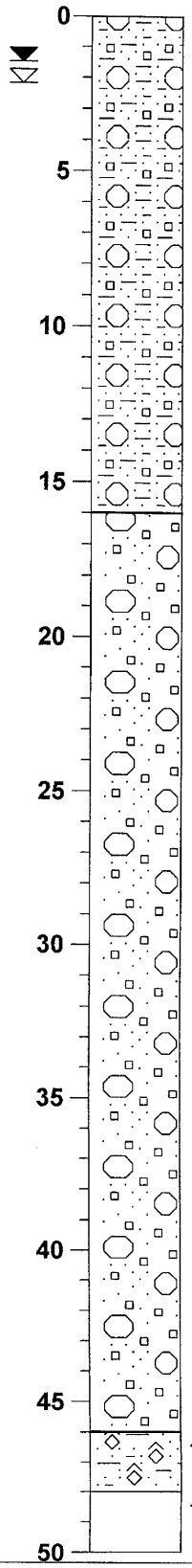
2 INCH PVC RISER 3.04' ABOVE GROUND - 16' BELOW

10 X 20 COLORADO SILICA SAND 13' - 48'

2 INCH PVC SCREEN 16' - 46'

BOTTOM OF BOREHOLE 48 FEET BELOW GROUND





BROWN-GRAY SILT WITH SAND AND GRAVEL

(Static Water Level 1.50 feet below ground 5/18/2006)

(Max drawdown 1.25 feet, 2.19 feet below ground 6/1/2006)

16 BROWN GRAVEL WITH SAND, WET

(No Recovery 33'-38')

46 GRAVEL AND CLAY, BOUND/COMPACT (TILL)

48

Project:	**Enumclaw**	Drilling Info:	**Prosonic**	Total Depth:	**48 feet**
Location:	**Watercress Springs**		**Limited Access Sonic**	TOC Elevation:	**741.77**
Job Number:	**1281-002A**		**Continuous**	Township/Range:	**20 N 7 E**
Date:	**5/9 - 5/11**	Logged By:	**MFP**	Section:	**19**

ROBINSON NOBLE SALTBUSH INC. Established 1947
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

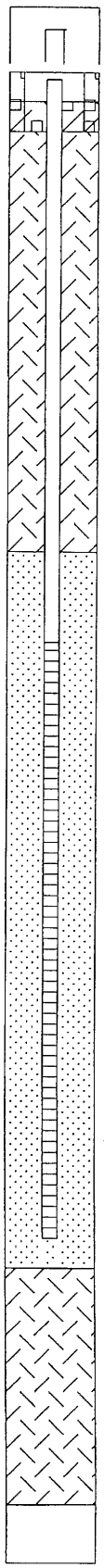
Monitoring Well 3

CONSTRUCTION DETAILS

SAMPLE NO.
BLOW COUNTS
SAMPLE RECOVERY

GEOLOGIC LOG

Monument Stickup 3.08', top of casing 0.40' below top of monument



CONCRETE 0' - 2'

BENTONITE 2' - 16'

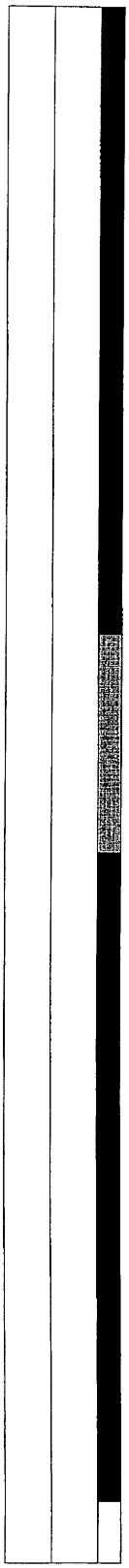
2 INCH PVC RISER 2.68' ABOVE GROUND - 19' BELOW

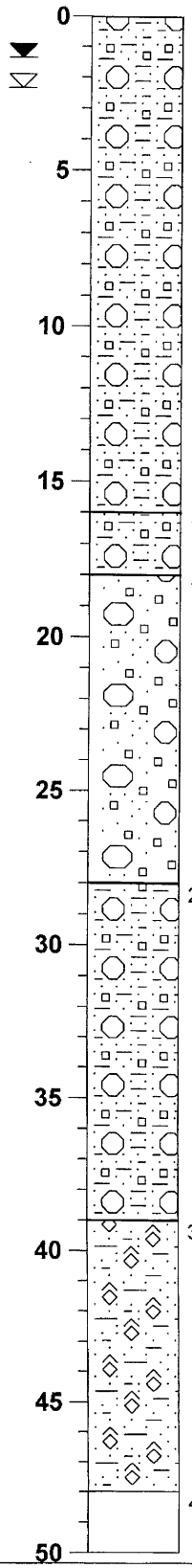
10 X 20 COLORADO SILICA SAND 16' - 40'

2 INCH PVC SCREEN 19' - 39'

BENTONITE 40' - 48'

BOTTOM OF BOREHOLE 48 FEET BELOW GROUND





BROWN-ORANGE SANDY GRAVELLY SILT

(Static Water Level 1.38 feet below ground 5/18/2006)
(Max drawdown 1.50 feet, 2.36 feet below ground 6/1/2006)

16 GRAY SANDY SILT WITH GRAVEL

18 SAND AND GRAVEL, WET

(No Recovery 20'-27')

28 GRAY SILT AND GRAVEL

39 GRAVEL AND CLAY, BOUND/COMPACT (TILL)

48

Project:	**Enumclaw**	Drilling Info:	**Prosonic**	Total Depth:	**48 feet**
Location:	**Watercress Springs**		**Limited Access Sonic**	TOC Elevation:	**740.99**
Job Number:	**1281-002A**		**Continuous**	Township/Range:	**20 N 7 E**
Date:	**5/9 - 5/11**	Logged By:	**CAF**	Section:	**19**

ROBINSON NOBLE SALTBUSH INC. Established 1947
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

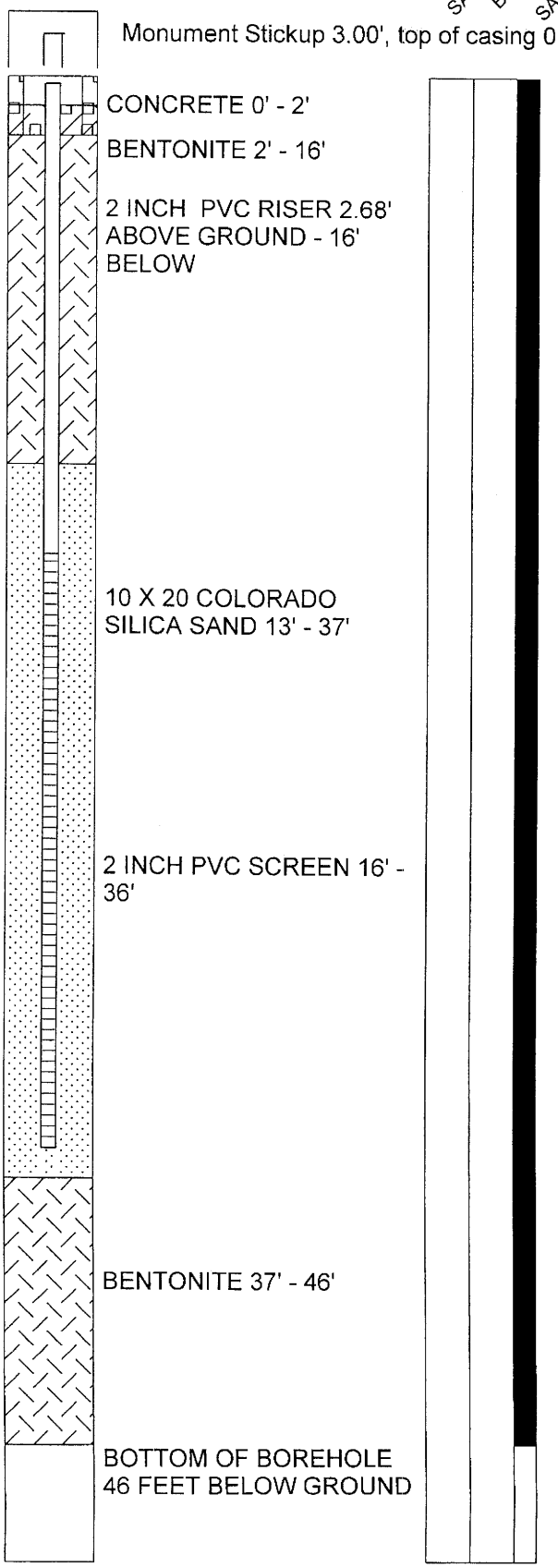
Monitoring Well 4

CONSTRUCTION DETAILS

SAMPLE NO.
BLOW COUNTS
SAMPLE RECOVERY

GEOLOGIC LOG

Monument Stickup 3.00', top of casing 0.32' below top of monument



CONCRETE 0' - 2'

BENTONITE 2' - 16'

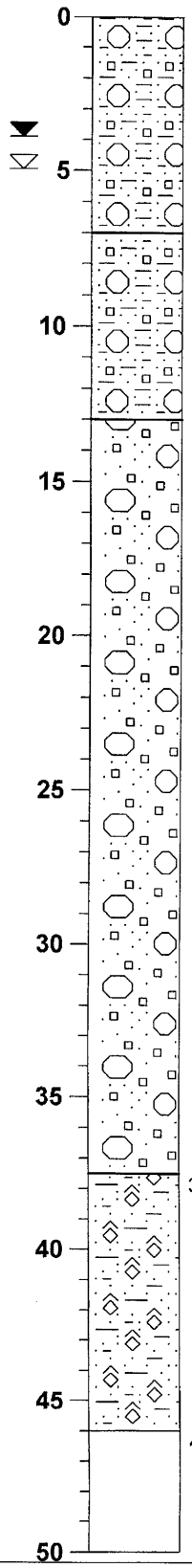
2 INCH PVC RISER 2.68' ABOVE GROUND - 16' BELOW

10 X 20 COLORADO SILICA SAND 13' - 37'

2 INCH PVC SCREEN 16' - 36'

BENTONITE 37' - 46'

BOTTOM OF BOREHOLE 46 FEET BELOW GROUND



0 — BROWN GRAVELLY SILT WITH SAND

(Static Water Level 3.91 feet below ground 6/1/2006)

(Max drawdown 1.51 feet, 4.97 feet below ground 5/18/2006)

7 — GRAY GRAVELLY SILT

13 — BROWN SAND AND GRAVEL, WET

37.5 — GRAVEL AND CLAY, BOUND/COMPACT (TILL)

46

5 10 15 20 25 30 35 40 45 50

Project:	**Enumclaw**	Drilling Info:	**Prosonic Limited Access Sonic Continuous**	Total Depth:	**46 feet**
Location:	**Watercress Springs**			TOC Elevation:	**743.35**
Job Number:	**1281-002A**			Township/Range:	**20 N 7 E**
Date:	**5/9 - 5/11**	Logged By:	**CAF**	Section:	**19**

ROBINSON NOBLE SALTBUSH INC. established 1967
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

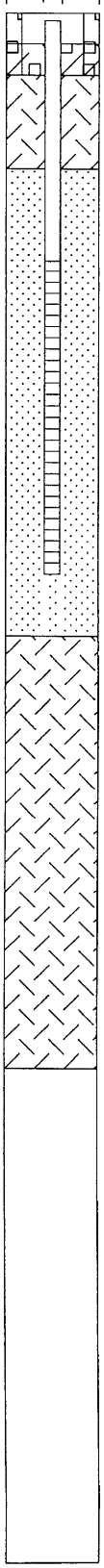
Monitoring Well 5

CONSTRUCTION DETAILS

SAMPLE NO.
BLOW COUNTS
SAMPLE RECOVERY

GEOLOGIC LOG

Monument Stickup 3.25 feet, top of casing 0.76 below top of monument



CONCRETE 0' - 2'

BENTONITE 2' - 5'

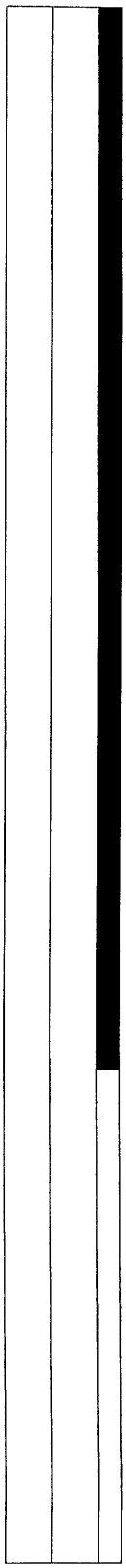
2 INCH PVC RISER 2.54' ABOVE GROUND - 16' BELOW

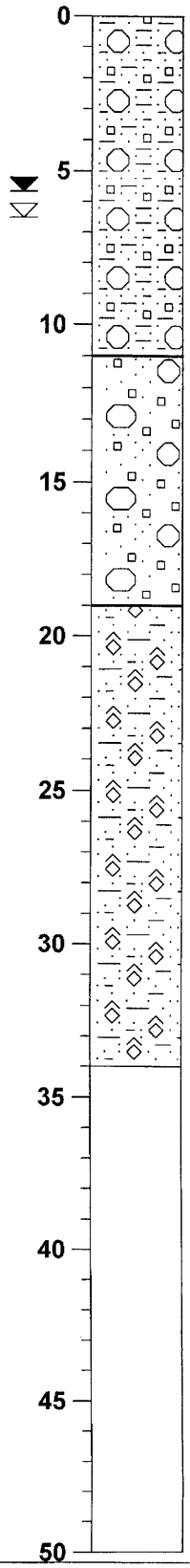
2 INCH PVC SCREEN 8' - 18'

10 X 20 COLORADO SILICA SAND 5' - 20'

BENTONITE 20' - 34'

BOTTOM OF BOREHOLE 34 FEET BELOW GROUND





BROWN SANDY SILT WITH GRAVEL

(Static Water Level 5.68 feet below ground 5/18/2006)

(Max drawdown 1.39 feet, 6.48 feet below ground 6/1/2006)

BROWN SAND AND GRAVEL, WET

GRAVEL AND CLAY, BOUND/COMPACT (TILL), DRY

Project:	**Enumclaw**	Drilling Info:	**Prosonic**	Total Depth:	**34 feet**
Location:	**Watercress Springs**		**Limited Access Sonic**	TOC Elevation:	**744.88**
Job Number:	**1281-002A**		**Continuous**	Township/Range:	**20 N 7 E**
Date:	**5/9 - 5/11**	Logged By:	**CAF**	Section:	**19**

ROBINSON NOBLE SALTBUSH INC.
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

Watercress MW 1

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(slect one)*

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Consulting Firm Robinson Noble and Saltbush

Unique Ecology Well ID Tag No. ATN752

WELLCONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print) David Donnelly

Driller/Engineer /Trainee Signature _____

Driller or Trainee License No. _____

If trainee, licensed driller's Signature and License No. _____

CURRENT Notice of Intent No. RE01484

Type of Well *(select one)*

[X] Resource Protection

[ ] Geotech Soil Boring

Property Owner City of Enumclaw

Site Address SE 440th

City Enumclaw County King

Location NE 1/4-1/4 NW 1/4 Sec 19 Twn 20 R 17E Select One [ ] EWM [X] WWM

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

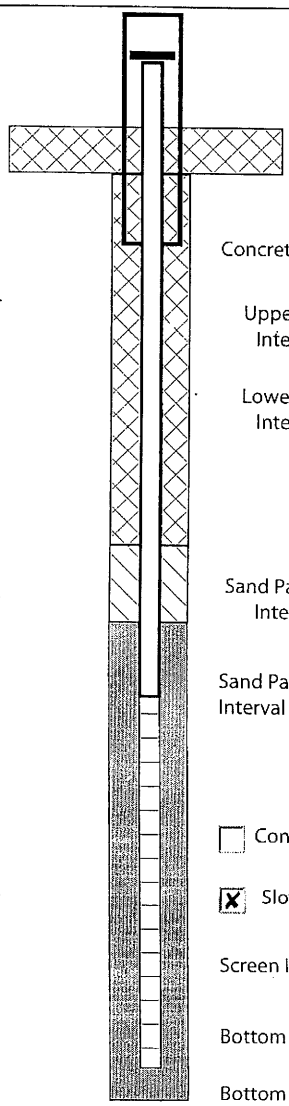
Tax Parcel No. _____

Cased or Uncased Diameter _____ Static Level 1.43 feet

Work/Decommission Start Date 5/9/06

Work/Decommission Completed Date 5/11/06

Construction/Design



[ ] Square [X] Round PAD

Concrete Depth 2'

Upper Seal Interval 2'-13'

Lower Seal Interval

Sand Pack Seal Interval

Sand Pack Interval 13'-48'

[ ] Continous Wire Wrap

[X] Slotted

Screen Interval 16'-46'

Bottom of Well 46'

Bottom of Hole 48'

Well Data

Monument Size	6"
Monument Stickup	
Pad Size	16"
Upper Surface Seal	Bentonite Chips
Lower Surface Seal	
Well Diameter	2"
Well Material	Sch 40 PVC
Filter Pack Seal	
Filter Pack Sand Size	10/20
Screen Slot Size	.020
Borehole Backfill Material	

Formation Description

0-14'	Silt
14'-44'	Sand & Gravels
44'-48'	Till

The Department of Ecology does NOT warranty the Data and/or Iformation on this Well Report

watercress MW2

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(slect one)*

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Consulting Firm Robinson Noble and Saltbush

Unique Ecology Well ID Tag No. ATN756

WELLCONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print) David Donnelly

Driller/Engineer /Trainee Signature _____

Driller or Trainee License No. _____

If trainee, licensed driller's Signature and License No. _____

CURRENT Notice of Intent No. RE01484

Type of Well *(select one)*

[X] Resource Protection

[ ] Geotech Soil Boring

Property Owner City of Enumclaw

Site Address 1309 Myrtle Avenue

City Enumclaw County King

Location NE 1/4-1/4 NW 1/4 Sec 19 Twn 20 R 17E Select One [ ] EWM [X] WWM

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

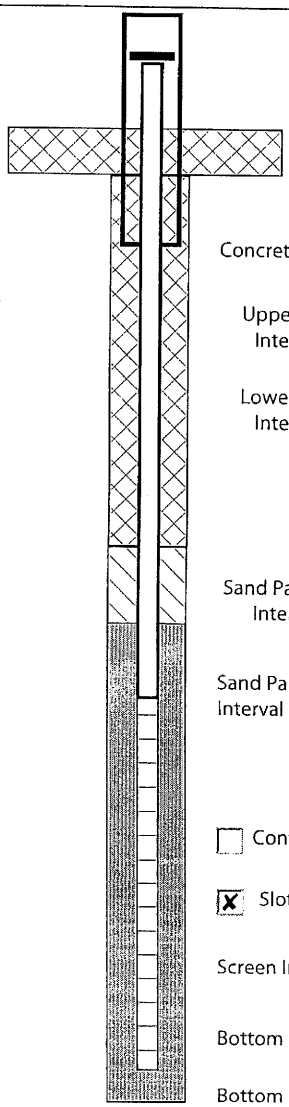
Tax Parcel No. _____

Cased or Uncased Diameter _____ Static Level .94 Feet

Work/Decommission Start Date 5/9/06

Work/Decommission Completed Date 5/11/06

Construction/Design



[ ] Square [X] Round PAD

Concrete Depth 2'

Upper Seal Interval 2' - 13'

Lower Seal Interval N/A

Sand Pack Seal Interval

Sand Pack Interval 13'-48'

[ ] Continous Wire Wrap

[X] Slotted

Screen Interval 16'-46'

Bottom of Well 46'

Bottom of Hole 48'

Well Data

Monument Size	6"
Monument Stickup	3.5
Pad Size	18"
Upper Surface Seal	Bentonite Chips
Lower Surface Seal	
Well Diameter	2"
Well Material	Sch 40 PVC
Filter Pack Seal	
Filter Pack Sand Size	10/20
Screen Slot Size	.010
Borehole Backfill Material	

Formation Description

0-15'	Silt
	Sand
15'-45'	Silt, Sand & Gravel
46'-48/	Till

The Department of Ecology does NOT warranty the Data and/or Iformation on this Well Report

watercress MW3

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(slect one)*

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Consulting Firm: Robinson Noble and Saltbush

Unique Ecology Well ID Tag No. ATN799

WELLCONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print) David Donnelly

Driller/Engineer /Trainee Signature _____

Driller or Trainee License No. _____

If trainee, licensed driller's Signature and License No. _____

CURRENT Notice of Intent No. RE01484

Type of Well *(select one)*

[X] Resource Protection

[ ] Geotech Soil Boring

Property Owner: City of Enumclaw

Site Address: 1309 Myrtle Avenue

City: Enumclaw County: King

Location NE 1/4-1/4 NW 1/4 Sec 19 Twn 20 R 17E Select One [ ] EWM [X] WWM

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

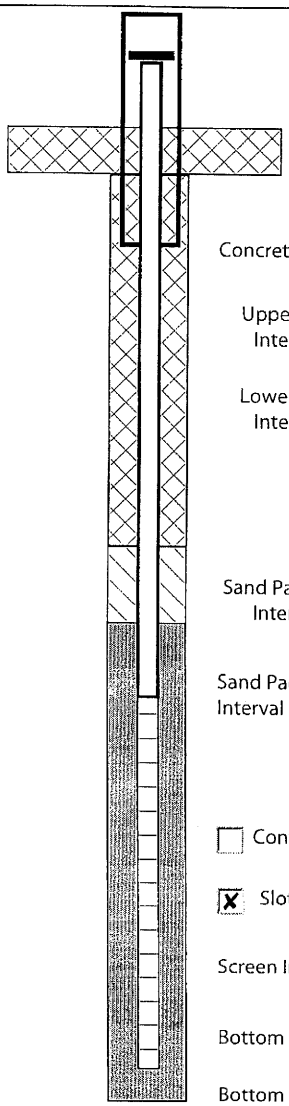
Tax Parcel No. _____

Cased or Uncased Diameter _____ Static Level 3 Feet

Work/Decommission Start Date 5/9/06

Work/Decommission Completed Date 5/11/06

Construction/Design



[ ] Square [X] Round PAD

Concrete Depth: 2'

Upper Seal Interval: 2' - 16'

Lower Seal Interval: N/A

Sand Pack Seal Interval

Sand Pack Interval: 16'-40'

[ ] Continous Wire Wrap

[X] Slotted

Screen Interval: 19'-39'

Bottom of Well: 39'

Bottom of Hole: 48'

Well Data

Monument Size	6"
Monument Stickup	3'
Pad Size	18"
Upper Surface Seal	Bentonite Chips
Lower Surface Seal	
Well Diameter	2"
Well Material	Sch 40 PVC
Filter Pack Seal	
Filter Pack Sand Size	10/20
Screen Slot Size	.020
Borehole Backfill Material	Bentonite Chips

Formation Description

0-15'	Silty-Sand
15'-39'	Silt, Sand & Gravel
39'-48/	Till

The Department of Ecology does NOT warranty the Data and/or Iformation on this Well Report

watercress MW4

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(slect one)*

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Consulting Firm Robinson Noble and Saltbush

Unique Ecology Well ID Tag No. ATN755

WELLCONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print) David Donnelly

Driller/Engineer /Trainee Signature _____

Driller or Trainee License No. _____

If trainee, licensed driller's Signature and License No. _____

CURRENT Notice of Intent No. RE01484

Type of Well *(select one)*

[X] Resource Protection

[ ] Geotech Soil Boring

Property Owner City of Enumclaw

Site Address 1309 Myrtle Avenue

City Enumclaw County King

Location NE 1/4-1/4 NW 1/4 Sec 19 Twn 20 R 17E Select One [ ] EWM [X] WWM

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

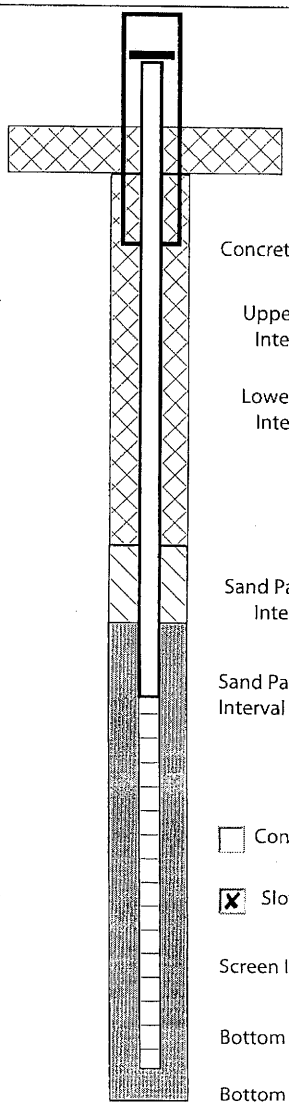
Tax Parcel No. _____

Cased or Uncased Diameter _____ Static Level 3 Feet

Work/Decommission Start Date 5/9/06

Work/Decommission Completed Date 5/11/06

Construction/Design



[ ] Square [X] Round PAD

Concrete Depth 2'

Upper Seal Interval 2' - 16'

Lower Seal Interval N/A

Sand Pack Seal Interval

Sand Pack Interval 13'-37'

[ ] Continous Wire Wrap

[X] Slotted

Screen Interval 16'-36'

Bottom of Well 36'

Bottom of Hole 46'

Well Data

Monument Size	6"
Monument Stickup	3'
Pad Size	18"
Upper Surface Seal	Bentonite Chips
Lower Surface Seal	
Well Diameter	2"
Well Material	Sch 40 PVC
Filter Pack Seal	
Filter Pack Sand Size	10/20
Screen Slot Size	.020
Borehole Backfill Material	Bentonite Chips

Formation Description

0-13'	Silty-Sand
13'-37.5'	Sand & Gravels
37.5'-48/	Till

The Department of Ecology does NOT warranty the Data and/or Iformation on this Well Report

Watercress MW5

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(slect one)*

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Consulting Firm Robinson Noble and Saltbush

Unique Ecology Well ID Tag No. ATN754

WELLCONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print) David Donnelly

Driller/Engineer /Trainee Signature _____

Driller or Trainee License No. _____

If trainee, licensed driller's Signature and License No. _____

CURRENT Notice of Intent No. RE01484

Type of Well *(select one)*

[X] Resource Protection

[ ] Geotech Soil Boring

Property Owner City of Enumclaw

Site Address 1309 Myrtle Avenue

City Enumclaw County King

Location NE 1/4-1/4 NW 1/4 Sec 19 Twn 20 R 17E Select One [ ] EWM [X] WWM

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

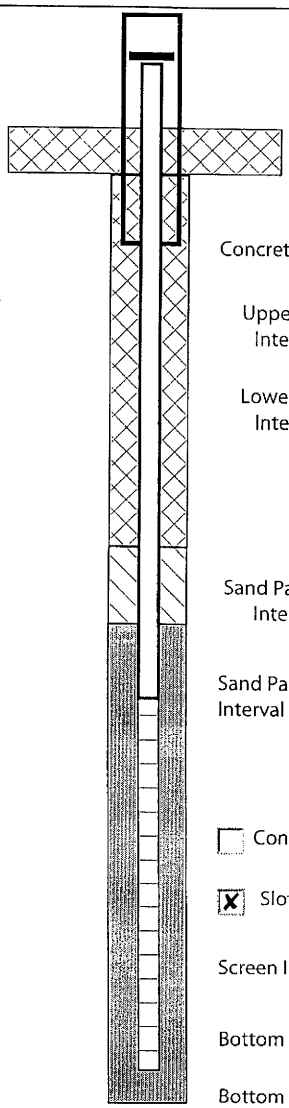
Tax Parcel No. _____

Cased or Uncased Diameter _____ Static Level 5 Feet

Work/Decommission Start Date 5/9/06

Work/Decommission Completed Date 5/11/06

Construction/Design



[ ] Square [X] Round PAD

Concrete Depth 2'

Upper Seal Interval 2' - 5'

Lower Seal Interval N/A

Sand Pack Seal Interval

Sand Pack Interval 5'-20'

[ ] Continous Wire Wrap

[X] Slotted

Screen Interval 8'-18'

Bottom of Well 18'

Bottom of Hole 34'

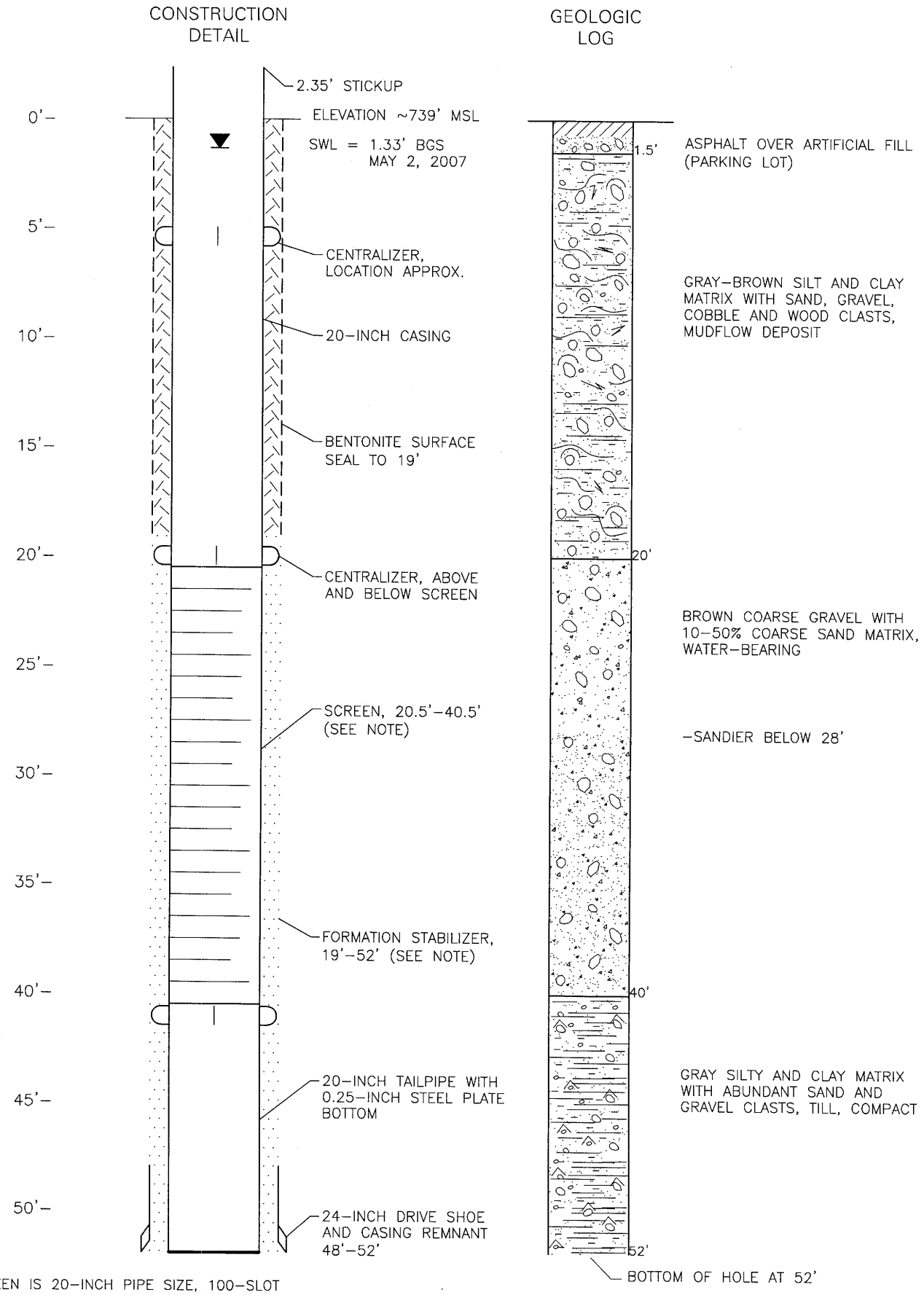
Well Data

Monument Size	6"
Monument Stickup	3'
Pad Size	18"
Upper Surface Seal	Bentonite Chips
Lower Surface Seal	
Well Diameter	2"
Well Material	Sch 40 PVC
Filter Pack Seal	
Filter Pack Sand Size	10/20
Screen Slot Size	.020
Borehole Backfill Material	Bentonite Chips

Formation Description

0-11'	Silty-Sand
11'-19'	Sand & Gravels
19'-34'	Till

The Department of Ecology does NOT warranty the Data and/or Iformation on this Well Report



NOTE: WELL SCREEN IS 20-INCH PIPE SIZE, 100-SLOT (0.100 OPENING) WIRE-WOUND STAINLESS STEEL. FORMATION STABILIZER IS COARSE PEA GRAVEL

ROBINSON NOBLE SALTBUSH INC.
GROUNDWATER & ENVIRONMENTAL SCIENTISTS
1947 60 Years 2007

PM: JEB
T 20 N/R 07 E - 19
1281-002B
JUNE 2007

Figure 2
Construction Detail and Geologic Log for Watercress Production Well
City of Enumclaw

Golf Course Well Logs

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy 20/7E/30/K

WATER WELL REPORT

STATE OF WASHINGTON WRC 34446

Application No. 20/07-30K
Permit No. 20/07-30K

(1) OWNER: Name KING COUNTY Address E-531 KING CO. COURTHOUSE, SEATTLE

(2) LOCATION OF WELL: County King — NW ¼ SE ¼ Sec. 30 T. 20 N., R. 7E W.M.

Bearing and distance from section or subdivision corner

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

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☐ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 60 ft. Depth of completed well ft.

(6) CONSTRUCTION DETAILS:

Casing installed: " Diam. from ft. to ft.
Threaded ☑ " Diam. from ft. to ft.
Welded ☐ " Diam. from ft. to ft.

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

Screens: Yes ☐ No ☐
Manufacturer's Name none
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

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

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

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

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 48 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom?
Yield: 115 gal./min. with ft. drawdown after 4 hrs.
" " " "
" " " "

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

Time	Water Level	Time	Water Level	Time	Water Level

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

(10) WELL LOG:

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

MATERIAL	FROM	TO
Old well - unknown		

Work started 4/11/73, 19 Completed, 19

WELL DRILLER'S STATEMENT:

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

NAME Richardson Well Drilling Company (Person, firm, or corporation) (Type or print)

Address P.O. Box 44408, Tacoma, Wa. 98444

[Signed] [signature] (Well Driller)

License No. 223-02-0500 Date 12/20/, 19 73

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

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

20/7E/30/K

WATER WELL REPORT

STATE OF WASHINGTON

WRC 3445

Application No. 20/07-30K

Permit No.

(1) OWNER: Name KING COUNTY Address KING CO. COURTHOUSE SEATTLE 98104

(2) LOCATION OF WELL: County King — NW ¼ SE ¼ Sec 30 T 20 N., R 7E W.M.

Bearing and distance from section or subdivision corner

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

(4) TYPE OF WORK: Owner's number of well (if more than one)

New well ☐ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☒ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 10 inches.
Drilled 109 ft. Depth of completed well 109 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ..... " Diam. from ..... ft. to ..... ft.
Threaded ☐ ..... " Diam. from ..... ft. to ..... ft.
Welded ☑ ..... " Diam. from ..... ft. to ..... ft.

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

Screens: Yes ☒ No ☐
Manufacturer's Name UOP Johnson
Type Stainless Model No.
Diam. 10 Slot size 40 from 89 ft. to 94 ft.
Diam. 10 Slot size 30 from 94 ft. to 109 ft.

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

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

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

(8) WATER LEVELS: Land-surface elevation above mean sea level ..... ft.
Static level 34 ft. below top of well Date 5/3/73
Artesian pressure ..... lbs. per square inch Date
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Driller
Yield: 300 gal./min. with 22 ft. drawdown after 4 hrs.
" " " "
" " " "

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

Time	Water Level	Time	Water Level	Time	Water Level

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

(10) WELL LOG:

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

MATERIAL	FROM	TO
Old well - unknown 0 - 99'		
Fine & course sand	99	109

Work started 4/26/ 1973 Completed 5/4/ 1973

WELL DRILLER'S STATEMENT:

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

NAME Richardson Well Drilling Company (Person, firm, or corporation) (Type or print)

Address P.O. Box 44408, Tacoma, Wa. 98444

[Signed] [signature] (Well Driller)

License No. 223-02-6500 Date 12/20/ 1973

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(slect one)*

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Consulting Firm Robinson Noble and Saltbush

Unique Ecology Well ID Tag No. ATN752

WELLCONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print) David Donnelly

Driller/Engineer /Trainee Signature _____

Driller or Trainee License No. _____

If trainee, licensed driller's Signature and License No. _____

CURRENT Notice of Intent No. RE01485

Type of Well *(select one)*

[X] Resource Protection

[ ] Geotech Soil Boring

Property Owner City of Enumclaw

Site Address 284th ave. SE, South of 456th street

City Enumclaw County King

Location NE 1/4-1/4 NW 1/4 Sec 19 Twn 20 R 17E Select One [ ] EWM [X] WWM

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

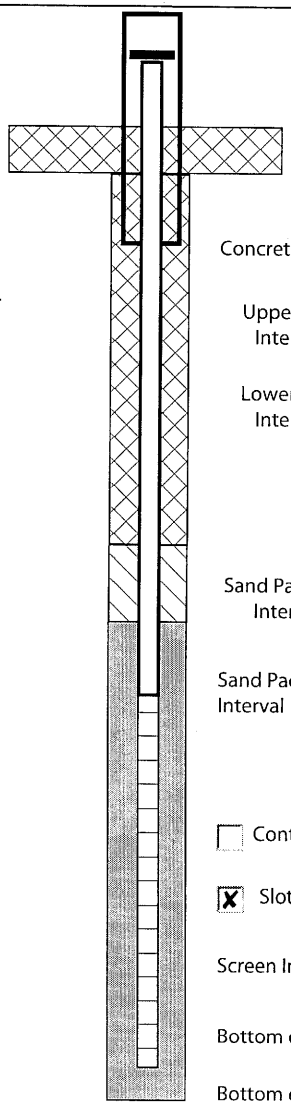
Tax Parcel No. _____

Cased or Uncased Diameter _____ Static Level 39.46 Feet

Work/Decommission Start Date 5/9/06

Work/Decommission Completed Date 5/11/06

Construction/Design



[ ] Square [X] Round PAD

Concrete Depth 2'

Upper Seal Interval 2'-103'

Lower Seal Interval

Sand Pack Seal Interval

Sand Pack Interval 103'-126.

[ ] Continous Wire Wrap

[X] Slotted

Screen Interval 106.5-126

Bottom of Well 126.5'

Bottom of Hole 137'

Well Data

Monument Size	6"
Monument Stickup	
Pad Size	1.5'
Upper Surface Seal	Cement
Lower Surface Seal	
Well Diameter	2"
Well Material	Sch 40 PVC
Filter Pack Seal	
Filter Pack Sand Size	10/20
Screen Slot Size	.020
Borehole Backfill Material	Bentonite Chips

Formation Description

0-2'	Top Soil
2'-12'	Sandy-Clay
12'-24'	Silty-Sand
24'-28'	Silt, Sand & Gravel
28'-45.5'	Silt, Sand & Gravel
45.5'-86'	Sand & Gravels
86'-101'	Sand
101'-126'	Sand Gravel&Cobbles
126'-135'	Silty-Sand
135'-137'	Sand Gravel&Cobbles

The Department of Ecology does NOT warranty the Data and/or Iformation on this Well Report

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

ECOLOGY

20-7E-30K

Construction/Decommission ("x" in circle)

☒ Construction 279970

☐ Decommission *ORIGINAL INSTALLATION*

Notice of Intent Number _____

PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) GCPW

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☒ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 20 inches, drilled 136 ft. Depth of completed well _____ ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 20" Diam. from +1 ft. to 81 ft.
☐ Liner installed 16" Diam. from +2 ft. to 80 ft.
☐ Threaded _____" Diam. From _____ ft. to _____ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used _____

SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location _____

Manufacturer's Name Johnson

Type steel Model No. _____

Diam. 16 Slot size 0.040 from 80 ft. to 131 ft.

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: ☒ Yes ☐ No Size of gravel/sand 8x12

Materials placed from 60 ft. to 136 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 25 ft.

Material used in seal bentonite

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

PUMP: Manufacturer's Name N/A

Type: N/A H.P. N/A

WATER LEVELS: Land-surface elevation above mean sea level 780 ft.

Static level 39.61 ft. below top of well Date 10/23/07

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☒ Yes ☐ No If yes, by whom? Hokkaido

Yield: 776 gal./min. with 3.74 ft. drawdown after 1 hrs.
Yield: 776 gal./min. with 3.99 ft. drawdown after 10 hrs.
Yield: 776 gal./min. with 4.15 ft. drawdown after 24 hrs.

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

Time	Water Level	Time	Water Level	Time	Water Level
0	40.14	30	40.05	240	39.91
5	40.10	60	40.03	440	39.84
10	40.08	120	39.98	1440	39.72

Date of test Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.

Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water 48 Was a chemical analysis made? ☒ Yes ☐ No

CURRENT

Notice of Intent No. WE06717

Unique Ecology Well ID Tag No. AFT 336

Water Right Permit No. 20890C

Property Owner Name City of Enumclaw

Well Street Address 45224 284th Avenue S

City Enumclaw County King

Location NW1/4-1/4 SE1/4 Sec 30 Twn 20 R 7E EWM ☒ Or WWM ☐

Lat/Long (s, t, r Still REQUIRED) Lat Deg N/A Min N/A Sec N/A Long Deg N/A Min N/A Sec N/A

Tax Parcel No. 3020079006

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dry Brown Silty Sand and Gravel with Cobbles	0	8
Dry Gray Silty Gravel	8	16
Dry Gray Silty Gravel w/ Cobbles and Wood	16	21
Dry Gray-Brown Silty Gravel w/ Cobbles, tight, some bound	21	45
Water Bearing Brown Medium Sand w/ some F-C Sand and Gravel	45	59
Water Bearing Brown Gravel with Med. Sand, some F-C	59	84
Water Bearing Brown Fine to Medium Sand w/ occ. Gravel and wood organics	84	108
Water Bearing Dark Brown Coarse to Medium Sand and Gravel w/ wood organics	108	131
Gray Moist Clay-Bound Sand and Gravel	131	136.5

RECEIVED NOV 02 2007 DEPT. OF ECOLOGY

Start Date 5/29/07 Completed Date 10/25/07

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Driller or trainee License No. 1239

Name (Print Last, First) ROBERT B. CARPER

Driller/Engineer/Trainee Signature Robert B Carper

IF TRAINEE: Driller's License No:

Driller's Signature:

Drilling Company HOKKAIDO DRILLING, INC.

Address P.O. BOX 100

City, State, Zip GRAHAM, WA 98338

Contractor's Registration No. HOKKADI017M8 Date NOVEMBER 1, 2007

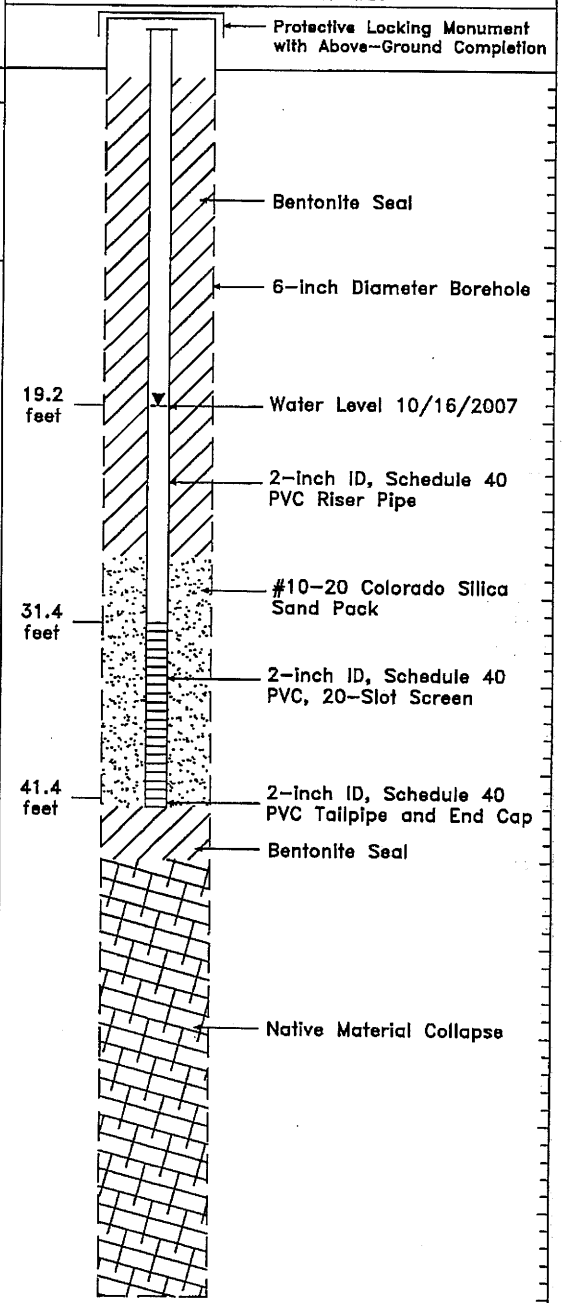
Boise Spring Well Logs

Figure 4 Well Log and As-Built for Boise Spring MW-1

DRAFT

DEPTH (ft)	GEOLOGIC LOG	UNIT
	Ground Surface Elevation: 920 ft (NGVD 29)	
0	Moist, brown, silty, very sandy, GRAVEL	Qvr
	Dry, orange/brown, sl. gravelly, silty, fine SAND	
5	Moist to wet, brown, gravelly, silty, fine SAND with cobbles up to 4-inches	
	Dry, gray, slightly gravelly, silty, fine SAND	Qvt
	Dry, brown, silty, fine SAND with trace gravel. Gap-graded, sub-angular gravel.	
10		
	Dry, brown, slightly gravelly, slightly silty, fine SAND. Increase in moisture and gravel at 13 feet.	
15		
	Interlayers of moist, brown, gravelly, very silty fine SAND and wet, brown, silty fine SAND. Layers 0.5 to 1.5 feet thick.	
20	Moist, brown, gravelly, silty, fine to coarse SAND	
25	Wet at 26 feet.	
	Wet, gray, gravelly, fine to coarse SAND with cobbles	Qva
30	Wet, brown, silty, very gravelly, fine to coarse SAND. Silt bound to outer gravel.	
35	Wet, gray, slightly silty, very gravelly, fine to coarse SAND	
	Moist, gravelly, silty, fine to coarse SAND. Lens of moist, black and white, fine to coarse SAND from 36.5 to 37 feet.	
40	Wet, gray, fine to coarse SAND with trace gravel	
45	Wet, brown, silty, gravelly, fine to coarse SAND with cobbles.	
50		
55	Wet, brown, slightly gravelly, fine to coarse SAND	
	Gray, slightly gravelly, clayey SILT with cobbles	
60	Dry, brown, very silty fine SAND with cored rock/boulder	
65	Black ANDESITE rock core up to 6-inches long in silty/clay matrix	Tb
	Dry, gray, sandy SILT	
70	Black ANDESITE rock core up to 5-inches long in silty matrix	
	Bottom of Boring 10/16/2007	
75		
80		

WELL CONSTRUCTION DETAILS



PROJECT NAME: Boise Spring Water Supply Evaluation
WELL IDENTIFICATION NUMBER: MW-1
LOCATION: SE ¼ NW ¼ Sec.29, T.20N., R.7E.
CONSULTING FIRM: Pacific Groundwater Group
REPRESENTATIVE: Inger Jackson/Dan Matlock
WDOE NO: BAM 077

DEPTH TO WATER: 19.2 feet below ground
WATER LEVEL DATE: 10/16/2007
START CARD NO.: R70812
DRILLING METHOD: Sonic
DRILLER: Brian Owens
FIRM: Boart Longyear

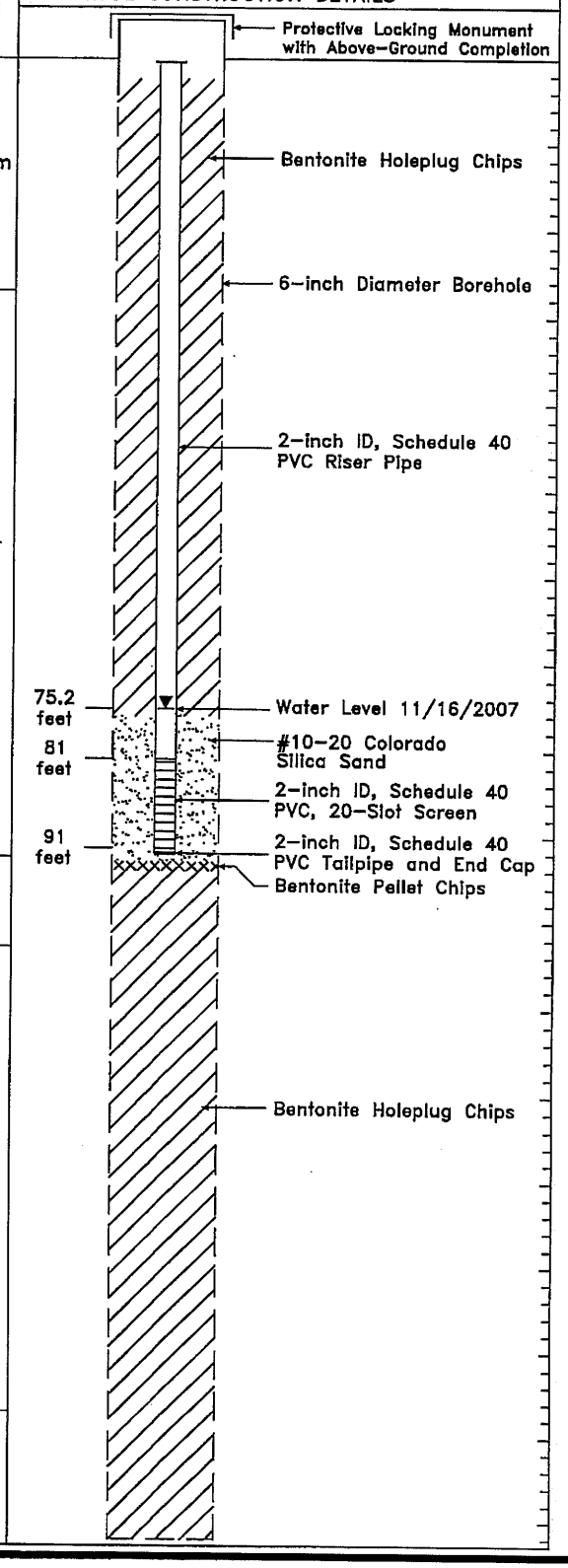
Confidential Attorney/Client Work Product Prepared in Anticipation of Litigation

PSG

Figure 5 Well Log and As-Built for Boise Spring MW-2

DRAFT

DEPTH (ft)	GEOLOGIC LOG	UNIT
	Ground Surface Elevation: 999 ft (NGVD 29)	
0	Dry, gray clay mixed with crushed road bed	
	Wet, brown with orange mottling, silty fine SAND with trace gravel. Cobble at 6 feet.	
10	Moist, gray, slightly gravelly, very silty, fine SAND. Cobbles at 11 feet.	Qom
	Dry, gray, slightly silty, gravelly, fine SAND	
20	Dry, brown, gravelly, fine SAND. Some coarse sand from 18 to 20 feet.	
	Dry, brown, very gravelly, fine SAND with cobbles	
30	Moist, gray, slightly gravelly, very silty, fine SAND	
	Dry, brown, silty, gravelly, fine SAND	
40	Dry, brown, slightly silty, gravelly, fine SAND with cobbles	
50		
60	Moist, brown, slightly silty, gravelly, fine SAND. Trace cobbles at 60 to 63 feet and 71 feet.	Qvr
70		
80	Water and medium to coarse SAND encountered at 75 feet.	
	Wet, brown, slightly silty, sandy, fine GRAVEL	
	Wet, brown, silty, sandy, fine GRAVEL	
90	Moist, brown, silty, very gravelly, fine to coarse SAND	
	Dry to moist, gray, compact, slightly gravelly, very silty, fine SAND	Qvt
100		
110	Brown, silty, gravelly, fine to medium SAND. Wet, slightly silty zone with cobbles from 105 to 108 feet	
	Moist, brown, silty, gravelly, fine SAND	
	Moist, brown, slightly gravelly, very sandy SILT	
120	Moist, gray, slightly gravelly, silty, fine SAND. Fine gravel decreases with depth. Cobbles at 124 feet	
130	Dry, gray, slightly gravelly, very sandy SILT	Qva
	Boulders	
140		
	Wet, silty, fine to medium SAND with trace gravel	
150	Wet, slightly silty, slightly gravelly, fine to medium SAND	
	Moist, slightly gravelly, silty SAND and sandy SILT layers. Hard below 151.5 feet.	
160	Boulders	
	Dry, sandy SILT/CLAY. Color changes with depth from red to blue to gray to orange/brown.	Tb
170	ANDESITE bedrock core	
	Bottom of Boring 11/16/2007	



PROJECT NAME: Boise Spring Water Supply Evaluation
WELL IDENTIFICATION NUMBER: MW-2
LOCATION: SW ¼ NE ¼ Sec.29, T.20N., R.7E.
CONSULTING FIRM: Pacific Groundwater Group
REPRESENTATIVE: Inger Jackson
WDOE NO: BAM 232

DEPTH TO WATER: 75.2 feet below temporary top of casing/ground surface
WATER LEVEL DATE: 11/16/2007
START CARD NO.: R70817
DRILLING METHOD: Sonic
DRILLER: Ken Phillips
FIRM: Boart Longyear

PGG

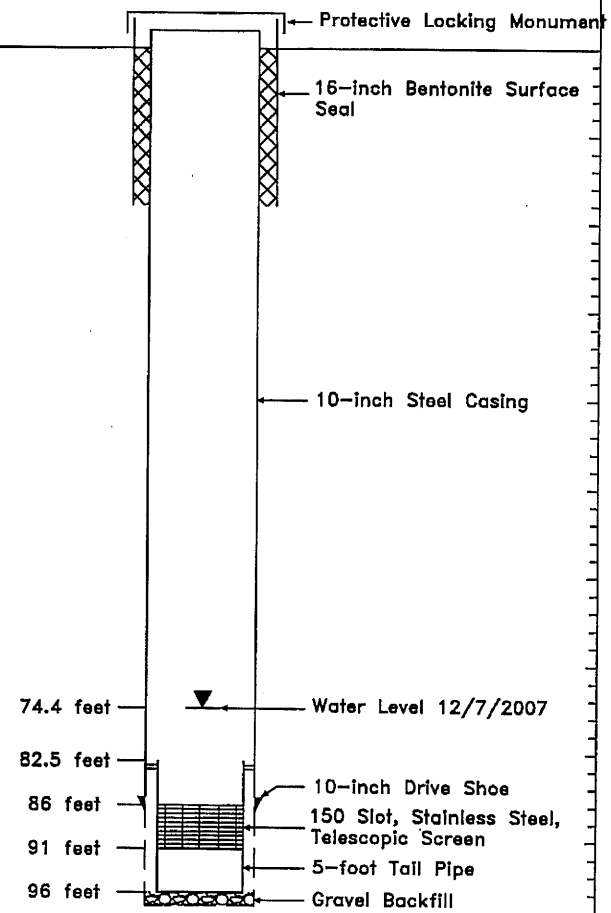
Confidential Attorney/Client Work Product Prepared in Anticipation of Litigation

Figure 6 Well Log and As-Built for Boise Spring TW-1

DRAFT

DEPTH (ft)	GEOLOGIC LOG	Sample Interval
0	Ground Surface Elevation: 999 ft (NGVD 29)	
	[Adding water during drilling 0–35 feet] Brown, slightly silty, gravelly, medium to coarse SAND	
10	Gray, sandy GRAVEL	
	Cobbles at 15 feet	
20	Dry, brown, slightly silty, gravelly, fine and medium SAND	
	Dry, gray, slightly (fine) sandy, fine GRAVEL	
30	Increase in coarse sand	
	Dry, gray, gravelly, medium to coarse SAND. Drilling action indicates cobbles at 36 feet.	
40		
	Wet, brown, slightly silty, gravelly, medium to coarse SAND. No binder observed.	
50	Moist, brown, very (medium to coarse) sandy, fine GRAVEL with trace silt. Decrease in medium sand at 55 feet.	
60	Dry, gray, slightly gravelly, medium SAND.	
	Brown, slightly silty, very sandy (medium to coarse), fine GRAVEL [adding water]	
70	(Washed) gray, gravelly, medium to coarse SAND [adding water]	
	Brown, very gravelly, medium to coarse SAND with trace silt. Wet at 80 feet.	
80	Wet, brown, sandy fine GRAVEL. Slightly silty at 87 feet.	
90	Wet, brown, sandy, fine GRAVEL (well-rounded, well-graded, 0.5–0.75 inches)	
	Large cobble/boulder at 95 feet. Wet, brown, slightly silty, gravelly, fine SAND	
100	—Bottom of Boring 12/7/2007—	
110		
120		
130		
140		
150		
160		
170		

WELL CONSTRUCTION DETAILS



PROJECT NAME: Boise Spring Water Supply Evaluation
WELL IDENTIFICATION NUMBER: TW-1
LOCATION: SW¼ NE¼ Sec.29, T.20N., R.7E.
CONSULTING FIRM: Pacific Groundwater Group
REPRESENTATIVE: Inger Jackson
WDOE NO: ALN 186

DEPTH TO WATER: 74.4 feet below ground surface
WATER LEVEL DATE: 12/7/2007
DRILLING METHOD: Air Rotary
DRILLER: John Arfman
FIRM: Boart Longyear

PGG

Confidential Attorney/Client Work Product Prepared in Anticipation of Litigation

280285

BOART LONGYEAR

20-7E-29K

Resource Protection Well Report

Project Name: Springtest well

Date: 10/17/07

Well Identification #: Ban 077

County: King NW ¼ SE ¼

Drilling Method: Sonic

Section: 29 T. 20 N R. 7E

Driller: Brian Owens Thomas Craney

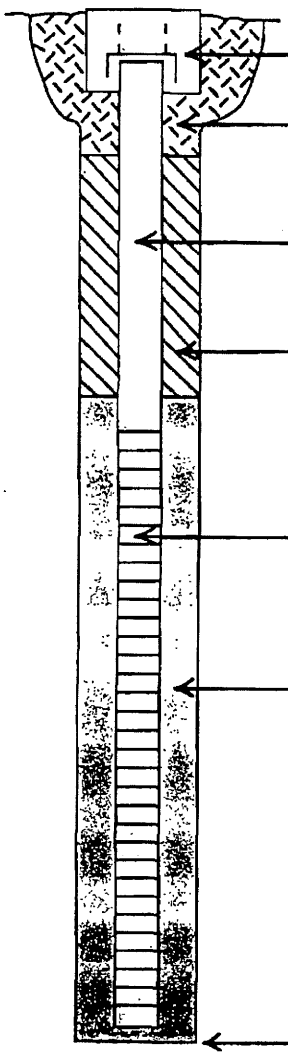
~~Street Address~~ N 47° 11.647 W 121° 56.593

License #: 2409

Start Card: R 70812

Consulting Firm: PGWG

AS-BUILT



WELL DATA

MONUMENT TYPE: above ground

CONCRETE SURFACE SEAL 0-2 ft.

PVC BLANK 2 "x 40'

BACKFILL 2-28 ft.

TYPE: 3/4 ben Chips

PVC SCREEN 2 "x 10 ft

SLOT SIZE: .20

TYPE: PVC tread together

GRAVEL PACK 28-41 ft.

MATERIAL: 10/20 Silica Sand

WELL DEPTH 41 ft.

FORMATION DESCRIPTION

0 - 15 ft. Rocky, Sand

15 - 60 ft. Rock, Sand, Silt

60 - 70 ft. bed rock

- ft.

REMARKS

RECEIVED

DEC 19 2007

DEPT. OF ECOLOGY

RECEIVED

DEC 19 2007

DEPT. OF ECOLOGY

Signature: Thomas W. Craney

VAV039.CDR

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.1

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager : City of Enumclaw

Water system name : City of Enumclaw

County: King

Water system number: 236001 Source number: ~~1~~ 2 01

Well depth: _____ (ft.) (*From WFI form*)

Source name: Boise Spring

WA well identification tag number: ___ ___ ___-___ ___ ___

_____ well not tagged

Number of connections: 4200 Population served: 10,000

Township: 20N Range: 7E

Section: 29 1/4 1/4 Section: SE ¼ NW ¼

Latitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
____other: Water Right Permit

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: ___ / ___ /___ month/day/year Early 1900's

last reconstruction: ___ / ___ /___ month/day/year

X information unavailable

2) Well driller: _____

_____

_____

___ well driller unknown

3) Type of well:

___Drilled: ___ rotary ___ bored ___ cable (percussion) ___ Dug

___ Other: X spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: _____

_____

4) Well report available? ___ YES (attach copy to form) X NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 540 (gallons/min)

Source of information: Metered

If not documented, how was pumping rate determined? _____

_____

___ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

X disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

Chlorination for disinfection.

_____

7) If source is chlorinated, is a chlorine residual maintained: X YES ___ NO

Residual level: .30 *(At the point closest to the source.)*

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

___ < 20 ft ___ 20–50 ft ___ 50–100 ft ___ 100–200 ft ___ >200 ft

___ information unavailable ('< ' *means less than;* '> ' *means greater than*)

2) Depth to ground water (static water level):

___ < 20 ft ___ 20–50 ft ___ 50–100 ft ___ >100 ft

_X_ flowing well/spring (artesian)

How was water level determined?

___ well log ___ other: _____

___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)

or

UNKNOWN feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: _X_ YES ___ NO

5) Wellhead elevation (height above mean sea level): 1000 (ft)

How was elevation determined? ___ topographic map _X_ Drilling/Well Log ___ altimeter

___ other: _____

___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

___ evidence of a confining layer in well log

___ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the top of the open interval? ___ YES ___ NO

_X_ information unavailable

7) Sanitary setback:

___ < 100 ft* ___ 100-120 ft ___ 120-200 ft X > 200 ft
* if less than 100 ft describe the site conditions:

8) Wellhead construction:

___ wellhead enclosed in a wellhouse

X controlled access (describe): Spring area fenced around catchment / app. 20 acre watershed.

___ other uses for wellhouse (describe): ___

___ no wellhead control

9) Surface seal:

___ 18 ft

___ < 18 ft (no Department of Ecology approval) (*'<' means less than*)

___ < 18 ft (Approved by Ecology, include documentation) (*'<' means less than*)

___ > 18 ft (*'>' means greater than*)

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

___ < 10 in/yr ___ 10-25 in/yr X > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 375,438,592 (gallons)

How was this determined?

X meter

___ estimated: ___ pumping rate (_____)

___ pump capacity (_____)

___ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 2,200 (ft)

1 year ground water travel time : 3,110 (ft)

5 year ground water travel time: 6,950 (ft)

10 year ground water travel time: 9,830 (ft)

Information available on length of screened/open interval?

___ YES X NO

Length of screened/open interval: _____(ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? X YES ___ NO (mark and identify on map). Boise Creek

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

Comments: _____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	No	No	NO	
stormwater injection wells	No	No	No	
other injection wells	No	No	No	
abandoned ground water well	No	No	No	
landfills, dumps, disposal areas	No	No	Yes-Enumclaw Landfill	
known hazardous materials clean-up site	No	No	No	
water system(s) with known quality problems	No	No	No	
population density > 1 house/acre	No	No	Yes	
residences commonly have septic tanks	No	Yes	Yes	
Wastewater treatment lagoons	No	No	No	
sites used for land application of waste	No	No	Yes--Farm Use	

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

_____

_____

_____

_____

_____

_____

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	___	X
< 2 mg/liter nitrate	___	X
2–5 mg/liter nitrate	___	X
> 5 mg/liter nitrate	___	X
___ Nitrate sampling records unavailable		

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES	NO
Results greater than MCL or SAL	___	X
VOCs detected at least once	___	X
VOCs never detected	___	X
___ VOC sampling records unavailable		

C. EDB/DBCP:	YES	NO
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	___	___
___ EDB/DBCP tests required but not yet completed		
X EDB/DBCP tests not required		

D. Other SOCs (Pesticides):	YES	NO
Other SOCs detected (pesticides and other synthetic organic chemicals)	___	___
___ Other SOC tests performed but none detected (list test methods in comments		
X Other SOC tests not performed		

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	___	X
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	___	X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

X YES ___ NO

Describe with references to map produced in Part IV:

Boise Spring is located in Cascade Foothills above the Enumclaw Plateau.

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES X NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES X NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

___ YES X NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	___	X	___
6 month–1 year travel time	___	X	___
1–5 year travel time	___	X	___
5–10 year travel time	___	X	___

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	___	X	___
1–5 year travel time	___	X	___
5–10 year travel time	___	X	___

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

Zone of contribution I believe is from the East of Spring in the Cascade Foothills. High Elevation.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES X NO

Did you find it useful? ___ YES X NO

Did you seek outside assistance to complete the assessment? ___ YES X NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.1

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager : City of Enumclaw

Water system name : City of Enumclaw

County: King

Water system number: 236001 Source number: 502

Well depth: _____ (ft.) (*From WFI form*)

Source name: Watercress Spring

WA well identification tag number: ___ ___ ___-___ ___ ___

_____ well not tagged

Number of connections: 4200 Population served: 10,000

Township: 20N Range: 7E

Section: NW½ 19 1/4 1/4 Section: NE¼ SW¼

Latitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey X topographic map
____other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: ___ / ___ /___ month/day/year Apx. 1953

last reconstruction: ___ / ___ /___ month/day/year

X information unavailable

2) Well driller: _____

_____

_____

__X__ well driller unknown

3) Type of well:

___Drilled: ___ rotary ___ bored ___ cable (percussion) ___ Dug

___ Other: __X__ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: _____

_____

4) Well report available? ___ YES (attach copy to form) __X__ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 1735 (gallons/min)

Source of information: Metered

If not documented, how was pumping rate determined? _____

_____

___ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

__X__ disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

Chlorination for disinfection

_____

7) If source is chlorinated, is a chlorine residual maintained: __X__ YES ___ NO

Residual level: .6 (*At the point closest to the source.*)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

___ < 20 ft ___ 20–50 ft ___ 50–100 ft ___ 100–200 ft ___ >200 ft

_X_ information unavailable ('< ' *means less than;* '> ' *means greater than*)

2) Depth to ground water (static water level):

___ < 20 ft ___ 20–50 ft ___ 50–100 ft ___ >100 ft

_X_ flowing well/spring (artesian)

How was water level determined?

___ well log ___ other: _____

___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)

or

Unknown feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: _X_ YES ___ NO

5) Wellhead elevation (height above mean sea level): 750 (ft)

How was elevation determined? ___ topographic map _X_ Drilling/Well Log ___ altimeter

___ other: _____

___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

___ evidence of a confining layer in well log

___ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the top of the open interval? ___ YES ___ NO

_X_ information unavailable

7) Sanitary setback:

___ < 100 ft* ___ 100–120 ft ___ 120–200 ft X > 200 ft
* if less than 100 ft describe the site conditions:

8) Wellhead construction:

___ wellhead enclosed in a wellhouse

X controlled access (describe): Catchment at pump house enclosed in 100'x100' fencing.

___ other uses for wellhouse (describe): ___

___ no wellhead control

9) Surface seal:

___ 18 ft

___ < 18 ft (no Department of Ecology approval) *('< ' means less than)*

___ < 18 ft (Approved by Ecology, include documentation) *('< ' means less than)*

___ > 18 ft *('> ' means greater than)*

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

___ < 10 in/yr ___ 10–25 in/yr X > 25 in/yr

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	No	No	No	
stormwater injection wells	No	No	No	
other injection wells	No	No	No	
abandoned ground water well	Yes		Yes	
landfills, dumps, disposal areas	No	Yes	Yes	
known hazardous materials clean-up site	No	No	No	
water system(s) with known quality problems	No	No	No	
population density > 1 house/acre	Yes	Yes	Yes	
residences commonly have septic tanks	Yes	Yes	Yes	
Wastewater treatment lagoons	No	No	No	
sites used for land application of waste	No	No	No	

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

_____

_____

_____

_____

_____

_____

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 454,855,268 (gallons)

How was this determined?

X meter

___ estimated: ___ pumping rate (_____)

___ pump capacity (_____)

___ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 2,200 (ft)

1 year ground water travel time : 3,110 (ft)

5 year ground water travel time: 6,950 (ft)

10 year ground water travel time: 9,830 (ft)

Information available on length of screened/open interval?

___ YES X NO

Length of screened/open interval: _____ (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? X YES ___ NO (mark and identify on map).

Drainage ditch marked as DD No!

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

Comments: _____

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	___	X
< 2 mg/liter nitrate	___	X
2–5 mg/liter nitrate	___	X
> 5 mg/liter nitrate	___	X
___ Nitrate sampling records unavailable		

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES	NO
Results greater than MCL or SAL	___	X
VOCs detected at least once	___	X
VOCs never detected	___	X
___ VOC sampling records unavailable		

C. EDB/DBCP:	YES	NO
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	___	___
___ EDB/DBCP tests required but not yet completed		
X EDB/DBCP tests not required		

D. Other SOCs (Pesticides):	YES	NO
Other SOCs detected (pesticides and other synthetic organic chemicals)	___	___
___ Other SOC tests performed but none detected (list test methods in comments		
X Other SOC tests not performed		

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	X	
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.		X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

___ YES ___ NO

Describe with references to map produced in Part IV:

Boise & Newaukum creeks, Cascade Foothills to the East.

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES ___ NO Log Unavailable

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES ___ NO Log Unavailable

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

X YES ___ NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	___	___	___
6 month–1 year travel time	X	___	___
1–5 year travel time	X	P.C.	Wells
5–10 year travel time	X	I	& II

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	___	___	~~X~~
1–5 year travel time	___	___	X
5–10 year travel time	___	___	X

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

I believe the zone of contribution for this source is primarily from the East and Northeast, flowing from the Cascade Foothills.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES X NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? ___ YES X NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

Ground Water Contamination
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IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager : City of Enumclaw

Water system name : City of Enumclaw

County: King

Water system number: 236001 Source number: ~~504~~ New 505

Well depth: 229.2 (ft.) (*From WFI form*)

Source name: P.C. Johnson II

WA well identification tag number: ___ ___ ___-___ ___ ___

_____ well not tagged

Number of connections: _____ Population served: _____

Township: T.20N Range: R.7E

Section: 18 1/4 1/4 Section: _____

Latitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
____other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 3 / 15 / 86 month/day/year

last reconstruction: ___ / ___ /___ month/day/year

_____ information unavailable

2) Well driller: Holt Drilling

___ well driller unknown

3) Type of well:

_X_ Drilled: ___ rotary ___ bored _X_ cable (percussion) ___ Dug

___ Other: ___ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: _____

4) Well report available? _X_ YES (attach copy to form) ___ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 1250 (gallons/min)

Source of information: Metered

If not documented, how was pumping rate determined? _____

___ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

_X_ disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

7) If source is chlorinated, is a chlorine residual maintained: _X_ YES ___ NO

Residual level: .47 (*At the point closest to the source.*)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

___ < 20 ft ___ 20–50 ft ___ 50–100 ft ___ 100–200 ft _X_ >200 ft

___ information unavailable (*'< ' means less than; '> ' means greater than*)

2) Depth to ground water (static water level):

___ < 20 ft _X_ 20–50 ft ___ 50–100 ft ___ >100 ft

___ flowing well/spring (artesian)

How was water level determined?

_X_ well log ___ other: _____

___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: ___ YES ___ NO

5) Wellhead elevation (height above mean sea level): _745_(ft)

How was elevation determined? ___ topographic map _X_ Drilling/Well Log ___ altimeter

___ other: _____

___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

_X_ evidence of a confining layer in well log

___ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the top of the open interval? _X_ YES ___ NO

___ information unavailable

7) Sanitary setback:

___ < 100 ft* ___ 100–120 ft ___ 120–200 ft ___ > 200 ft
* if less than 100 ft describe the site conditions:

8) Wellhead construction:

X wellhead enclosed in a wellhouse

X controlled access (describe): Well House inside chain link fence.

___ other uses for wellhouse (describe): ___

___ no wellhead control

9) Surface seal:

___ 18 ft

X < 18 ft (no Department of Ecology approval) ('< ' *means less than*)

___ < 18 ft (Approved by Ecology, include documentation) ('< ' *means less than*)

___ > 18 ft ('> ' *means greater than*)

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

___ < 10 in/yr ___ 10–25 in/yr X > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 74,645,333 (gallons) 1993

How was this determined?

X meter

___ estimated: ___ pumping rate (_____)

___ pump capacity (_____)

___ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 620 (ft)

1 year ground water travel time : 880 (ft)

5 year ground water travel time: 1,970 (ft)

10 year ground water travel time: 2,780 (ft)

Information available on length of screened/open interval?

X YES ___ NO

Length of screened/open interval: 20 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? ___ YES ___ NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

Comments: _____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	~~No~~	~~No~~	~~No~~	
stormwater injection wells	No	No	No	
other injection wells	No	No	No	
abandoned ground water well	Yes	Yes		
landfills, dumps, disposal areas	No	No	No	
known hazardous materials clean-up site	No	No	No	
water system(s) with known quality problems	No	No	No	
population density > 1 house/acre	~~No~~	~~No~~	~~No~~	
residences commonly have septic tanks	Yes	Yes	Yes	
Wastewater treatment lagoons	No	No	No	
sites used for land application of waste	No	No	No	

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

I belive zone of contribution is primarily from the East.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	___	X
< 2 mg/liter nitrate	___	___
2–5 mg/liter nitrate	___	___
> 5 mg/liter nitrate	___	___
___ Nitrate sampling records unavailable		

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES	NO
Results greater than MCL or SAL	___	___
VOCs detected at least once	___	X
VOCs never detected	___	___
___ VOC sampling records unavailable		

C. EDB/DBCP:	YES	NO
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	___	___
___ EDB/DBCP tests required but not yet completed		
X EDB/DBCP tests not required		

D. Other SOCs (Pesticides):	YES	NO
Other SOCs detected (pesticides and other synthetic organic chemicals)	___	___
___ Other SOC tests performed but none detected (list test methods in comments		
X Other SOC tests not performed		

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	___	X
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	___	X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

___ YES ___ NO

Describe with references to map produced in Part IV:

_____

_____

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES X NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES X NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

___ YES X NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time		X	
6 month–1 year travel time		X	
1–5 year travel time		X	
5–10 year travel time		X	

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time			X
1–5 year travel time			X
5–10 year travel time			X

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

~~I believe the zone of contribution is primarily from the~~ East.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES X_ NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? ___ YES X_ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

SOURCE- 06

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.2

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager: City of Enumclaw

Water system name: City of Enumclaw

County: *King*

Water system number: 236001 Source number: *503R (replacement well)*

Well depth: 230 (ft.) (From WFI form)

Source name: P.C. Johnson Well No. 1

WA well identification tag number: ACS 963

_____ well not tagged

Number of connections: *4200* Population served: 10,000

Township: *20N* Range: *7E*

Section: 18 1/4 1/4 Section: NE SW *(WM)*

Latitude/longitude (if available): _____ / _____

How was lat./long. determined?

_____ global positioning device ____ survey ____ topographic map

_____ other:_____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 6/25/97 month/day/year

last reconstruction: __/__/__ month/day/year

____ information unavailable

2) Well driller: *Holt Drilling, Inc.*
10621 Todd Rd. E, Puyallup, WA 98372
St. Contr. Reg. # 1099

_____ well driller unknown

3) Type of well:

__ Drilled: ____ rotary *(Air)* __ bored ✓ cable (percussion) Dug

__ Other: ___ spring(s) __ lateral collector (Ranney)

___ driven __ jetted __ other:

Additional comments: _____

_____

4) Well report available? ✓ YES (attach copy to form) __ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

4) Average pumping rate: 820 (gallons/min) *(will only be pumped at 550 gpm per water right restriction)*

Source of information: *aquifer pumping test, (free discharge through pipe orifice tables)*

If not documented, how was pumping rate determined? _____

_____

_____ Pumping rate unknown

6) Is this source treated? *Yes**

If so, what type of treatment:

✓ disinfection ___ filtration __ carbon filter __ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

** Source will be treated with Cl for bacteria. No planned additional treatment for well.*

7) If source is chlorinated, is a chlorine residual maintained: ✓ YES __ NO

Residual level: *0.45 ppm* (At the point closest to the source.)

PART III: Hydrogeologic Information

1) Depth to top of open interval (screen): [check one]

__ <20 ft __ 20--50 ft ___ 50--100 ft ✓ 100--200 ft ___>200 ft

__ information unavailable ('<' means less than: '>' means greater than)

2) Depth to ground water (static water level):

__<20 ft ✓ 20--50 ft __ 50--100 ft __ > 100 ft

__ flowing well/spring (artesian)

How was water level determined?

__ well log ✓ other: *electrical conductivity water level indicator and Hermit data logger, model 2000.*

__ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or *N/A*
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: ___YES ___NO *N/A.*

5) Wellhead elevation (height above mean sea level): 745 (ft)

How was elevation determined? ___ topographic map __ Drilling/Well log ___ altimeter

✓other: Elevation of P.C. Johnson Well No. II which is 80 feet north of newly constructed P.C. 1 replacement well

__ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

___*Yes*___ evidence of a confining layer *in Kleinfelder lithologic log and previous logs*

_____ no evidence of a confirming layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the **bottom** of the **lowest confining layer**? ✓YES __NO

7) Sanitary setback:

✓ <100 ft __ 100--120 ft __ 120--200 ft __ > 200 ft

* If less than 100 ft describe the site conditions:

The sanitary setback north, east, and west of the well is at least 100 feet. The sanitary setback south of the well is 80 feet. The owners of the property to the south would not lease or sell the portion of their land within the 100 foot sanitary control radius of the well to the City, or provide the City with restrictive covenants for that portion of land. Cattle occasionally graze on this portion of land. However, based on the results of the pumping test (confined aquifer), the depth of the sanitary seal, and the absence of coliform bacteria in the water samples, we do not believe the 20 foot reduction in sanitary setback distance constitutes a threat to human health.

8) Wellhead construction:

__ wellhead enclosed in a wellhouse

✓ controlled access (describe): *The new well is constructed with a pitless adapter, Baker Monitor PS unit, approved by the Washington State Department of Health. The pump station hardware and appurtenances are located approximately 20 feet north of the well in the old P.C. Johnson Well No. 1 pumphouse. The well site is secured with a chain-link fence.*

__ other uses for wellhouse (describe): _____

__ no wellhead control

9) Surface seal:

__ 18 ft

__ < 18 ft (no Department of Ecology approval) ('<' means less than)

__ < 18 ft (Approved by Ecology, include the documentation) ('<' means less than)

✓ > 18 ft *(50')* ('>' means greater than)

__ depth of seal unknown

__ no surface seal

10) Annual rainfall (inches per year):

__ < 10 in/yr 10--25 in/yr ✓ >25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: *0* (gallons)

How was this determined? This is an emergency replacement well which will not be used unless P.C. Johnson Well No. II becomes inoperable. The original P.C. Johnson Well No. I has been abandoned.

___ meter

__ estimated __ pumping rate

__ pump capacity (_____)

__ other

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet) *based on calculated sustained yield of 550 (water right) and 820 gpm, and a constant pumping rate, 365 days/yr, in the event P.C. Johnson Well No. II becomes inoperable. See Plate 2*

	550 gpm	*820 gpm*
6 month ground water travel time:	*966 ft*	*1,179 ft*
1 year ground water travel time:	*1,366 ft*	*1,667 ft*
5 year ground water travel time:	*3,054 ft*	*3,729 ft*
10 year ground water travel time:	*4,319 ft*	*5,273 ft*

Information available on length of screened/open interval?

✓ YES __NO

Length of screened/open interval: *30* (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? __YES ✓ NO.

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___YES* ✓ NO (mark and identify on map).

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	N	N	N	
stormwater injection wells	N	N	N	
other injection wells	N	N	N	
abandoned ground water well	Y	Y	Y	
landfills, dumps, disposal areas	N	N	N	
known hazardous materials clean-up site	N	N	N	
water system(s) with known quality problems	N	N	N	
population density > 1 house/acre	N	N	Y	
residences commonly have septic tanks	Y	Y	Y	
Wastewater treatment lagoons	N	N	N	
sites used for land application of waste	N	N	N	

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary. (Plate 2 is a map of the wellhead and time of travel areas. Locations of homes, streets, driveways, etc. are shown on the map.)

If other recorded or potential sources of groundwater contamination exist within the ten year time of travel circular zone around your water supply, please describe: None known.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. **Nitrate:** (Nitrate MCL = 10 mg/l)	YES
Results greater than MCL	____
<2 mg/liter nitrate	✓
2--5 mg/liter nitrate	____
>5 mg/liter nitrate	____
Nitrate sampling records unavailable	____

B. **VOCs** (VOC detection level 0.5 ug/l or 0.0005 mg/l)	YES
Results greater than MCL or SAL	____
VOCs detected at least once	____
VOCs never detected	✓
VOC sampling records unavailable	____

C. **EDB/DBCP:**	YES
(EDG MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)	____
EDB/DBCP detected below MCL at least once	____
EDB/DBCP detected above MCL at least once	____
EDB/DBCP never detected	____
EDB/DBCP tests required but not yet completed	____
EDB/DBCP tests not required	✓

D. **Other SOCs (Pesticides):**	YES
Other SOCs detected (pesticides and other synthetic organic chemicals)	____
Other SOC tests performed but none detected (list test methods in comments)	____
Other SOC tests not performed	✓

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here:

Existing P.C. Johnson Well No. 1 has only been tested for inorganic compounds, bacteria, and VOCs to our knowledge.

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E. **Bacterial Contamination:** YES

Any bacterial contamination detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	*No*
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	*No*
Source sampling tests for bacteria unavailable	____

PART VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for these sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

✓YES __NO

Describe with references to map produced in Part IV:

- *Drilling conditions and the aquifer pumping test results indicate this aquifer is confined and is therefore not influenced by surface water.*
- *Steep hillsides exist to the northwest and east within the 10-year T-O-T. However, the aquifer potentiometric surface likely does not mimic surface topography.*
- *A Wellhead Protection Program is currently being developed for the City by another consultant.*

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES ✓ NO

B) Does the drilling log, well log or the geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

✓ YES __ NO

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3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

✓ YES ___ NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

✓ YES ___ NO

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	✓		
6 month--1 year travel time		✓	
1--5 year travel time		✓	
5--10 year travel time		✓	

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time		✓	
1--5 year travel time		✓	
5--10 year travel time		✓	

Please identify or describe hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to location on the map produced in Part IV.

The primary recharge zone is to the southeast.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES ✓ NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? ___ YES ✓ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or

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made clearer? Did the instruction package help you find the information needed to complete the assessment: How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

_____

_____

_____

_____

_____

_____

_____

_____

_____

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Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.2

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system.
Photocopy as necessary.

PART I: System Information

Well owner/manager : City of Enumclaw

Water system name : Enumclaw Water Dept

County: King

Water system number: 236001 Source number: S08 (new)

Well depth: 52 (ft.) (*From WFI form*)

Source name: Watercress

WA well identification tag number: ___ ___ ALK–139 ___ ___

_____ well not tagged

Number of connections: 5340 Population served: 15,900

Township: 20N Range: 7 E

Section: 19 1/4 1/4 Section: NW of NW

Latitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
___other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 5 / 7 / 07 month/day/year

last reconstruction: __ / __ /__ month/day/year

_____ information unavailable

2) Well driller: Boart Longyear

__ well driller unknown

3) Type of well:

__Drilled: __ rotary __ bored _x_ cable (percussion)__ Dug

__ Other: __ spring(s) __ lateral collector (Ranney)

__ driven __ jetted __ other:

Additional comments: _____

4) Well report available? _x_ YES (attach copy to form) __ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs. **See Attachments 1 & 2.**

5) Average pumping rate: 4,300 test (gallons/min)

Source of information: Water Well Report and Well Construction Report

If not documented, how was pumping rate determined? _____

__ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

_x_ disinfection __ filtration __ carbon filter __ air stripper __ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

Provide contact time of 6 mg/l-min because of shallow aquifer

7) If source is chlorinated, is a chlorine residual maintained: _x_ YES __ NO

Residual level: _____0.5 mg/1_____ (*At the point closest to the source.*)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

__ < 20 ft _x_ 20–50 ft __ 50–100 ft __ 100–200 ft __ >200 ft

__ information unavailable ('<' *means less than;* '>' *means greater than*)

2) Depth to ground water (static water level):

_x_ < 20 ft __ 20–50 ft __ 50–100 ft __ >100 ft

__ flowing well/spring (artesian)

How was water level determined?

_x_ well log __ other: _____

_ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: __ YES __ NO

5) Wellhead elevation (height above mean sea level): _741.5 NGVD 1929__ (ft)

How was elevation determined? __ topographic map __ Drilling/Well Log __ altimeter

_X_ other: __Field survey_____

__ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

_x_ evidence of a confining layer in well log

__ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the **bottom** of the **lowest confining layer**? __ YES _x_ NO

__ information unavailable

7) Sanitary setback:

__ < 100 ft* _x_ 100–120 ft __ 120–200 ft __ > 200 ft

* if less than 100 ft describe the site conditions:

_____

_____

_____

_____

8) Wellhead construction:

_x_ wellhead enclosed in a wellhouse

_x_ controlled access (describe): _Gate at access to public right-of-way and_

6′ chain link fence topped w/ barbed wire on outward angled arms around well area

__ other uses for wellhouse (describe): _____

_____

__ no wellhead control

9) Surface seal:

__ 18 ft

__ < 18 ft (no Department of Ecology approval) ('<' *means less than*)

__ < 18 ft (Approved by Ecology, include documentation)('<' *means less than*)

_x_ > 18 ft ('>' *means greater than*)

__ depth of seal unknown

__ no surface seal

10) Annual rainfall (inches per year):

__ < 10 in/yr __ 10–25 in/yr _x_ > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: ave 419,000,000 last 10 years (gallons)

How was this determined?

_x_ meter

__ estimated: __ pumping rate (_____)

__ pump capacity (_____)

__ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 1,335 (ft)

1 year ground water travel time : 2,700 per 1998 Wellhead Plan (ft)

5 year ground water travel time: 7,000 at foothill bedrock barrier (ft)

10 year ground water travel time: 7,000 at foothill bedrock barrier (ft)

Information available on length of screened/open interval?

_x_ YES __ NO

Length of screened/open interval: 20 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? _x_ YES __ NO (mark and identify on map). **See Attachment 3.**

Watercress Creek is shown on the Attachment 3 map. A branch of the creek originates on the City property where the subject replacement well is located.

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? __ YES _x_ NO (mark and identify on map).

Comments: _____

_____

_____

_____

_____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application.....	___x__	__x__	__x__	_____
stormwater injection wells	_____	_____	_____	__x__
other injection wells	_____	_____	_____	__x__
abandoned ground water well	_____	_____	_____	__x__
landfills, dumps, disposal areas	_____	_____	__x__	_____
known hazardous materials clean-up site	_____	_____	_____	__x__
water system(s) with known quality problems	_____	_____	_____	__x__
population density > 1 house/acre.....	__x__	__x__	_____	_____
residences commonly have septic tanks	__x__	__x__	__x__	_____
Wastewater treatment lagoons.....	_____	_____	_____	_____
sites used for land application of waste	_____	_____	_____	_____

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*) **See notes below**

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

See page 30 excerpt from the 1998 Wellhead Protection Plan (Attachment 4). The aboveground fuel storage tank noted in the text has been removed. Any update to the 1998 plan is in progress.

The wellhead protection area map (Attachment 3) is excerpted from the City of Enumclaw Comprehensive Water System Plan. Many of the underlying parcels within the time of travel have a single family home on them that have septic tanks and may use pesticides. Only a few of these parcels are small lots less than 1 acre in size. The landfill is labeled on the map.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES
Results greater than MCL	____
< 2 mg/liter nitrate	____
2–5 mg/liter nitrate	_x__
> 5 mg/liter nitrate	____
Nitrate sampling records unavailable	____

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES
Results greater than MCL or SAL	____
VOCs detected at least once	____
VOCs never detected	_x__
VOC sampling records unavailable	____

C. EDB/DBCP:	YES
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)	
EDB/DBCP detected below MCL at least once	____
EDB/DBCP detected above MCL at least once	____
EDB/DBCP never detected	____
EDB/DBCP tests required but not yet completed	____
EDB/DBCP tests not required	_x__

D. Other SOCs (Pesticides):	YES
Other SOCs detected (pesticides and other synthetic organic chemicals)	____
Other SOC tests performed but none detected (list test methods in comments)	____
Other SOC tests not performed	_x__

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination: YES

Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records)....._x__

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source....._____

Source sampling records for bacteria unavailable ____

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

_x_ YES __ NO

Describe with references to map produced in Part IV:

According to the 1998 Wellhead Protection Plan, the bedrock of the foothills to the east

of the source forms a barrier of the zone of contribution

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

__ YES _x_ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

_x_ YES __ NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

_x_ YES __ NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within... **The City operates Watercress Spring (DOH source S02) about 80 feet away from the subject replacement well that is reviewed in this assessment. The affect of the replacement well on the existing facility is discussed in the well construction and testing report by Robinson Noble & Saltbush attached to this assessment.**

	YES	NO	unknown
< 6 month travel time	_x__	___	____
6 month–1 year travel time	_x__	___	____
1–5 year travel time	_x__	___	____
5–10 year travel time	_x__	___	____

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	___	_x__	____
1–5 year travel time	___	_x__	____
5–10 year travel time	___	_x__	____

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

_____

_____

_____

_____

_____

_____

_____

_____

Suggestions and Comments

Did you attend one of the susceptibility workshops? __ YES _x_ NO

Did you find it useful? __ YES __ NO

Did you seek outside assistance to complete the assessment? __ YES _x_ NO

- -

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

____

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____

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.2

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system.
Photocopy as necessary.

PART I: System Information

Well owner/manager : City of Enumclaw

Water system name : Enumclaw Water Dept

County: King

Water system number: 236001 Source number: S09 (new)

Well depth: 136 (ft.) (*From WFI form*)

Source name: Zone 888/1002 Well

WA well identification tag number:_ ___ AFT_–336 ___ ___

_____ well not tagged

Number of connections: 5340 Population served: 15,900

Township: 20N Range: 7 E

Section: 30 1/4 1/4 Section: NW of SE

Latitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
___other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 10 / 25 / 07 month/day/year

last reconstruction: __ / __ /__ month/day/year

_____ information unavailable

2) Well driller: Hokkaido Drilling, Inc

PO Box 100

Graham, WA 98338

__ well driller unknown

3) Type of well:

__Drilled: __ rotary __ bored _x_ cable (percussion) __ Dug

__ Other: __ spring(s) __ lateral collector (Ranney)

__ driven __ jetted __ other:

Additional comments: _____

4) Well report available? _x_ YES (attach copy to form) __ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs. See Attachment 1 for the Water Well Report. Construction and testing of the well are described in a separate detailed report by Robinson Noble & Saltbush dated December 2007 submitted concurrently with this assessment.

5) Average pumping rate: 776 test (gallons/min)

Source of information: Water Well Report and Well Construction Report

If not documented, how was pumping rate determined? _____

__ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

_x_ disinfection __ filtration __ carbon filter __ air stripper __ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

Ensure disinfection residual maintained in water system

7) If source is chlorinated, is a chlorine residual maintained: _x_ YES __ NO

Residual level: _____+/- 0.5 mg/l__ (*At the point closest to the source.*)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

__ < 20 ft __ 20–50 ft _x_ 50–100 ft __ 100–200 ft __ >200 ft

__ information unavailable ('<' *means less than;* '>' *means greater than*)

2) Depth to ground water (static water level):

__ < 20 ft _x_ 20–50 ft __ 50–100 ft __ >100 ft

__ flowing well/spring (artesian)

How was water level determined?

_x_ well log __ other: _____

_ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: __ YES __ NO

5) Wellhead elevation (height above mean sea level): __780 NGVD 1929__ (ft)

How was elevation determined? __ topographic map __ Drilling/Well Log __ altimeter

_X_ other: __Field survey_____

__ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

_x_ evidence of a confining layer in well log

__ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above

the **bottom** of the **lowest confining layer**? __ YES _x_ NO

__ information unavailable

7) Sanitary setback:

_x_ < 100 ft* __ 100–120 ft __ 120–200 ft __ > 200 ft

* if less than 100 ft describe the site conditions:

The wellhead is located along the boundary between the City's Exposition Center and Golf Course properties. Thus, the properties for a minimum of ~180 feet from the well are under City ownership and control. It is not believed necessary to restrict access and land use activities of the Exposition Center and Golf Course to 100 feet from the well because of the surface seal at the well of 25 feet and the low permeability sediments present from land surface down to a depth of 45 feet below ground. The well is also located at the very upper end of the surficial drainage divide between the Newaukum Creek and Boise Creek drainages, with the well being in the Newaukum Creek drainage even though it is only about 700 feet from Boise Creek at its closest point.

8) Wellhead construction:

_x_ wellhead enclosed in a wellhouse

_x_ controlled access (describe): Gate in fence around building. Fence 6' tall topped w/ barbed wire on outward angled arms

__ other uses for wellhouse (describe): _____

__ no wellhead control

9) Surface seal:

__ 18 ft

__ < 18 ft (no Department of Ecology approval) ('<' *means less than*)

__ < 18 ft (Approved by Ecology, include documentation)('<' *means less than*)

_x_ > 18 ft ('>' *means greater than*)

__ depth of seal unknown

__ no surface seal

10) Annual rainfall (inches per year):

__ < 10 in/yr __ 10–25 in/yr _x_ > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 100,000,000 (gallons)

How was this determined?

__ meter

__ estimated: __ pumping rate (_____)

__ pump capacity (_____)

_x_ other: 2007 Comp Water System Plan Pg 7-26 and estimated irrigation usage

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet) The CFR travel times are not mapped. See Preliminary Wellhead Protection Area mapped in Attachment 2.

6 month ground water travel time: 408 (ft)

1 year ground water travel time: 578 (ft)

5 year ground water travel time: 1,292 (ft)

10 year ground water travel time: 1,827 (ft)

Information available on length of screened/open interval?

_x_ YES __ NO

Length of screened/open interval: 50 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? _x_ YES __ NO (mark and identify on map).

Boise Creek runs through the easterly portion of the 6-month time of travel per Attachments 2 and 3.

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? __ YES _x_ NO (mark and identify on map).

Comments: _____

_____

_____

_____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application.....	__x__	_____	_____	_____
stormwater injection wells	_____	_____	_____	__x__
other injection wells	_____	_____	_____	__x__
abandoned ground water well	_____	_____	_____	__x__
landfills, dumps, disposal areas	_____	_____	_____	__x__
known hazardous materials clean-up site	_____	_____	_____	__x__
water system(s) with known quality problems	_____	_____	_____	__x__
population density > 1 house/acre.....	_____	__x__	_____	_____
residences commonly have septic tanks	_____	__x__	_____	_____
Wastewater treatment lagoons.....	_____	_____	_____	_____
sites used for land application of waste	_____	_____	_____	_____

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following*.) See notes below

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

The golf course may apply pesticides/fungicide to greens, but not to fairways or tees.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES
Results greater than MCL	____
< 2 mg/liter nitrate	_x__
2–5 mg/liter nitrate	____
> 5 mg/liter nitrate	____
Nitrate sampling records unavailable	____

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES
Results greater than MCL or SAL	____
VOCs detected at least once	____
VOCs never detected	_x__
VOC sampling records unavailable	____

C. EDB/DBCP: (EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)	YES
EDB/DBCP detected below MCL at least once	____
EDB/DBCP detected above MCL at least once	____
EDB/DBCP never detected	_x__
EDB/DBCP tests required but not yet completed	____
EDB/DBCP tests not required	____

D. Other SOCs (Pesticides):	YES
Other SOCs detected (pesticides and other synthetic organic chemicals)	____
Other SOC tests performed but none detected (list test methods in comments)	_x__
Other SOC tests not performed	____

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

EDB/DBCP and SOC tests completed at the existing golf course irrigation well approximately 127 feet northeast of the new well. SOC test methods used included EPA 531.2, 515.1, 525.2, and 504.2 .

E. Bacterial contamination: YES

Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).....____

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.....____

Source sampling records for bacteria unavailable ____

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

_x_ YES __ NO

Describe with references to map produced in Part IV:

Surficial runoff from the bedrock to the east (Baldy Hill) contributes to the groundwater source and the capture zone boundary extends to the surface water divide as shown in Attachment 2.

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

__ YES _x_ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

_x_ YES __ NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

_x_ YES __ NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within... The City operates an existing irrigation well approximately 127 feet northeast of the new well. The existing well will be decommissioned per regulations.

	YES	NO	unknown
< 6 month travel time	_x__	____	____
6 month–1 year travel time	___	_x__	____
1–5 year travel time	____	_x__	____
5–10 year travel time	____	_x__	____

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...
The golf course property next to the well will be irrigated from the water that the well will supply.

	YES	NO	unknown
< 1 year travel time	_x__	___	____
1–5 year travel time	___	_x__	____
5–10 year travel time	___	_x__	____

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

_____

_____

_____

_____

_____

_____

_____

_____

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES _x_ NO

Did you find it useful? ___ YES __ NO

Did you seek outside assistance to complete the assessment? _x_ YES __ NO

- -

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

Construction/Decommission *("x" in circle)*

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION*

Notice of Intent Number ____

PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other ____

TYPE OF WORK: Owner's number of well (if more than one) GCPW

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☒ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 20 inches, drilled 136 ft.

Depth of completed well ____ ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 20" Diam. from +1 ft. to 81 ft.

☐ Liner installed 16" Diam. from +2 ft. to 80 ft.

☐ Threaded ____" Diam. From ____ ft. to ____ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used ____

SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location ____

Manufacturer's Name Johnson

Type steel Model No. ____

Diam. 16 Slot size 0.040 from 80 ft. to 131 ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel/Filter packed: ☒ Yes ☐ No Size of gravel/sand 8x12

Materials placed from 60 ft. to 136 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 25 ft.

Material used in seal bentonite

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ____ Depth of strata ____

Method of sealing strata off ____

PUMP: Manufacturer's Name N/A

Type: N/A H.P. N/A

WATER LEVELS: Land-surface elevation above mean sea level 780 ft.

Static level 39.61 ft. below top of well Date 10/23/07

Artesian pressure ____ lbs. per square inch Date ____

Artesian water is controlled by ____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☒ Yes ☐ No If yes, by whom? Hokkaido

Yield: 776 gal./min. with 3.74 ft. drawdown after 1 hrs.

Yield: 776 gal./min. with 3.99 ft. drawdown after 10 hrs.

Yield: 776 gal./min. with 4.15 ft. drawdown after 24 hrs.

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

Time	Water Level	Time	Water Level	Time	Water Level
0	40.14	30	40.05	240	39.81
5	40.10	60	40.03	440	39.84
10	40.08	120	39.98	1440	39.72

Date of test Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water 48 Was a chemical analysis made? ☒ Yes ☐ No

CURRENT

Notice of Intent No. WE06717

Unique Ecology Well ID Tag No. AFT 336

Water Right Permit No. 20890C

Property Owner Name City of Enumclaw

Well Street Address 45224 284th Avenue S

City Enumclaw County King

Location NW1/4-1/4 SE1/4 Sec 30 Twn 20 R 7E

EWM ☒ Or WWM ☐

Lat/Long (s, t, r Still REQUIRED) Lat Deg N/A Min N/A Sec N/A Long Deg N/A Min N/A Sec N/A

Tax Parcel No. 3020079006

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Dry Brown Silty Sand and Gravel with Cobbles	0	8
Dry Gray Silty Gravel	8	16
Dry Gray Silty Gravel w/ Cobbles and Wood	16	21
Dry Gray-Brown Silty Gravel w/ Cobbles, tight, some bound	21	45
Water Bearing Brown Medium Sand w/ some F-C Sand and Gravel	45	59
Water Bearing Brown Gravel with Med. Sand, some F-C	59	84
Water Bearing Brown Fine to Medium Sand w/ occ. Gravel and wood organics	84	108
Water Bearing Dark Brown Coarse to Medium Sand and Gravel w/ wood organics	108	131
Gray Moist Clay-Bound Sand and Gravel	131	136.5

Start Date 5/29/07 Completed Date 10/25/07

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Driller or trainee License No. 1239

Name (Print Last, First) ROBERT B. CARPER

Driller/Engineer/Trainee Signature Robert B Carper

IF TRAINEE: Driller's License No: ____

Driller's Signature: ____

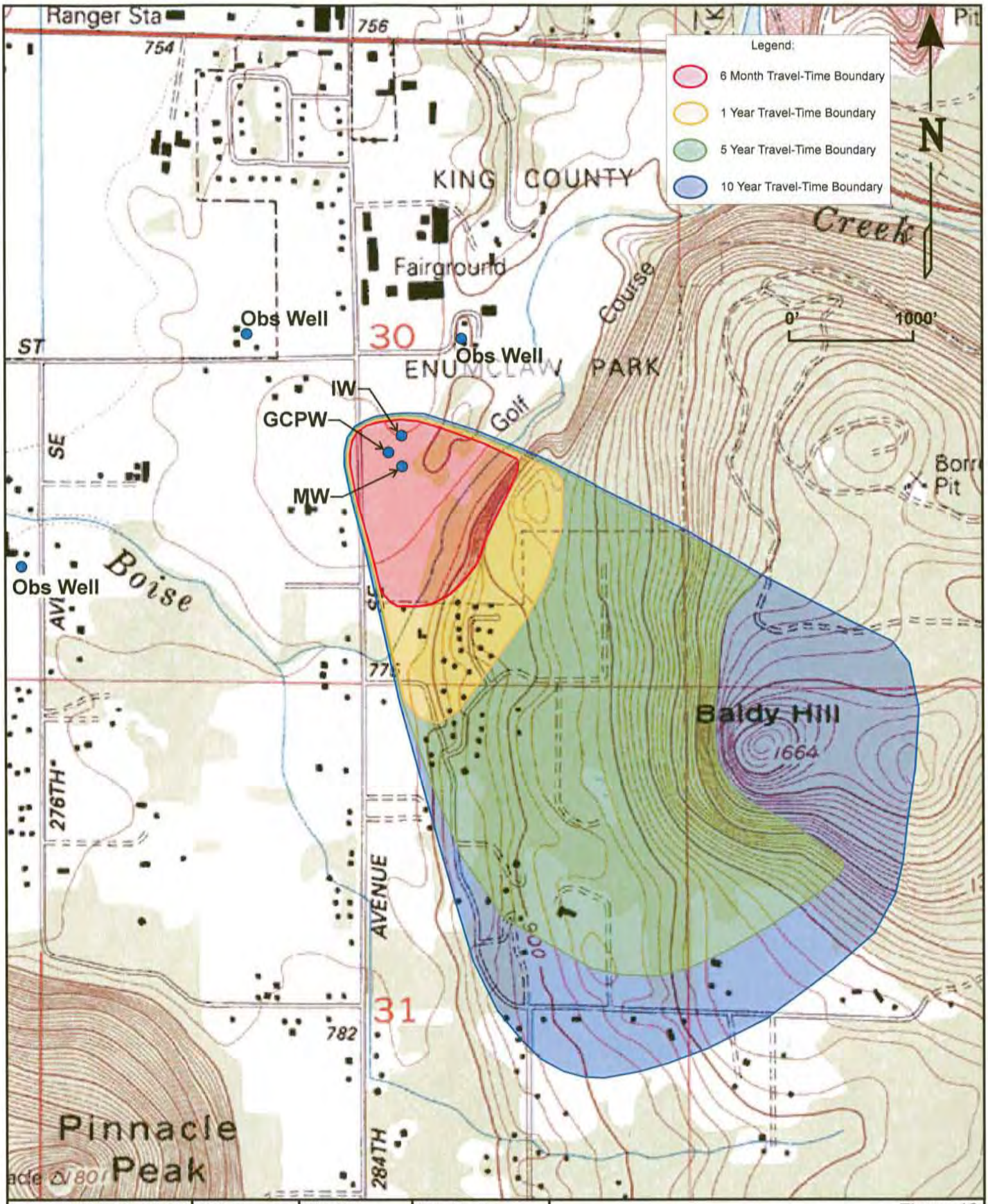
Drilling Company HOKKAIDO DRILLING, INC.

Address P.O. BOX 100

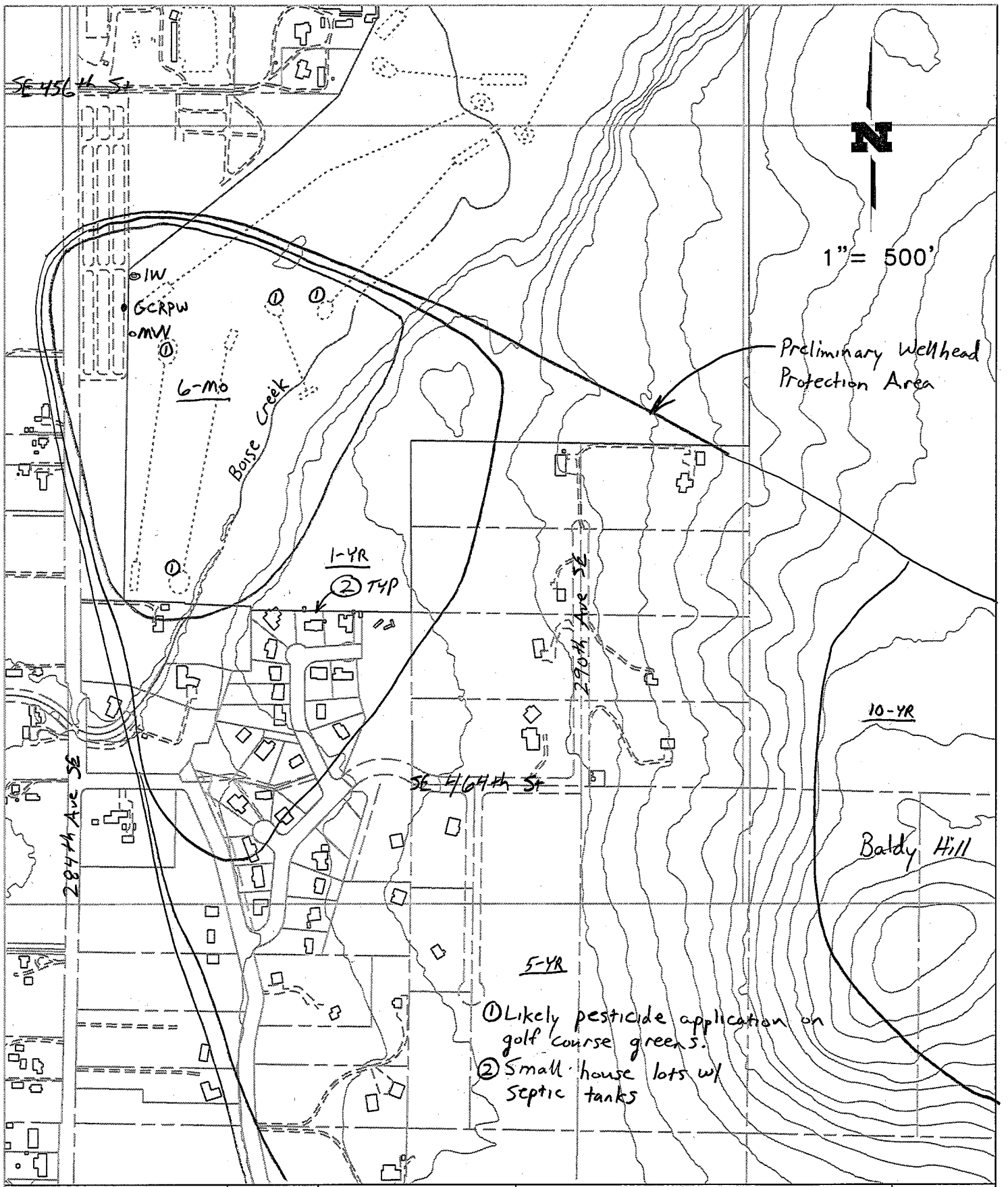
City, State, Zip GRAHAM, WA 98338

Contractor's Registration No. HOKKADI017M8 Date NOVEMBER 1, 2007

Ecology is an Equal Opportunity Employer



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS 1947 60 Years 2007	Note: Basemap from USGS Enumclaw Quadrangle.	PM: JEB 1281-004B December 2007	King County T 20 N/R 07 E - 30 Scale 1" = 1000'	Figure 18 Preliminary Wellhead Protection Areas City of Enumclaw: Golf Course Production Well



REVISIONS	DATE:
DRAWN BY:	CHECKED BY:

City of Enumclaw

Attachment 3
Sources of Risk

DWG. NO.

PARCEL INSIGHT

INCORPORATED

Parcel Insight Radius Map Report

Report ID: 275
Date: 11/8/2007

Enumclaw, WA

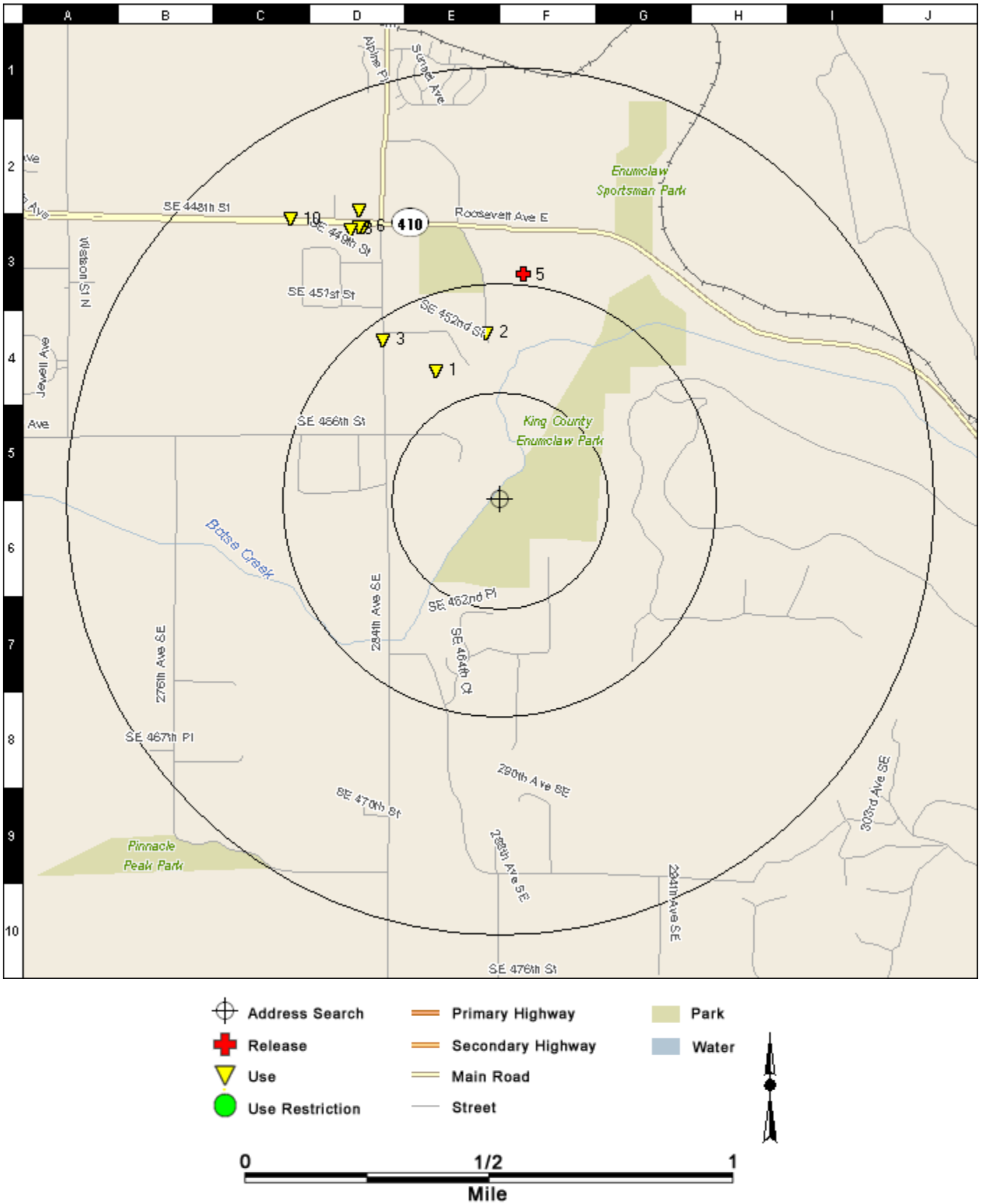
28750 SE 452ND ST
ENUMCLAW, WA 98022

TABLE OF CONTENTS

1/4 Mile Detail Map	*1*
Overview Map	*2*
Non-Exact Match Map	*3*
Tabular Summary of Findings	*4*
Exact Match Summary	*5*
Exact Match Details	*6*
Disclaimer	*12*
Government Record Tracking	*13*

1/4 Mile Detail Map

Overview Map



Non-Exact Match Map

Tabular Summary of Findings

RELEASE	+	*A site listed in a database that documents a release of hazardous material(s).*
USE	∇	*A site listed in a database that documents the use of hazardous material(s), but not a release of hazardous material(s).*
USE RESTRICTION	O	*A site listed in a database that documents a restriction on the use of the site related to a release of a hazardous material(s) or a formal oversight decision from a government agency.*

Map Class		Subject Property	Distance					Total by Map Class
			0.00 to 0.25 M	0.25 to 0.50 M	0.50 to 0.75 M	0.75 to 1.00 M	1.00+ M	
RELEASE	+				1			1
USE	∇			4	4	1		9
USE RESTRICTION	O							

Database		Search Radius	Subject Property	Distance					Total by Database Type
				0.00 to 0.25 M	0.25 to 0.50 M	0.50 to 0.75 M	0.75 to 1.00 M	1.00+ M	
NPL	+	1.00 M							
RCRA CORRACTS	+	1.00 M							
RCRA TSD	∇	1.00 M							
CERCLIS	+	1.00 M							
CERCLIS NFRAP	+	1.00 M							
ERNS	+	1.00 M							
RCRA LQG	∇	1.00 M							
RCRA SQG	∇	1.00 M							
RCRA CESQG	∇	1.00 M			1				1
LUST ACTIVE TRIBAL	+	1.00 M							
LUST INACTIVE TRIBAL	+	1.00 M							
BROWNFIELDS	O	1.00 M							
INST ENG CONTROLS	O	1.00 M							
HMIRS	+	1.00 M							
TRIS	+	1.00 M							
CSCSL	+	1.00 M							
CSCSL HSL	+	1.00 M							
CSCSL NFA	+	1.00 M							
SWLF STATE	+	1.00 M							
LUST	+	1.00 M							
UST	∇	1.00 M			2	2			4
SWLF SEA	+	1.00 M							
SWLF KING	+	1.00 M				1			1
SWLF STATE	+	1.00 M							
DECISIONS	O	1.00 M							
INST ENG CONTROLS	O	1.00 M							
RCRA ND	∇	1.00 M			1	3	1		5
Totals by Distance			0	0	0	0	0	0	0

Exact Match Summary

				MAP CLASS		
				+	▽	○
MAP ID GRID	SITE NAME ADDRESS	PI ID # DISTANCE DIRECTION	DATABASES	RELEASE	USE	USE RESTRICTION
1 E4	FARMAN BROTHERS PICKLES 1243 ROOSEVELT E BOX 457, ENUMCLAW	53025530 0.33444 N	UST		X	
2 E4	KING COUNTY PARKS & RECREATION MAINT 45220 288TH AVE SE, ENUMCLAW	53006742 0.38997 N	UST		X	
3 D4	KING CNTY NATURAL RESOURCES PA 45224 284TH AVE SE, ENUMCLAW	53015299 0.45795 NW	RCRA CESQG		X	
4 D4	WA AGR KING 3 45224B 284TH AVE SE, ENUMCLAW	53003951 0.45795 NW	RCRA ND		X	
5 F3	ENUMCLAW SOUTHEAST OF 284TH AVENUE SE AND SE 448TH STREET, ENUMCLAW	53034548 0.52538 N	SWLF KING	X		
6 D3	WA DNR ENUMCLAW 28329 SE 448TH ST, ENUMCLAW	53023260 0.70518 NW	RCRA ND UST		X	
7 D3	TEXACO REFINING MARKETING IN ENUMCLAW 230 ROOSEVELT E, ENUMCLAW	53028017 0.71058 NW	RCRA ND		X	
8 D3	WILLIAM G BISHOP 120 ROOSEVELT AVE EAST, ENUMCLAW	53016439 0.71393 NW	UST		X	
9 D2	WEYERHAEUSER WHITE RIVER TREE FARM T19 R9E S25, GREENWATER	53006705 0.74456 NW	RCRA ND		X	
10 C3	US FS WHITE RIVER RANGER DIST 857 ROOSEVELT AVE E, ENUMCLAW	53006262 0.80700 NW	RCRA ND		X	

Exact Match Details

Map ID 1 0.334 M N	GRID E4	PI ID # 53025530	LAT: 47.19427	LON: -121.96095	USE
	Site Name	FARMAN BROTHERS PICKLES		Databases: UST	
	Address	1243 ROOSEVELT E BOX 457 ENUMCLAW, WA 980229237			

UST **Underground Storage Tanks**

Site: FARMAN BROS. PICKLE CO. INC. 1243 ROOSEVELT E BOX 457 ENUMCLAW, WA 98022
Facility Site Id: 83478496
County: King
Unit: NW

Tank ID	Tank Name	Status	Inst. Date	Capacity	Cmpt./ID	Substance
10090	1	Removed	12/31/1964	111 TO 1,100 Gallons	1/10257	Leaded Gasoline

Map ID 2 0.390 M N	GRID E4	PI ID # 53006742	LAT: 47.19553	LON: -121.95847	USE
	Site Name	KING COUNTY PARKS & RECREATION MAINT		Databases: UST	
	Address	45220 288TH AVE SE ENUMCLAW, WA 980229255			

UST **Underground Storage Tanks**

Site: ENUMCLAW GOLF COURSE 45220 288TH SE ENUMCLAW, WA 98022
Facility Site Id: 12755755
County: King
Unit: NW

Tank ID	Tank Name	Status	Inst. Date	Capacity	Cmpt./ID	Substance
455666	001	Operational	06/01/1988		1/455713	Unleaded Gasoline

Map ID 3 0.458 M NW	GRID D4	PI ID # 53015299	LAT: 47.19530	LON: -121.96355	USE
	Site Name	KING CNTY NATURAL RESOURCES PA		Databases: RCRA CESQG	
	Address	45224 284TH AVE SE ENUMCLAW, WA 980229275			

RCRA CESQG **RCRA Conditionally Exempt Small Quantity Generator**

Site: KING CNTY NATURAL RESOURCES PA 45224 284TH AVE SE ENUMCLAW, WA 98022
HANDLER ID: WAD981763873
NAICS DESC: Janitorial Services
CONTACT NAME: KEN CROY
TSD ACTIVITY: N

Report Submission History

Category	Report Date
LQG	
SQG	
CESQG	04/20/1988
RCRA ND	

Last Report Details:

Exact Match Details

Map ID 3 0.458 M NW	GRID D4	PI ID # 53015299	LAT: 47.19530	LON: -121.96355	USE ∇
	Site Name	KING CNTY NATURAL RESOURCES PA		Databases:	
	Address	45224 284TH AVE SE ENUMCLAW, WA 980229275		RCRA CESQG	

Site Name: KING CNTY NATURAL RESOURCES PA
Seq Number: 1
Received Date: 04/20/1988
Transfer Facility:
Federal Waste Generator: Conditionally Exempt Small Quantity Generator
State Waste Generator: Small Quantity Generator

Map ID 4 0.458 M NW	GRID D4	PI ID # 53003951	LAT: 47.19530	LON: -121.96355	USE ∇
	Site Name	WA AGR KING 3		Databases:	
	Address	45224B 284TH AVE SE ENUMCLAW, WA 980229275		RCRA ND	

RCRA ND **RCRA No Designation**

Site: WA AGR KING 3 45224B 284TH AVE SE ENUMCLAW, WA 98022
HANDLER ID: WAH000019158
NAICS DESC: Regulation of Agricultural Marketing and Commodities
CONTACT NAME: JOE HOFFMAN
TSD ACTIVITY: N

Report Submission History

Category	Report Date
LQG	09/11/2002, 02/28/2003
SQG	
CESQG	
RCRA ND	12/31/2003, 12/31/2005, 02/11/2004, 02/28/2005, 01/24/2006

Last Report Details:

Site Name: WA AGR KING 3
Seq Number: 5
Received Date: 01/24/2006
Transfer Facility:
Federal Waste Generator: N
State Waste Generator: N

Map ID 5 0.525 M N	GRID F3	PI ID # 53034548	LAT: 47.19746	LON: -121.95674	RELEASE +
	Site Name	ENUMCLAW		Databases:	
	Address	SOUTHEAST OF 284TH AVENUE SE AND SE 448TH STREET ENUMCLAW, WA		SWLF KING	

SWLF KING **King County Abandoned Landfills**

Site: ,
Site_ID: KC07
Site_Name: Enumclaw
Site_Address: Southeast of 284th Avenue SE and SE 448th Street
Site_City: Enumclaw
Site_State: WA
PILAT: 47°11'50.87"N

Exact Match Details

Map ID 5 0.525 M N	GRID F3	PI ID # 53034548	LAT: 47.19746	LON: -121.95674	RELEASE +
	Site Name	ENUMCLAW		Databases:	
	Address	SOUTHEAST OF 284TH AVENUE SE AND SE 448TH STREET ENUMCLAW, WA		SWLF KING	

PILON: 121˚57'24.27"W
Buffer Miles: 0.150

Map ID 6 0.705 M NW	GRID D3	PI ID # 53023260	LAT: 47.19906	LON: -121.96451	USE ∇
	Site Name	WA DNR ENUMCLAW		Databases:	
	Address	28329 SE 448TH ST ENUMCLAW, WA 980229203		UST RCRA ND	

UST **Underground Storage Tanks**

Site: WASH. ST. DEPT. OF NATURAL RESOURCES 28329 S.E. 448TH STREET ENUMCLAW, WA 98022
Facility Site Id: 74593866
County: King
Unit: NW

Tank ID	Tank Name	Status	Inst. Date	Capacity	Cmpt./ID	Substance
40124	2	Unknown	12/31/1964		1/40686	Unleaded Gasoline
40176	1	Unknown	12/31/1964		1/40741	Leaded Gasoline

RCRA ND **RCRA No Designation**

Site: WA DNR ENUMCLAW 28329 SE 448TH ST ENUMCLAW, WA 98022
HANDLER ID: WAD988473518
NAICS DESC: Other General Government Support
CONTACT NAME: NA NA
TSD ACTIVITY: N

Report Submission History

Category	Report Date
LQG	
SQG	
CESQG	02/27/1995
RCRA ND	06/02/1997

Last Report Details:

Site Name: WA DNR ENUMCLAW
Seq Number: 2
Received Date: 06/02/1997
Transfer Facility:
Federal Waste Generator: N
State Waste Generator: N

Exact Match Details

Map ID 7 0.711 M NW	GRID D3	PI ID # 53028017	LAT: 47.19908	LON: -121.96471	USE
	Site Name	TEXACO REFINING MARKETING IN ENUMCLAW		Databases: RCRA ND	
	Address	230 ROOSEVELT E ENUMCLAW, WA 98022			

RCRA ND **RCRA No Designation**

Site: TEXACO REFINING MARKETING IN ENUMCLAW 230 ROOSEVELT E ENUMCLAW, WA 98022
HANDLER ID: WAD988480851
NAICS DESC: Gasoline Stations with Convenience Stores
CONTACT NAME: NA NA
TSD ACTIVITY: N

Report Submission History

Category	Report Date
LQG	
SQG	12/31/1993
CESQG	
RCRA ND	03/11/2003

Last Report Details:

Site Name: TEXACO REFINING MARKETING IN ENUMCLAW
Seq Number: 2
Received Date: 03/11/2003
Transfer Facility:
Federal Waste Generator: N
State Waste Generator: N

Map ID 8 0.714 M NW	GRID D3	PI ID # 53016439	LAT: 47.19897	LON: -121.96516	USE
	Site Name	WILLIAM G BISHOP		Databases: UST	
	Address	120 ROOSEVELT AVE EAST ENUMCLAW, WA 980229240			

UST **Underground Storage Tanks**

Site: WILLIAM G BISHOP 120 ROOSEVELT AVE EAST ENUMCLAW, WA 98022
Facility Site Id: 48395887
County: King
Unit: NW

Tank ID	Tank Name	Status	Inst. Date	Capacity	Cmpt./ID	Substance
33691	1	Removed	12/31/1964		1/34186	Leaded Gasoline
33825	3	Removed	12/31/1964		1/34320	Unleaded Gasoline
33834	2	Removed	12/31/1964		1/34330	Unleaded Gasoline

Exact Match Details

Map ID 9 0.745 M NW	GRID D2	PI ID # 53006705	LAT: 47.19962	LON: -121.96472	USE
	Site Name	WEYERHAEUSER WHITE RIVER TREE FARM		Databases: RCRA ND	
	Address	T19 R9E S25 GREENWATER, WA 98022			

RCRA ND **RCRA No Designation**

Site: WEYERHAEUSER WHITE RIVER TREE FARM T19 R9E S25 GREENWATER, WA 98022
HANDLER ID: WAH000006155
CONTACT NAME: STEVE KETZ
TSD ACTIVITY: N

Report Submission History

Category	Report Date
LQG	09/03/1999
SQG	09/01/1998
CESQG	
RCRA ND	04/26/2000, 12/13/2000, 12/13/2000

Last Report Details:

Site Name: WEYERHAEUSER WHITE RIVER TREE FARM
Seq Number: 5
Received Date: 12/13/2000
Transfer Facility:
Federal Waste Generator: N
State Waste Generator: N

Map ID 10 0.807 M NW	GRID C3	PI ID # 53006262	LAT: 47.19932	LON: -121.96805	USE
	Site Name	US FS WHITE RIVER RANGER DIST		Databases: RCRA ND	
	Address	857 ROOSEVELT AVE E ENUMCLAW, WA 980229239			

RCRA ND **RCRA No Designation**

Site: US FS WHITE RIVER RANGER DIST 857 ROOSEVELT AVE E ENUMCLAW, WA 98022
HANDLER ID: WA5122300184
NAICS DESC: Support Activities for Forestry
CONTACT NAME: NA NA
TSD ACTIVITY: N

Report Submission History

Category	Report Date
LQG	
SQG	
CESQG	10/25/1995
RCRA ND	01/01/1994, 01/24/1997, 04/03/1998, 01/27/1999, 02/14/2000

Last Report Details:

Site Name: US FS WHITE RIVER RANGER DIST
Seq Number: 6
Received Date: 02/14/2000
Transfer Facility:

Exact Match Details

Map ID 10 0.807 M NW	GRID C3	PI ID # 53006262	LAT: 47.19932	LON: -121.96805	USE
	Site Name	US FS WHITE RIVER RANGER DIST		Databases:	
	Address	857 ROOSEVELT AVE E ENUMCLAW, WA 980229239		RCRA ND	

Federal Waste Generator: N
State Waste Generator: N

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Database: *Brownfields Grant Sites*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.epa.gov/brownfields/index.html*
Date of Database: *2007-04-15T00:00:00*

The Brownfields Management System (BMS) is the official U.S. Environmental Protection Agency (EPA0 database of the Brownfields Program. It is designed to assist EPA in collecting, tracking, and updating information, as well as reporting on the major activities and accomplishments of the various Brownfields grant programs. BMS captures data on grantee activities (assessment, cleanup and redevelopment), funding, job training, and details on cooperative partners and leveraging efforts - a central objective of the Brownfields Program.

Database: *CERCLIS No Further Remedial Action Planned*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/sites/cursites/index.htm*
Date of Database: *2006-12-15T00:00:00*

The No Further Remedial Action Planned (NFRAP) or "Archived" designation means that, to the best of the EPA's knowledge, Superfund has completed its assessment at a site, and has determined no further steps to list this site on the NPL will be taken unless information indicating this decision was not appropriate or other considerations make a recommendation for listing appropriate at a later time. The U.S. Environmental Protection Agency (EPA) may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available and in these cases, the Archive designation is removed and the site is returned to the CERCLIS inventory if more sustentative assessment and/or any cleanup work is necessary under the Federal Superfund program. An archive decision does not necessarily mean that there is no hazard associated with a given site; it means only that based upon available information, the location is not judged to be a potential NPL site. Sites are archived as historical records so EPA does not needlessly repeat the investigations in the future. The States will coordinate with EPA to determine if any sites should be returned to CERCLIS because of newly identified contamination problems at the site. It is important to note the sites on CERCLIS and the archived list will change as the sites are being investigated or if new information becomes available.

Database: *Comprehensive Environmental Response, Compensation, and Liability Information System*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/sites/siteinfo.htm*
Date of Database: *2007-03-15T00:00:00*

The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list contains information on hazardous waste sites, potentially hazardous waste sites and remedial activities. CERCLIS is a database used by the U.S. Environmental Protection Agency (EPA) to track activities conducted under its Superfund program. Specific information is tracked for each individual site. The database includes sites that are on the National Priorities List (NPL) or being considered for the NPL. The CERCLIS Database displays site information for NPL sites (i.e., sites proposed to the NPL, currently on the final NPL or deleted from the final NPL. NPL Sites are listed separately on the

NPL data set. Once a site is added to CERCLIS, the next step in evaluating the potential problem is the completion of a preliminary assessment (PA). The purpose of the PA is to determine whether the site warrants further Superfund investigation. The PA is typically an information gathering phase for which sampling does not take place. A PA is usually completed within one year of a site being listed in CERCLIS. Based on the conclusions of the PA, a site could be recommended for a) no further action under the EPA Superfund program; b) a sampling site investigation to collect data for further evaluation and possible nomination to the NPL; or c) an emergency or time-critical removal (short-term cleanup). Active CERCLIS sites are sites at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted under the Superfund program. CERCLIS excludes sites which EPA has assessed and designated "No Further Remedial Action Planned", or archive, sites. EPA is aware that the CERCLIS inventory is often used as a resource in assessing property. People conducting such assessments should not misinterpret the meaning of a site being contained in CERCLIS. Such sites are not necessarily contaminated, and sites not in CERCLIS are not necessarily contaminant-free.

Database: *Confirmed and Suspected Contaminated Sites List No Further Action*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*

Date of Database: *2007-01-01T00:00:00*

No Further Action Site List This data set contains information about sites previously on the Confirmed and Suspected Contaminated Sites list (above) that have received a No Further Action (NFA) determination. Because it is necessary to maintain historical records of sites that have been investigated and cleaned up, sites are not deleted from the database when cleanup activities are completed. Instead, a No Further Action code is entered based upon the type of NFA determination the site received. The NFA code lists the basis for the NFA determination.

Database: *Confirmed and Suspected Contaminated Sites List*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*

Date of Database: *2007-07-15T00:00:00*

The data set contains information about sites that are undergoing cleanup and sites that are awaiting further investigation and/or cleanup by the Department of Ecology Toxics Cleanup Program. Sites on the Hazardous Sites List (i.e., those that have been ranked using the Washington Ranking Model) are included in this data set. Within 90 days of learning of a potentially contaminated site, the Department of Ecology conducts an initial investigation of each site. If the initial investigation shows that further action is needed, the site will appear in the Confirmed & Suspected Contaminated Sites (CSCS) Report. Once remedial action has been completed, the Toxics Cleanup Program's management determines the removal of a site from the CSCS Report. The Hazardous Sites List is a subset of the CSCS Report. It contains those sites that have been ranked using the Washington Ranking Method. Site owners and operators do not necessarily agree with Ecology's determination of site status.

Database: *Confirmed and Suspected Contaminated Sites List Hazardous Site List*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The Hazardous Sites List (HSL) is required by law 173-340-330 WAC. It includes all sites which have been assessed and ranked using the Washington Ranking Method (WARM). Also listed are National Priorities List (NPL) sites. The categories of evaluation are linear and include several steps. The Initial Investigation (II) is a brief investigation conducted within 90 days of receiving a site discovery report. The II step provides enough information to determine if the site needs further investigation, emergency cleanup, or no further action. If further action is required, early notice letters are sent to site owners, operators, etc. inviting them to work cooperatively with us to resolve any contamination problems, AND the site proceeds to the next step. The Site Hazard Assessment (SHA) is an assessment to confirm the presence of hazardous substances and to determine the relative risk the site poses to human health and the environment. (Note: Some SHAs are conducted by Ecology staff while others are conducted by local health districts / departments.) The Hazard Ranking (WARM Score) includes the results of the Site Hazard Assessment step that are used in the Washington Ranking Method (WARM) to yield a WARM score. The WARM score is a number between 1 and 5, where a score of 1 represents the highest level of risk and 5 indicates the lowest assessed risk. A zero indicates that the site is either on the federal National Priorities List (NPL) or is a sub-site or operable unit of an NPL site. NPL sites are ranked under the federal Hazard Ranking System (HRS). This WARM score is not removed at the time of a No Further Action determination as it is kept for historical purposes.

Database: *Ecology Digest 26 (Catalog of Formal Oversight Decision Documents, Orders and Decrees)*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/DIGEST%2026.pdf*
Date of Database:

The Toxics Cleanup Program maintains a list of all formal oversight decision documents under the Model Toxics Control Act that have been agreed to and signed by the Program's manager or designee. These decision documents include all Consent Decrees, Prospective Purchaser Consent Decrees, Agreed Orders, and Enforcement Orders under the Model Toxics Control Act.

Database: *Emergency Response Notification System*
Map Class: *Release*
Contact Number:
Web Page: *http://www.nrc.uscg.mil/wdbcgi/wdbcgi.exe/WWWUSER/WEBDB.foia_query.show_parms*
Date of Database: *2007-01-15T00:00:00*

The Emergency Response Notification System (ERNS) is a national computer data base used to store information on releases of oil and hazardous substances. ERNS supports the Emergency Response and the Title III program. The ERNS program is a cooperative effort among EPA Headquarters, the Department of Transportation (DOT), National Transportation Systems Center (NTSC), the ten EPA Regions, the U.S. Coast Guard (USCG), and the National Response Center (NRC). ERNS provides the most comprehensive data compiled on release notifications of oil and hazardous substances in the United States. When a release report is submitted to Federal authorities (e.g., NRC or Regional offices), the individual reporting is asked a series of questions regarding the release (e.g., type, location, volume). Information concerning all releases originally reported to the NRC or EPA Regional offices is entered into local

computers and transmitted electronically from the NRC or EPA Regional office to the NTSC, where it becomes part of the ERNS national data base. The procedures for maintaining the initial reports differs between the NRC and the EPA Regions. The NRC maintains electronic copies of all spill reports as they were initially received and does not make any changes to spill reports once they have been entered into the system. Reports received by the NRC contain information that may be valuable to the on-scene coordinators, as well as to enforcement personnel. The information received by the NRC is sent to the Regional offices through the Volpe National Transportation Systems Center (VNTSC). Since these reports may be used in enforcement actions, it is necessary to maintain a copy of the spill report as it was originally reported. Each EPA Region maintains its own Region-specific data base, which is a subset of the national data base. Initial spill reports made directly to an EPA Region are maintained as hard copies and kept in the individual Regional office. When additional information on a release notification is obtained, it is also entered at the Regional level and electronically transmitted to the national system. An initial and modified copy of each report is maintained at VNTSC to preserve data integrity.

Database: *Hazardous Materials Information Reporting System*
Map Class: *Release*
Contact Number:
Web Page: *http://hazmat.dot.gov/pubs/inc/hmisframe.htm*
Date of Database: *2007-01-01T00:00:00*

The Hazardous Materials Incident Reporting System (HMIRS) contains data on spills, releases, or other incidents involving hazardous materials during the course of transportation. All modes of transportation are included except pipeline and bulk marine transportation. The data set contains the Incident Report Form 5800.1 data submitted under the requirements of Title 49 CFR 171.15 and 171.16. HMIRS of the Pipeline and Hazardous Materials Safety Administration (PHMSA) was established in 1971 to fulfill the requirements of the federal hazardous materials transportation law. Part 171 of Title 49, Code of Federal Regulations (49 CFR) contains the incident reporting requirements of carriers of hazardous materials. An unintentional release of hazardous materials meeting the criteria set forth in Section 171.16, 49 CFR must be reported on U.S. Department of Transportation (DOT) Form 5800.1, and data from the reports received are subsequently entered in the HMIRS database. All spills meeting the following criteria to be reported to PHMSA: 1) As a direct result of hazardous materials a person is killed or receives injuries requiring hospitalization, estimated property damage exceeds $50,000, an evacuation of the general public lasts for one or more hours, a major transportation artery or facility is closed for one or more hours, or the operational flight pattern or routing of an aircraft is altered, 2) Fire, breakage, spillage, or suspected contamination occurs involving shipment of radioactive materials or infectious substances, 3) There has been a release of a marine pollutant exceeding 450 L or 400 kg, or 4) Any hazardous material is unintentionally released from a package or any quantity of hazardous waste is discharged during transportation.

Database: *Institutional and Engineering Controls*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.epa.gov/superfund/index.htm*
Date of Database: *2007-03-15T00:00:00*

This data set identifies RCRA and NPL sites with institutional and/or engineering controls in place.

Database: *Institutional and Engineering Controls*
Map Class: *Use Restriction*
Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

This data set is a subset of CSCSL and identifies sites where a remedial action was conducted, residual contamination was left on site and on-going institutional controls required.

Database: *King County Abandoned Landfills*
Map Class: *Release*
Contact Number:
Web Page: *http://www.spl.org/*
Date of Database:

Abandoned landfill study in King County by Seattle-King County Dept. of Public Health. Environmental Health Division, 1985.

Database: *Leaking Underground Storage Tanks*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The LUST data file contains information on UST Cleanup sites and cleanup history. Sites that have been cleaned up and sites currently being cleaned up are included in the data set. Sites are categorized based on the activities taken. Awaiting Cleanup means the site has been discovered or reported release, yet no active cleanup measures taken or Site check (identified the source) begun or completed, yet no active cleanup measures taken or site characterization begun or completed, yet no active cleanup measures taken. Cleanup Started means responsible party has initiated physical, biological, or chemical management of release, e.g. soil excavated, groundwater pumped, vapors extracted, free product removed, oxygen added, etc., site investigations and emergency responses (e.g. venting explosive vapors, providing bottled water) do not qualify as activities under cleanup started. Monitoring means groundwater monitoring is the only activity occurring at the site or site has been characterized, only low levels of soil and/or groundwater contamination remain, and natural attenuation is the chosen cleanup method or conformational monitoring following active cleanup measures. Reported Cleaned Up means owner or consultant reports that contamination has been cleaned up and/or some soil contamination may remain under existing structures or in otherwise inaccessible areas if groundwater is not threatened and there has been no migration of contamination into the structure and cleanup report has not been formally reviewed by Ecology. A formal review could determine that the site has not been cleaned up to MTCA standards. No Further Action means the cleanup report has been formally reviewed by Ecology under the fee-based Voluntary Cleanup Program and resulted in a No Further Action status and Institutional controls may have been required due to soil contamination that may remain under existing structures or in otherwise inaccessible areas.

Database: *National Priority List*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/index.htm*
Date of Database: *2007-04-23T00:00:00*

The National Priorities List (NPL) is an information and management tool that is a part of the Superfund cleanup process. The NPL serves primarily informational purposes, identifying for the States and the public those sites or other releases that appear to warrant remedial actions. The identification of a site for the NPL is intended primarily to guide the U.S. Environmental Protection Agency (EPA) in: determining which sites warrant further investigation to assess the nature and extent of the human health and environmental risks associated with a site; identifying what Comprehensive Environmental Response Compensation and Liability Act (CERCLA)-financed remedial actions may be appropriate; notifying the public of sites EPA believes warrant further investigation; and serving notice to potentially responsible parties that EPA may initiate CERCLA-financed remedial action. Inclusion of a site on the NPL does not in itself reflect a judgment of the activities of its owner or operator, it does not require those persons to undertake any action, nor does it assign liability to any person. Section 105(a)(8)(B) of CERCLA, as amended, requires that the statutory criteria provided by the Hazard Ranking System (HRS) be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. The NPL list is also known as Appendix B of the National Contingency Plan. The Federal Register (FR) Notices for NPL Updates page provides a list of FR Notices for proposed and final NPL Updates. The Superfund cleanup process begins with site discovery or notification to EPA of possible releases of hazardous substances. Sites are discovered by various parties, including citizens, State agencies, and EPA Regional offices. Once discovered, sites are entered into the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), EPA's computerized inventory of potential hazardous substance release sites (view Superfund Site Information). EPA then evaluates the potential for a release of hazardous substances from the site through these steps in the Superfund cleanup process. Superfund was created in 1980 when Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to clean up the nation's uncontrolled hazardous waste sites. Under the Superfund program, abandoned, accidentally spilled, or illegally dumped hazardous wastes that pose a current or future threat to human health or the environment are cleaned up. EPA works closely with communities, potentially responsible parties, scientists, researchers, contractors, and state, local, tribal, and federal authorities on site cleanup. Together with these groups, EPA identifies hazardous waste sites, tests the conditions of the sites, develops cleanup plans, and cleans up the sites.

Database: *RCRA Conditionally Exempt Small Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Conditionally Exempt Small Quantity Generators (CESQG) generate 100 kilograms or less per month of hazardous waste, or 1 kilogram or less per month of acutely hazardous waste. Requirements for CESQG's include (see also 40 CFR 261.5). CESQG's must identify all the hazardous waste generated. CESQG's may not accumulate more than 1,000 kilograms of hazardous waste at any time. CESQG's must ensure that hazardous waste is delivered to a person or facility who is authorized to manage it.

Database: *RCRA Corrective Action Report*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/hazwaste/ca/index.htm*
Date of Database: *2007-07-15T00:00:00*

The Resource Conservation and Recovery Act (RCRA) Corrective Action (CORRACTS) list is a summary of those facilities where corrective action is occurring. The RCRA Corrective Action Program, run by EPA and 41 authorized states and territories, compels responsible parties to address the investigation and cleanup of hazardous releases themselves.

RCRA Corrective Action differs from Superfund in that Corrective Action sites generally have viable operators and on-going operations. RCRA grants EPA and authorized states the authority to regulate hazardous waste management facilities that treat, store, or dispose of hazardous waste. Although EPA guidelines are designed to prevent toxic releases at RCRA facilities, accidents or other activities have sometimes released pollutants into soil, ground water, surface water and air. By the year 2020, EPA and the authorized states plan to have largely completed the work of implementing final remedies at all facilities requiring Corrective Action. (See Goal 3 of the Office of Solid Waste's 2020 Vision for more details.) While working toward the 2020 goal, EPA decided to ensure that sites presenting the greatest risk to human health and the environment are dealt with first. Accordingly, the Corrective Action Program has pledged to select a final remedy at 30% and put a final remedy in place at 20% of 1,968 highest-priority sites by 2008.

Database: *RCRA Large Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Large Quantity Generators (LQG) generate 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste. LQG's may only accumulate waste on site for 90 days, but certain exceptions apply. LQG's do not have a limit on the amount of hazardous waste accumulated on site. There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. LQG's must have detailed, written contingency plans for handling emergencies. LQG's must submit a biennial hazardous waste report.

Database: *RCRA No Designation*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

RCRA sites that are identified as having a RCRA generator identified number but that are not identified as a large quantity generator, small quantity generator, conditionally exempt small quantity generator, treatment storage or disposal (TSD) facility, or RCRA corrective action sites.

Database: *RCRA Non Corracts TSD*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/tsds.htm*
Date of Database: *2007-07-15T00:00:00*

Through the Resource Conservation and Recovery Act (RCRA), Congress directed EPA to create regulations to manage hazardous waste from "the cradle to the grave." Under this mandate, EPA developed strict requirements for all aspects

of hazardous waste management including the treatment, storage, and disposal (TSD) of hazardous waste. TSDS include those facilities that treat, store, and/or dispose hazardous waste. TSDS are the last link in the cradle to the grave waste management system. The requirements for TSDS are found in 40 CFR Parts 264 and 265 and are more extensive than those that apply to hazardous waste generators or transporters.

Database: *RCRA Small Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Small Quantity Generators (SQG) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month. SQG's may accumulate hazardous waste on site for 180 days without a permit (or 270 days if shipping a distance greater than 200 miles). The quantity of hazardous on site waste must never exceed 6,000 kilograms. There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. SQG's are not required to have detailed, written contingency plans.

Database: *Seattle Abandoned Landfills*
Map Class: *Release*
Contact Number:
Web Page: *http://www.spl.org/*
Date of Database: *1984-07-30T00:00:00*

Abandoned landfill study in the City of Seattle by Seattle-King County Dept. of Public Health. Environmental Health Division, 1984.

Database: *Solid Waste Facility Database*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/biblio/0407019.html*
Date of Database: *2007-01-01T00:00:00*

The solid waste facility database contains disposal information for landfills, incinerators, and transfer facilities. The types of facilities included are those that are permitted under chapter 173-350 WAC, Minimum Functional Standards for Solid Waste Handling and chapter 173-351 WAC, Criteria for Municipal Solid Waste Landfills. Information in the solid waste facility database is obtained through annual reporting forms sent to all landfill types (municipal, inert/demolition, limited purpose/special use, and wood waste landfills) and to waste-to-energy/incinerators.

Database: *Toxic Chemical Release Inventory*
Map Class: *Release*

Contact Number:

Web Page: http://www.epa.gov/tri/index.htm

Date of Database: 2007-01-01T00:00:00

The Toxics Release Inventory (TRI) contains information on releases of nearly 650 chemicals and chemical categories from industries including manufacturing, metal and coal mining, electric utilities, and commercial hazardous waste treatment, among others. The Emergency Planning and Community Right-to-Know Act (EPCRA) primary purpose is to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored on-site to state and local governments in order to help communities prepare to respond to chemical spills and similar emergencies. EPCRA Section 313 requires EPA and the States to annually collect data on releases and transfers of certain toxic chemicals from industrial facilities, and make the data available to the public in the Toxics Release Inventory (TRI). In 1990 Congress passed the Pollution Prevention Act which required that additional data on waste management and source reduction activities be reported under TRI. The goal of TRI is to empower citizens, through information, to hold companies and local governments accountable in terms of how toxic chemicals are managed. EPA compiles the TRI data each year and makes it available. The TRI program has expanded significantly since its inception in 1987. The Agency has issued rules to roughly double the number of chemicals included in the TRI to approximately 650. Seven new industry sectors have been added to expand coverage significantly beyond the original covered industries, i.e. manufacturing industries. Most recently, the Agency has reduced the reporting thresholds for certain persistent, bioaccumulative, and toxic (PBT) chemicals in order to be able to provide additional information to the public on these chemicals.

Database: Tribal Leaking Underground Storage Tanks Active

Map Class: Release

Contact Number:

Web Page: http://www.epa.gov/oust/directiv/od961015.htm

Date of Database: 2006-11-01T00:00:00

The list contains information about "active" leaking underground storage tanks (LUST) sites on federally recognized Native American tribal lands. The sites are considered active because they are still subject to future investigation and/or remediation by the U.S. Environmental Protection Agency. The tribes are sovereign entities subject to federal laws. Underground storage tanks located on tribal lands generally are not subject to state laws. As a result, unless a state acts as a tribe's agent pursuant to a formal agreement with a tribe, EPA and the tribe are responsible for implementing and enforcing the UST program on tribal lands.

Database: Tribal Leaking Underground Storage Tanks Inactive

Map Class: Release

Contact Number:

Web Page: http://www.epa.gov/OUST/directiv/d961015a.htm

Date of Database: 2006-11-01T00:00:00

The list contains information about "inactive" leaking underground storage tanks (LUST) sites on federally recognized Native American tribal lands. The sites are considered inactive because they have been investigated and/or remediated and the U.S. Environmental Protection Agency has concurred with the inactive status. The tribes are sovereign entities subject to federal laws. Underground storage tanks located on tribal lands generally are not subject to state laws. As a result, unless a state acts as a tribe's agent pursuant to a formal agreement with a tribe, EPA and the tribe are responsible for implementing and enforcing the UST program on tribal lands.

Database: *Underground Storage Tanks*
Map Class: *Use*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The UST list contains information for UST sites and tanks in Washington. Both operational and closed USTs are on the list. USTs that are excluded from the list include those that have not been registered with the Washington Department of Ecology. Non-registered tanks generally include farm or residential tanks of 1,100 gallons or less capacity storing motor fuel for noncommercial purposes; tanks storing heating oil for use on the premises where stored; Septic tanks; Pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws; Surface impoundments, pits, ponds, or lagoons; Storm water or waste water collection systems; Flow-through process tanks; Liquid traps or associated gathering lines directly related to oil or gas production and gathering operations; Tanks on or above the floor of underground areas, such as basements or tunnels; Tanks with a capacity of 110 gallons or less. The substances covered under the notification requirements apply to USTs.

Database: *Washington Unauthorized Tire Piles*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/biblio/0507043.html*
Date of Database: *2005-11-15T00:00:00*

The Washington Department of Ecology (Ecology) conducted a study of unauthorized tire piles in Washington. The legislature required this study to be completed and submitted by Ecology to the appropriate standing committees of the legislature by November 15, 2005. The report and appendices present a detailed discussion of how this information was collected and assembled. This study identified 54 sites statewide with unauthorized accumulations of scrap tires. Site mapping was completed and the number of scrap tires was estimated. One site (Goldendale-Tire Shredders) accounts for more than two-thirds of the calculated scrap tires and more than half of the total estimated cleanup costs. Of the 54 sites, only five require more than 10 estimated on-site days to complete the individual cleanups.

PARCEL INSIGHT

INCORPORATED

Parcel Insight Radius Map Report

Report ID: 276
Date: 11/8/2007

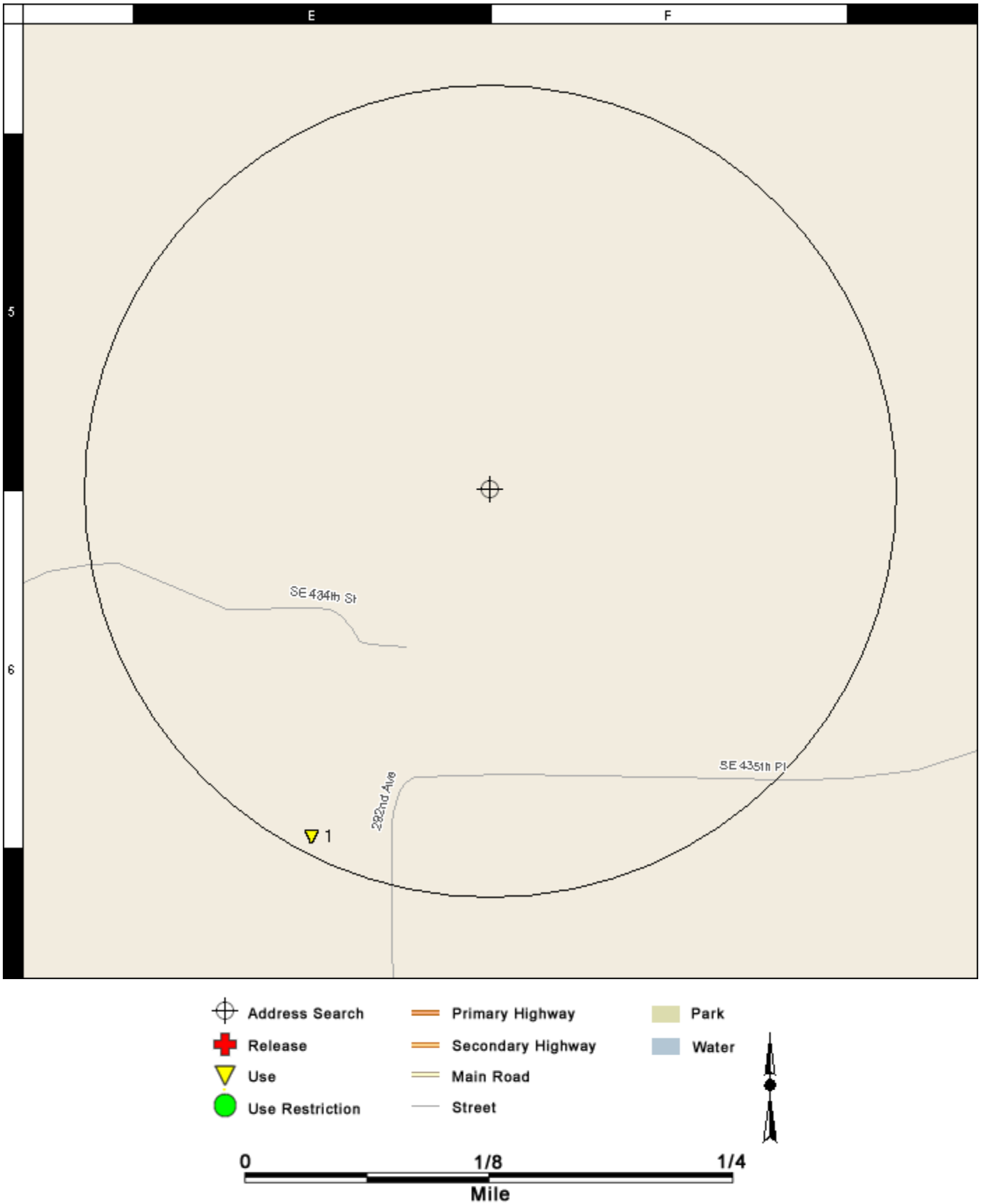
Enumclaw, WA

28750 SE 452ND ST
ENUMCLAW, WA 98022

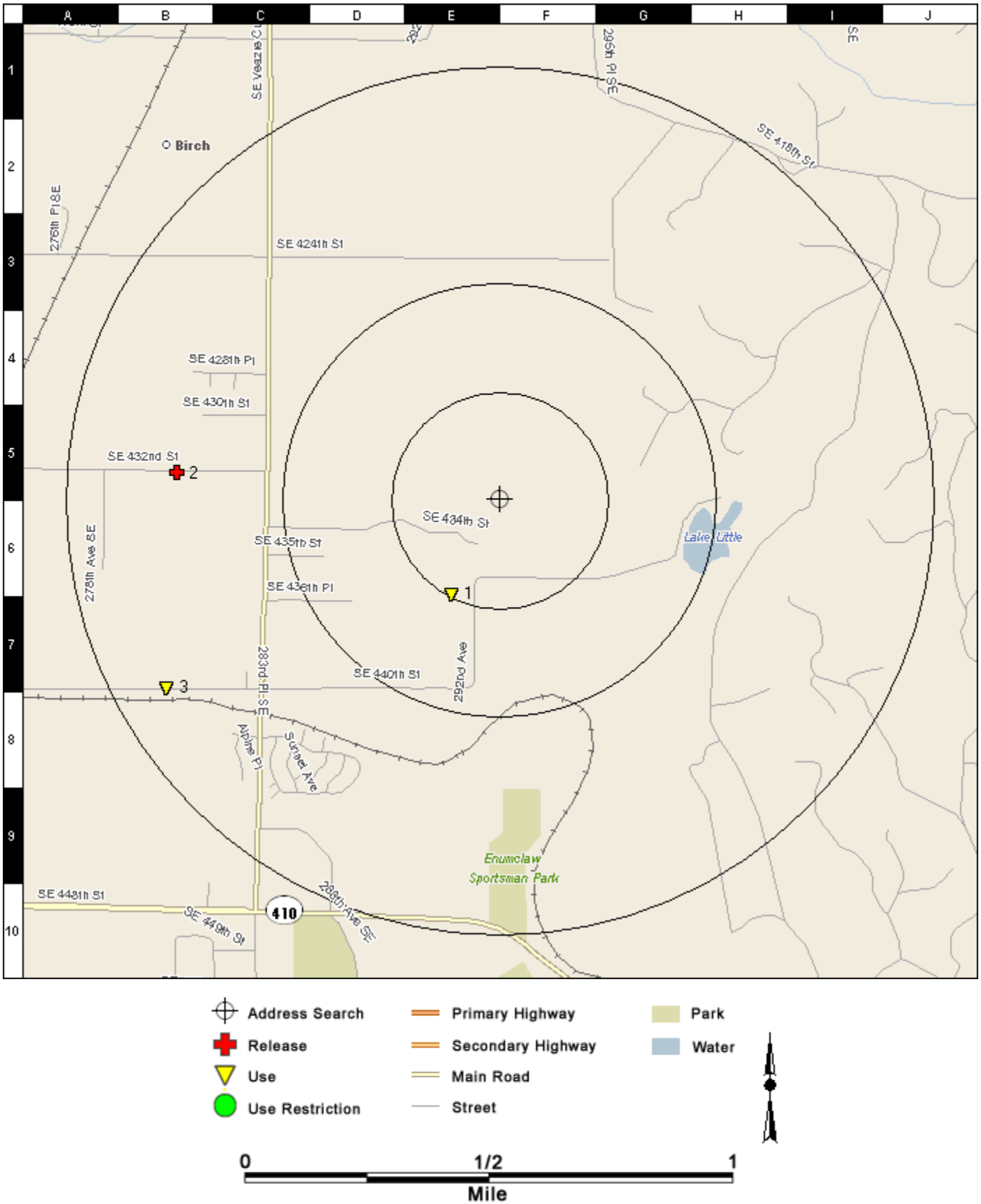
TABLE OF CONTENTS

1/4 Mile Detail Map	*1*
Overview Map	*2*
Non-Exact Match Map	*3*
Tabular Summary of Findings	*4*
Exact Match Summary	*5*
Exact Match Details	*6*
Disclaimer	*8*
Government Record Tracking	*9*

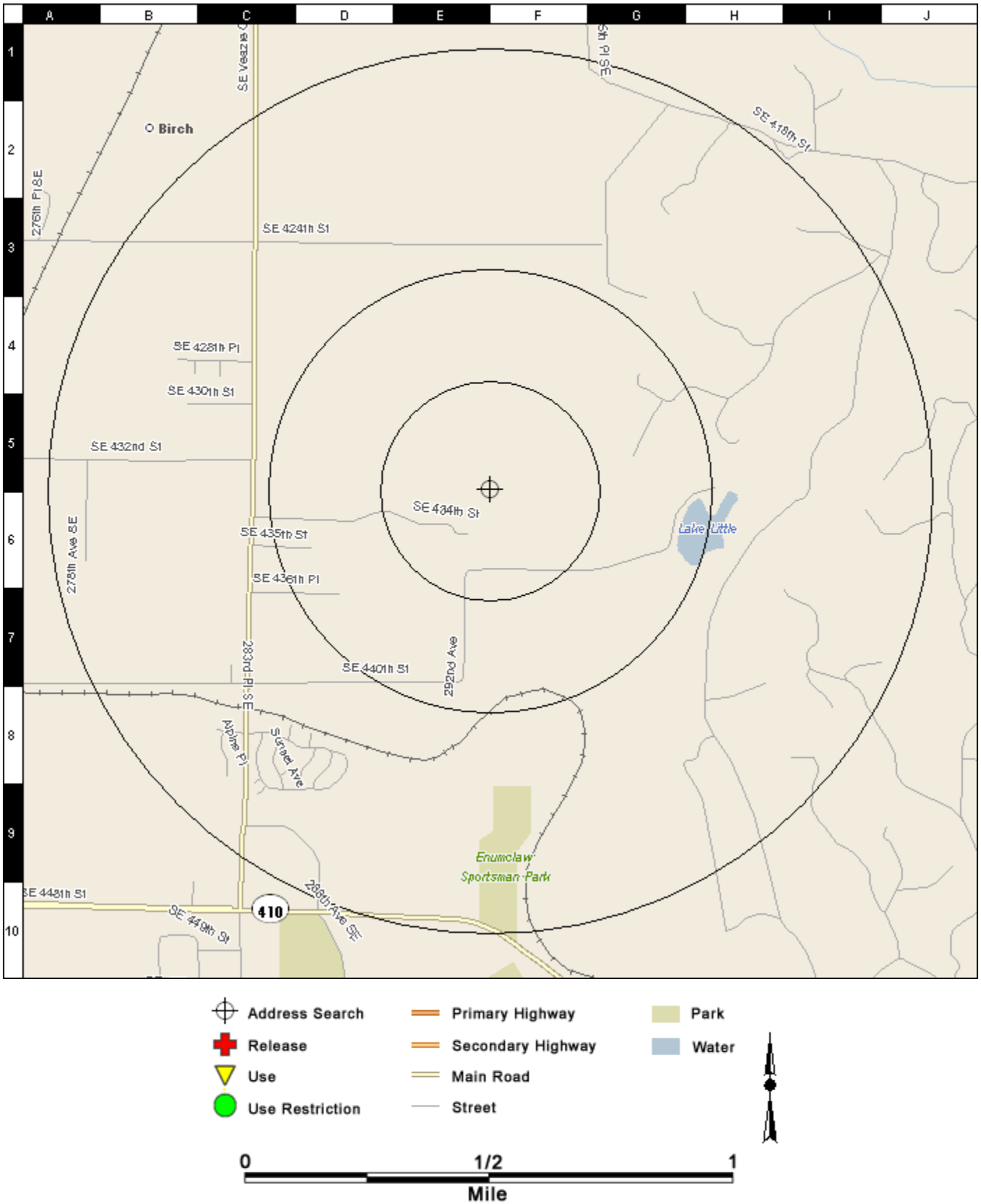
1/4 Mile Detail Map



Overview Map



Non-Exact Match Map



Tabular Summary of Findings

RELEASE	+	*A site listed in a database that documents a release of hazardous material(s).*
USE	∇	*A site listed in a database that documents the use of hazardous material(s), but not a release of hazardous material(s).*
USE RESTRICTION	O	*A site listed in a database that documents a restriction on the use of the site related to a release of a hazardous material(s) or a formal oversight decision from a government agency.*

Map Class		Subject Property	Distance					Total by Map Class
			0.00 to 0.25 M	0.25 to 0.50 M	0.50 to 0.75 M	0.75 to 1.00 M	1.00+ M	
RELEASE	+				1			1
USE	∇		1			1		2
USE RESTRICTION	O							

Database		Search Radius	Subject Property	Distance					Total by Database Type
				0.00 to 0.25 M	0.25 to 0.50 M	0.50 to 0.75 M	0.75 to 1.00 M	1.00+ M	
NPL	+	1.00 M							
RCRA CORRACTS	+	1.00 M							
RCRA TSD	∇	1.00 M							
CERCLIS	+	1.00 M							
CERCLIS NFRAP	+	1.00 M				1			1
ERNS	+	1.00 M							
RCRA LQG	∇	1.00 M							
RCRA SQG	∇	1.00 M							
RCRA CESQG	∇	1.00 M							
LUST ACTIVE TRIBAL	+	1.00 M							
LUST INACTIVE TRIBAL	+	1.00 M							
BROWNFIELDS	O	1.00 M							
INST ENG CONTROLS	O	1.00 M							
HMIRS	+	1.00 M							
TRIS	+	1.00 M							
CSCSL	+	1.00 M							
CSCSL HSL	+	1.00 M							
CSCSL NFA	+	1.00 M							
SWLF STATE	+	1.00 M							
LUST	+	1.00 M							
UST	∇	1.00 M					1		1
SWLF SEA	+	1.00 M							
SWLF KING	+	1.00 M							
SWLF STATE	+	1.00 M							
DECISIONS	O	1.00 M							
INST ENG CONTROLS	O	1.00 M							
RCRA ND	∇	1.00 M		1					1
Totals by Distance			0	0	0	0	0	0	0

Exact Match Summary

				MAP CLASS		
				+	▽	○
MAP ID GRID	SITE NAME ADDRESS	PI ID # DISTANCE DIRECTION	DATABASES	RELEASE	USE	USE RESTRICTION
1 E6	KING CNTY SOLID WASTE DIV ENUMCLAW TRANS 1650 BATTERSBY AVE E, ENUMCLAW	53022761 0.23807 SW	RCRA ND		X	
2 B5	BALLESTRASSE LOGGING 28015 SE 432ND ST, ENUMCLAW	53032321 0.74429 W	CERCLIS NFRAP	X		
3 B7	ENUMCLAW WATER DEPT WATERCREST SPRING 28014 SE 440TH ST, ENUMCLAW	53035278 0.87667 SW	UST		X	

Exact Match Details

Map ID 1 0.238 M SW	GRID E6	PI ID # 53022761	LAT: 47.20975	LON: -121.95400	USE
	Site Name	KING CNTY SOLID WASTE DIV ENUMCLAW TRANS		Databases: RCRA ND	
	Address	1650 BATTERSBY AVE E ENUMCLAW, WA 98022			

RCRA ND **RCRA No Designation**

Site: KING CNTY SOLID WASTE DIV ENUMCLAW TRANS 1650 BATTERSBY AVE E ENUMCLAW, WA 98022
HANDLER ID: WAD980639777
NAICS DESC: All Other Waste Management Services
CONTACT NAME: NA NA
TSD ACTIVITY: N

Report Submission History

Category	Report Date
LQG	
SQG	
CESQG	02/27/1996, 03/03/1997
RCRA ND	12/31/2003, 12/31/2005, 03/02/1998, 02/26/1999, 03/01/2000, 02/16/2001, 02/22/2002, 03/03/2003, 03/30/2004, 02/16/2005, 02/21/2006

Last Report Details:

Site Name: KING CNTY SOLID WASTE DIV ENUMCLAW TRANS
Seq Number: 11
Received Date: 02/21/2006
Transfer Facility:
Federal Waste Generator: N
State Waste Generator: N

Map ID 2 0.744 M W	GRID B5	PI ID # 53032321	LAT: 47.21378	LON: -121.96747	RELEASE
	Site Name	BALLESTRASSE LOGGING		Databases: CERCLIS NFRAP	
	Address	28015 SE 432ND ST ENUMCLAW, WA 98022			

CERCLIS NFRAP **CERCLIS No Further Remedial Action Planned**

Site: BALLESTRASSE LOGGING 28015 SE 432ND ST ENUMCLAW, WA 98022
County: KING
Region: 10
EPA ID: WAD044606945
FIPS Code: 53033

OU ID: 00
Action Code: DS
Action Name: DISCVRY
Action Code ID: 001
Action Lead Type: EPA Fund
Action Completion Date: 1979-07-01T00:00:00
Action_Template_Order: 10
Non_NPL_Status: NFRAP

OU ID: 00
Action Code: PA
Action Name: PA
Action Code ID: 001
Action Lead Type: State (Fund)
Action Start Date: 1984-12-20T01:01:01

Exact Match Details

Map ID 2 0.744 M W	GRID B5	PI ID # 53032321	LAT: 47.21378	LON: -121.96747	RELEASE +
	Site Name	BALLESTRASSE LOGGING		Databases:	
	Address	28015 SE 432ND ST ENUMCLAW, WA 98022		CERCLIS NFRAP	

Action Completion Date: 1985-04-30T00:00:00
Action_Template_Order: 130
Non_NPL_Status: NFRAP

OU ID: 00
Action Code: SI
Action Name: SI
Action Code ID: 001
Action Lead Type: EPA Fund
Action Start Date: 1986-02-28T01:01:01
Action Completion Date: 1986-03-12T00:00:00
Action_Template_Order: 160
Non_NPL_Status: NFRAP

OU ID: 00
Action Code: SI
Action Name: SI
Action Code ID: 002
Action Lead Type: EPA Fund
Action Start Date: 1988-07-26T01:01:01
Action Completion Date: 1988-07-26T00:00:00
Action_Template_Order: 160
Non_NPL_Status: NFRAP

OU ID: 00
Action Code: VS
Action Name: ARCH SITE
Action Code ID: 001
Action Lead Type: EPA In-House
Action Completion Date: 1988-07-26T00:00:00
Action_Template_Order: 1500
Non_NPL_Status: NFRAP

Map ID 3 0.877 M SW	GRID B7	PI ID # 53035278	LAT: 47.20663	LON: -121.96798	USE ∇
	Site Name	ENUMCLAW WATER DEPT WATERCREST SPRING		Databases:	
	Address	28014 SE 440TH ST ENUMCLAW, WA 98022		UST	

UST **Underground Storage Tanks**

Site: ENUMCLAW WATER DEPT WATERCREST SPRING 28014 SE 440TH ST ENUMCLAW, WA 98022
Facility Site Id: 44564942
County: King
Unit: NW

Tank ID	Tank Name	Status	Inst. Date	Capacity	Cmpt./ID	Substance
619407	1	Closure in Process		111 TO 1,100 Gallons	1/593770	Diesel

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Database: *Brownfields Grant Sites*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.epa.gov/brownfields/index.html*
Date of Database: *2007-04-15T00:00:00*

The Brownfields Management System (BMS) is the official U.S. Environmental Protection Agency (EPA0 database of the Brownfields Program. It is designed to assist EPA in collecting, tracking, and updating information, as well as reporting on the major activities and accomplishments of the various Brownfields grant programs. BMS captures data on grantee activities (assessment, cleanup and redevelopment), funding, job training, and details on cooperative partners and leveraging efforts - a central objective of the Brownfields Program.

Database: *CERCLIS No Further Remedial Action Planned*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/sites/cursites/index.htm*
Date of Database: *2006-12-15T00:00:00*

The No Further Remedial Action Planned (NFRAP) or "Archived" designation means that, to the best of the EPA's knowledge, Superfund has completed its assessment at a site, and has determined no further steps to list this site on the NPL will be taken unless information indicating this decision was not appropriate or other considerations make a recommendation for listing appropriate at a later time. The U.S. Environmental Protection Agency (EPA) may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available and in these cases, the Archive designation is removed and the site is returned to the CERCLIS inventory if more sustentative assessment and/or any cleanup work is necessary under the Federal Superfund program. An archive decision does not necessarily mean that there is no hazard associated with a given site; it means only that based upon available information, the location is not judged to be a potential NPL site. Sites are archived as historical records so EPA does not needlessly repeat the investigations in the future. The States will coordinate with EPA to determine if any sites should be returned to CERCLIS because of newly identified contamination problems at the site. It is important to note the sites on CERCLIS and the archived list will change as the sites are being investigated or if new information becomes available.

Database: *Comprehensive Environmental Response, Compensation, and Liability Information System*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/sites/siteinfo.htm*
Date of Database: *2007-03-15T00:00:00*

The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list contains information on hazardous waste sites, potentially hazardous waste sites and remedial activities. CERCLIS is a database used by the U.S. Environmental Protection Agency (EPA) to track activities conducted under its Superfund program. Specific information is tracked for each individual site. The database includes sites that are on the National Priorities List (NPL) or being considered for the NPL. The CERCLIS Database displays site information for NPL sites (i.e., sites proposed to the NPL, currently on the final NPL or deleted from the final NPL. NPL Sites are listed separately on the

NPL data set. Once a site is added to CERCLIS, the next step in evaluating the potential problem is the completion of a preliminary assessment (PA). The purpose of the PA is to determine whether the site warrants further Superfund investigation. The PA is typically an information gathering phase for which sampling does not take place. A PA is usually completed within one year of a site being listed in CERCLIS. Based on the conclusions of the PA, a site could be recommended for a) no further action under the EPA Superfund program; b) a sampling site investigation to collect data for further evaluation and possible nomination to the NPL; or c) an emergency or time-critical removal (short-term cleanup). Active CERCLIS sites are sites at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted under the Superfund program. CERCLIS excludes sites which EPA has assessed and designated "No Further Remedial Action Planned", or archive, sites. EPA is aware that the CERCLIS inventory is often used as a resource in assessing property. People conducting such assessments should not misinterpret the meaning of a site being contained in CERCLIS. Such sites are not necessarily contaminated, and sites not in CERCLIS are not necessarily contaminant-free.

Database: *Confirmed and Suspected Contaminated Sites List No Further Action*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*

Date of Database: *2007-01-01T00:00:00*

No Further Action Site List This data set contains information about sites previously on the Confirmed and Suspected Contaminated Sites list (above) that have received a No Further Action (NFA) determination. Because it is necessary to maintain historical records of sites that have been investigated and cleaned up, sites are not deleted from the database when cleanup activities are completed. Instead, a No Further Action code is entered based upon the type of NFA determination the site received. The NFA code lists the basis for the NFA determination.

Database: *Confirmed and Suspected Contaminated Sites List*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*

Date of Database: *2007-07-15T00:00:00*

The data set contains information about sites that are undergoing cleanup and sites that are awaiting further investigation and/or cleanup by the Department of Ecology Toxics Cleanup Program. Sites on the Hazardous Sites List (i.e., those that have been ranked using the Washington Ranking Model) are included in this data set. Within 90 days of learning of a potentially contaminated site, the Department of Ecology conducts an initial investigation of each site. If the initial investigation shows that further action is needed, the site will appear in the Confirmed & Suspected Contaminated Sites (CSCS) Report. Once remedial action has been completed, the Toxics Cleanup Program's management determines the removal of a site from the CSCS Report. The Hazardous Sites List is a subset of the CSCS Report. It contains those sites that have been ranked using the Washington Ranking Method. Site owners and operators do not necessarily agree with Ecology's determination of site status.

Database: *Confirmed and Suspected Contaminated Sites List Hazardous Site List*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The Hazardous Sites List (HSL) is required by law 173-340-330 WAC. It includes all sites which have been assessed and ranked using the Washington Ranking Method (WARM). Also listed are National Priorities List (NPL) sites. The categories of evaluation are linear and include several steps. The Initial Investigation (II) is a brief investigation conducted within 90 days of receiving a site discovery report. The II step provides enough information to determine if the site needs further investigation, emergency cleanup, or no further action. If further action is required, early notice letters are sent to site owners, operators, etc. inviting them to work cooperatively with us to resolve any contamination problems, AND the site proceeds to the next step. The Site Hazard Assessment (SHA) is an assessment to confirm the presence of hazardous substances and to determine the relative risk the site poses to human health and the environment. (Note: Some SHAs are conducted by Ecology staff while others are conducted by local health districts / departments.) The Hazard Ranking (WARM Score) includes the results of the Site Hazard Assessment step that are used in the Washington Ranking Method (WARM) to yield a WARM score. The WARM score is a number between 1 and 5, where a score of 1 represents the highest level of risk and 5 indicates the lowest assessed risk. A zero indicates that the site is either on the federal National Priorities List (NPL) or is a sub-site or operable unit of an NPL site. NPL sites are ranked under the federal Hazard Ranking System (HRS). This WARM score is not removed at the time of a No Further Action determination as it is kept for historical purposes.

Database: *Ecology Digest 26 (Catalog of Formal Oversight Decision Documents, Orders and Decrees)*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/DIGEST%2026.pdf*
Date of Database:

The Toxics Cleanup Program maintains a list of all formal oversight decision documents under the Model Toxics Control Act that have been agreed to and signed by the Program's manager or designee. These decision documents include all Consent Decrees, Prospective Purchaser Consent Decrees, Agreed Orders, and Enforcement Orders under the Model Toxics Control Act.

Database: *Emergency Response Notification System*
Map Class: *Release*
Contact Number:
Web Page: *http://www.nrc.uscg.mil/wdbcgi/wdbcgi.exe/WWWUSER/WEBDB.foia_query.show_parms*
Date of Database: *2007-01-15T00:00:00*

The Emergency Response Notification System (ERNS) is a national computer data base used to store information on releases of oil and hazardous substances. ERNS supports the Emergency Response and the Title III program. The ERNS program is a cooperative effort among EPA Headquarters, the Department of Transportation (DOT), National Transportation Systems Center (NTSC), the ten EPA Regions, the U.S. Coast Guard (USCG), and the National Response Center (NRC). ERNS provides the most comprehensive data compiled on release notifications of oil and hazardous substances in the United States. When a release report is submitted to Federal authorities (e.g., NRC or Regional offices), the individual reporting is asked a series of questions regarding the release (e.g., type, location, volume). Information concerning all releases originally reported to the NRC or EPA Regional offices is entered into local

computers and transmitted electronically from the NRC or EPA Regional office to the NTSC, where it becomes part of the ERNS national data base. The procedures for maintaining the initial reports differs between the NRC and the EPA Regions. The NRC maintains electronic copies of all spill reports as they were initially received and does not make any changes to spill reports once they have been entered into the system. Reports received by the NRC contain information that may be valuable to the on-scene coordinators, as well as to enforcement personnel. The information received by the NRC is sent to the Regional offices through the Volpe National Transportation Systems Center (VNTSC). Since these reports may be used in enforcement actions, it is necessary to maintain a copy of the spill report as it was originally reported. Each EPA Region maintains its own Region-specific data base, which is a subset of the national data base. Initial spill reports made directly to an EPA Region are maintained as hard copies and kept in the individual Regional office. When additional information on a release notification is obtained, it is also entered at the Regional level and electronically transmitted to the national system. An initial and modified copy of each report is maintained at VNTSC to preserve data integrity.

Database: *Hazardous Materials Information Reporting System*
Map Class: *Release*
Contact Number:
Web Page: *http://hazmat.dot.gov/pubs/inc/hmisframe.htm*
Date of Database: *2007-01-01T00:00:00*

The Hazardous Materials Incident Reporting System (HMIRS) contains data on spills, releases, or other incidents involving hazardous materials during the course of transportation. All modes of transportation are included except pipeline and bulk marine transportation. The data set contains the Incident Report Form 5800.1 data submitted under the requirements of Title 49 CFR 171.15 and 171.16. HMIRS of the Pipeline and Hazardous Materials Safety Administration (PHMSA) was established in 1971 to fulfill the requirements of the federal hazardous materials transportation law. Part 171 of Title 49, Code of Federal Regulations (49 CFR) contains the incident reporting requirements of carriers of hazardous materials. An unintentional release of hazardous materials meeting the criteria set forth in Section 171.16, 49 CFR must be reported on U.S. Department of Transportation (DOT) Form 5800.1, and data from the reports received are subsequently entered in the HMIRS database. All spills meeting the following criteria to be reported to PHMSA: 1) As a direct result of hazardous materials a person is killed or receives injuries requiring hospitalization, estimated property damage exceeds $50,000, an evacuation of the general public lasts for one or more hours, a major transportation artery or facility is closed for one or more hours, or the operational flight pattern or routing of an aircraft is altered, 2) Fire, breakage, spillage, or suspected contamination occurs involving shipment of radioactive materials or infectious substances, 3) There has been a release of a marine pollutant exceeding 450 L or 400 kg, or 4) Any hazardous material is unintentionally released from a package or any quantity of hazardous waste is discharged during transportation.

Database: *Institutional and Engineering Controls*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.epa.gov/superfund/index.htm*
Date of Database: *2007-03-15T00:00:00*

This data set identifies RCRA and NPL sites with institutional and/or engineering controls in place.

Database: *Institutional and Engineering Controls*
Map Class: *Use Restriction*
Contact Number:

Government Record Tracking

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

This data set is a subset of CSCSL and identifies sites where a remedial action was conducted, residual contamination was left on site and on-going institutional controls required.

Database: *King County Abandoned Landfills*
Map Class: *Release*
Contact Number:
Web Page: *http://www.spl.org/*
Date of Database:

Abandoned landfill study in King County by Seattle-King County Dept. of Public Health. Environmental Health Division, 1985.

Database: *Leaking Underground Storage Tanks*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The LUST data file contains information on UST Cleanup sites and cleanup history. Sites that have been cleaned up and sites currently being cleaned up are included in the data set. Sites are categorized based on the activities taken. Awaiting Cleanup means the site has been discovered or reported release, yet no active cleanup measures taken or Site check (identified the source) begun or completed, yet no active cleanup measures taken or site characterization begun or completed, yet no active cleanup measures taken. Cleanup Started means responsible party has initiated physical, biological, or chemical management of release, e.g. soil excavated, groundwater pumped, vapors extracted, free product removed, oxygen added, etc., site investigations and emergency responses (e.g. venting explosive vapors, providing bottled water) do not qualify as activities under cleanup started. Monitoring means groundwater monitoring is the only activity occurring at the site or site has been characterized, only low levels of soil and/or groundwater contamination remain, and natural attenuation is the chosen cleanup method or conformational monitoring following active cleanup measures. Reported Cleaned Up means owner or consultant reports that contamination has been cleaned up and/or some soil contamination may remain under existing structures or in otherwise inaccessible areas if groundwater is not threatened and there has been no migration of contamination into the structure and cleanup report has not been formally reviewed by Ecology. A formal review could determine that the site has not been cleaned up to MTCA standards. No Further Action means the cleanup report has been formally reviewed by Ecology under the fee-based Voluntary Cleanup Program and resulted in a No Further Action status and Institutional controls may have been required due to soil contamination that may remain under existing structures or in otherwise inaccessible areas.

Database: *National Priority List*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/index.htm*
Date of Database: *2007-04-23T00:00:00*

The National Priorities List (NPL) is an information and management tool that is a part of the Superfund cleanup process. The NPL serves primarily informational purposes, identifying for the States and the public those sites or other releases that appear to warrant remedial actions. The identification of a site for the NPL is intended primarily to guide the U.S. Environmental Protection Agency (EPA) in: determining which sites warrant further investigation to assess the nature and extent of the human health and environmental risks associated with a site; identifying what Comprehensive Environmental Response Compensation and Liability Act (CERCLA)-financed remedial actions may be appropriate; notifying the public of sites EPA believes warrant further investigation; and serving notice to potentially responsible parties that EPA may initiate CERCLA-financed remedial action. Inclusion of a site on the NPL does not in itself reflect a judgment of the activities of its owner or operator, it does not require those persons to undertake any action, nor does it assign liability to any person. Section 105(a)(8)(B) of CERCLA, as amended, requires that the statutory criteria provided by the Hazard Ranking System (HRS) be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. The NPL list is also known as Appendix B of the National Contingency Plan. The Federal Register (FR) Notices for NPL Updates page provides a list of FR Notices for proposed and final NPL Updates. The Superfund cleanup process begins with site discovery or notification to EPA of possible releases of hazardous substances. Sites are discovered by various parties, including citizens, State agencies, and EPA Regional offices. Once discovered, sites are entered into the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), EPA's computerized inventory of potential hazardous substance release sites (view Superfund Site Information). EPA then evaluates the potential for a release of hazardous substances from the site through these steps in the Superfund cleanup process. Superfund was created in 1980 when Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to clean up the nation's uncontrolled hazardous waste sites. Under the Superfund program, abandoned, accidentally spilled, or illegally dumped hazardous wastes that pose a current or future threat to human health or the environment are cleaned up. EPA works closely with communities, potentially responsible parties, scientists, researchers, contractors, and state, local, tribal, and federal authorities on site cleanup. Together with these groups, EPA identifies hazardous waste sites, tests the conditions of the sites, develops cleanup plans, and cleans up the sites.

Database: *RCRA Conditionally Exempt Small Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Conditionally Exempt Small Quantity Generators (CESQG) generate 100 kilograms or less per month of hazardous waste, or 1 kilogram or less per month of acutely hazardous waste. Requirements for CESQG's include (see also 40 CFR 261.5). CESQG's must identify all the hazardous waste generated. CESQG's may not accumulate more than 1,000 kilograms of hazardous waste at any time. CESQG's must ensure that hazardous waste is delivered to a person or facility who is authorized to manage it.

Database: *RCRA Corrective Action Report*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/hazwaste/ca/index.htm*
Date of Database: *2007-07-15T00:00:00*

The Resource Conservation and Recovery Act (RCRA) Corrective Action (CORRACTS) list is a summary of those facilities where corrective action is occurring. The RCRA Corrective Action Program, run by EPA and 41 authorized states and territories, compels responsible parties to address the investigation and cleanup of hazardous releases themselves.

RCRA Corrective Action differs from Superfund in that Corrective Action sites generally have viable operators and on-going operations. RCRA grants EPA and authorized states the authority to regulate hazardous waste management facilities that treat, store, or dispose of hazardous waste. Although EPA guidelines are designed to prevent toxic releases at RCRA facilities, accidents or other activities have sometimes released pollutants into soil, ground water, surface water and air. By the year 2020, EPA and the authorized states plan to have largely completed the work of implementing final remedies at all facilities requiring Corrective Action. (See Goal 3 of the Office of Solid Waste's 2020 Vision for more details.) While working toward the 2020 goal, EPA decided to ensure that sites presenting the greatest risk to human health and the environment are dealt with first. Accordingly, the Corrective Action Program has pledged to select a final remedy at 30% and put a final remedy in place at 20% of 1,968 highest-priority sites by 2008.

Database: *RCRA Large Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Large Quantity Generators (LQG) generate 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste. LQG's may only accumulate waste on site for 90 days, but certain exceptions apply. LQG's do not have a limit on the amount of hazardous waste accumulated on site. There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. LQG's must have detailed, written contingency plans for handling emergencies. LQG's must submit a biennial hazardous waste report.

Database: *RCRA No Designation*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

RCRA sites that are identified as having a RCRA generator identified number but that are not identified as a large quantity generator, small quantity generator, conditionally exempt small quantity generator, treatment storage or disposal (TSD) facility, or RCRA corrective action sites.

Database: *RCRA Non Corracts TSD*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/tsds.htm*
Date of Database: *2007-07-15T00:00:00*

Through the Resource Conservation and Recovery Act (RCRA), Congress directed EPA to create regulations to manage hazardous waste from "the cradle to the grave." Under this mandate, EPA developed strict requirements for all aspects

of hazardous waste management including the treatment, storage, and disposal (TSD) of hazardous waste. TSDS include those facilities that treat, store, and/or dispose hazardous waste. TSDS are the last link in the cradle to the grave waste management system. The requirements for TSDS are found in 40 CFR Parts 264 and 265 and are more extensive than those that apply to hazardous waste generators or transporters.

Database: *RCRA Small Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Small Quantity Generators (SQG) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month. SQG's may accumulate hazardous waste on site for 180 days without a permit (or 270 days if shipping a distance greater than 200 miles). The quantity of hazardous on site waste must never exceed 6,000 kilograms. There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. SQG's are not required to have detailed, written contingency plans.

Database: *Seattle Abandoned Landfills*
Map Class: *Release*
Contact Number:
Web Page: *http://www.spl.org/*
Date of Database: *1984-07-30T00:00:00*

Abandoned landfill study in the City of Seattle by Seattle-King County Dept. of Public Health. Environmental Health Division, 1984.

Database: *Solid Waste Facility Database*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/biblio/0407019.html*
Date of Database: *2007-01-01T00:00:00*

The solid waste facility database contains disposal information for landfills, incinerators, and transfer facilities. The types of facilities included are those that are permitted under chapter 173-350 WAC, Minimum Functional Standards for Solid Waste Handling and chapter 173-351 WAC, Criteria for Municipal Solid Waste Landfills. Information in the solid waste facility database is obtained through annual reporting forms sent to all landfill types (municipal, inert/demolition, limited purpose/special use, and wood waste landfills) and to waste-to-energy/incinerators.

Database: *Toxic Chemical Release Inventory*
Map Class: *Release*

Contact Number:

Web Page: http://www.epa.gov/tri/index.htm

Date of Database: 2007-01-01T00:00:00

The Toxics Release Inventory (TRI) contains information on releases of nearly 650 chemicals and chemical categories from industries including manufacturing, metal and coal mining, electric utilities, and commercial hazardous waste treatment, among others. The Emergency Planning and Community Right-to-Know Act (EPCRA) primary purpose is to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored on-site to state and local governments in order to help communities prepare to respond to chemical spills and similar emergencies. EPCRA Section 313 requires EPA and the States to annually collect data on releases and transfers of certain toxic chemicals from industrial facilities, and make the data available to the public in the Toxics Release Inventory (TRI). In 1990 Congress passed the Pollution Prevention Act which required that additional data on waste management and source reduction activities be reported under TRI. The goal of TRI is to empower citizens, through information, to hold companies and local governments accountable in terms of how toxic chemicals are managed. EPA compiles the TRI data each year and makes it available. The TRI program has expanded significantly since its inception in 1987. The Agency has issued rules to roughly double the number of chemicals included in the TRI to approximately 650. Seven new industry sectors have been added to expand coverage significantly beyond the original covered industries, i.e. manufacturing industries. Most recently, the Agency has reduced the reporting thresholds for certain persistent, bioaccumulative, and toxic (PBT) chemicals in order to be able to provide additional information to the public on these chemicals.

Database: Tribal Leaking Underground Storage Tanks Active

Map Class: Release

Contact Number:

Web Page: http://www.epa.gov/oust/directiv/od961015.htm

Date of Database: 2006-11-01T00:00:00

The list contains information about "active" leaking underground storage tanks (LUST) sites on federally recognized Native American tribal lands. The sites are considered active because they are still subject to future investigation and/or remediation by the U.S. Environmental Protection Agency. The tribes are sovereign entities subject to federal laws. Underground storage tanks located on tribal lands generally are not subject to state laws. As a result, unless a state acts as a tribe's agent pursuant to a formal agreement with a tribe, EPA and the tribe are responsible for implementing and enforcing the UST program on tribal lands.

Database: Tribal Leaking Underground Storage Tanks Inactive

Map Class: Release

Contact Number:

Web Page: http://www.epa.gov/OUST/directiv/d961015a.htm

Date of Database: 2006-11-01T00:00:00

The list contains information about "inactive" leaking underground storage tanks (LUST) sites on federally recognized Native American tribal lands. The sites are considered inactive because they have been investigated and/or remediated and the U.S. Environmental Protection Agency has concurred with the inactive status. The tribes are sovereign entities subject to federal laws. Underground storage tanks located on tribal lands generally are not subject to state laws. As a result, unless a state acts as a tribe's agent pursuant to a formal agreement with a tribe, EPA and the tribe are responsible for implementing and enforcing the UST program on tribal lands.

Government Record Tracking

Database: *Underground Storage Tanks*
Map Class: *Use*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The UST list contains information for UST sites and tanks in Washington. Both operational and closed USTs are on the list. USTs that are excluded from the list include those that have not been registered with the Washington Department of Ecology. Non-registered tanks generally include farm or residential tanks of 1,100 gallons or less capacity storing motor fuel for noncommercial purposes; tanks storing heating oil for use on the premises where stored; Septic tanks; Pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws; Surface impoundments, pits, ponds, or lagoons; Storm water or waste water collection systems; Flow-through process tanks; Liquid traps or associated gathering lines directly related to oil or gas production and gathering operations; Tanks on or above the floor of underground areas, such as basements or tunnels; Tanks with a capacity of 110 gallons or less. The substances covered under the notification requirements apply to USTs.

Database: *Washington Unauthorized Tire Piles*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/biblio/0507043.html*
Date of Database: *2005-11-15T00:00:00*

The Washington Department of Ecology (Ecology) conducted a study of unauthorized tire piles in Washington. The legislature required this study to be completed and submitted by Ecology to the appropriate standing committees of the legislature by November 15, 2005. The report and appendices present a detailed discussion of how this information was collected and assembled. This study identified 54 sites statewide with unauthorized accumulations of scrap tires. Site mapping was completed and the number of scrap tires was estimated. One site (Goldendale-Tire Shredders) accounts for more than two-thirds of the calculated scrap tires and more than half of the total estimated cleanup costs. Of the 54 sites, only five require more than 10 estimated on-site days to complete the individual cleanups.

PARCEL INSIGHT

INCORPORATED

Parcel Insight Radius Map Report

Report ID: 277
Date: 11/13/2007

Enumclaw

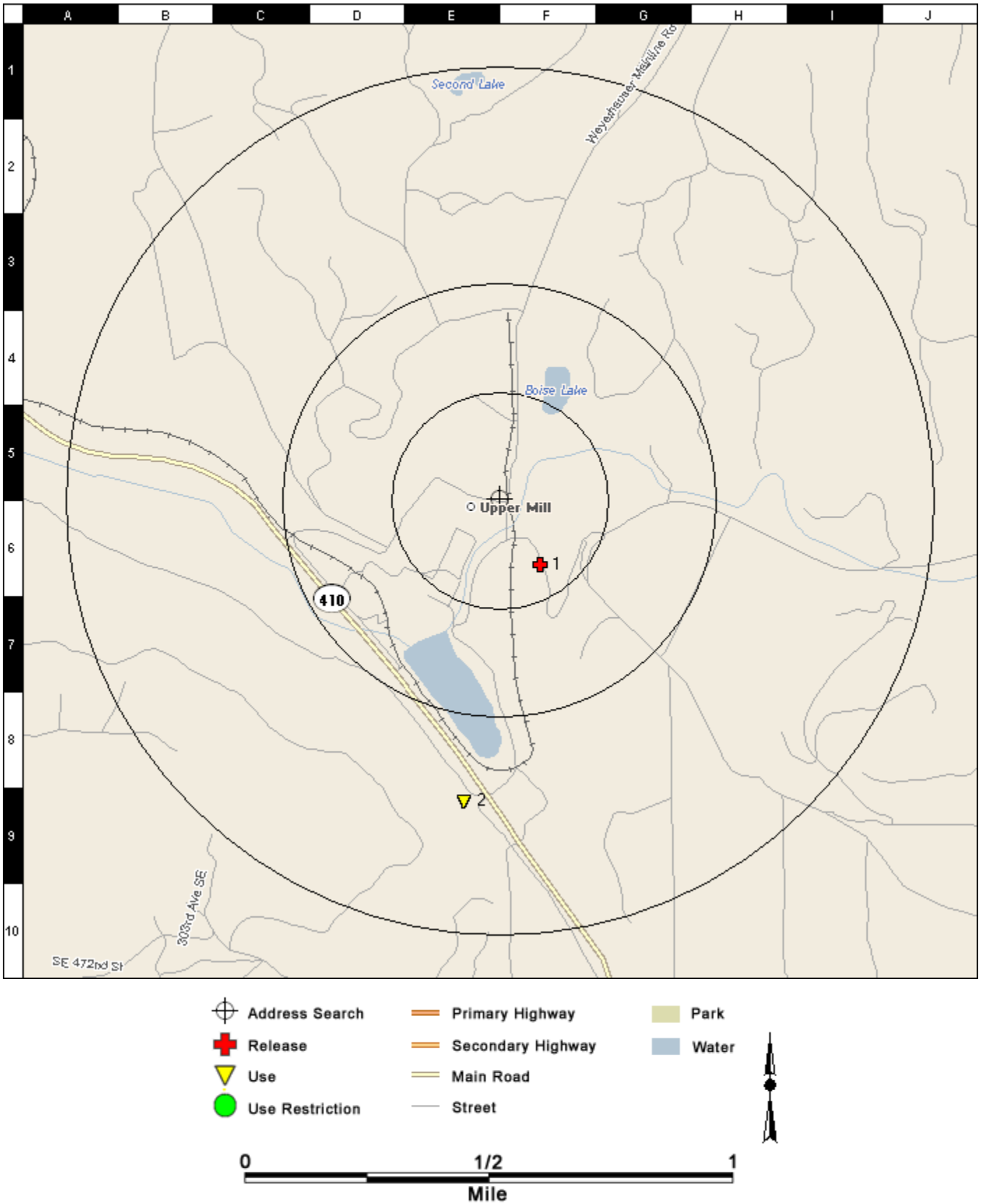
CHINOOK PASS HWY
ENUMCLAW, WA 98022

TABLE OF CONTENTS

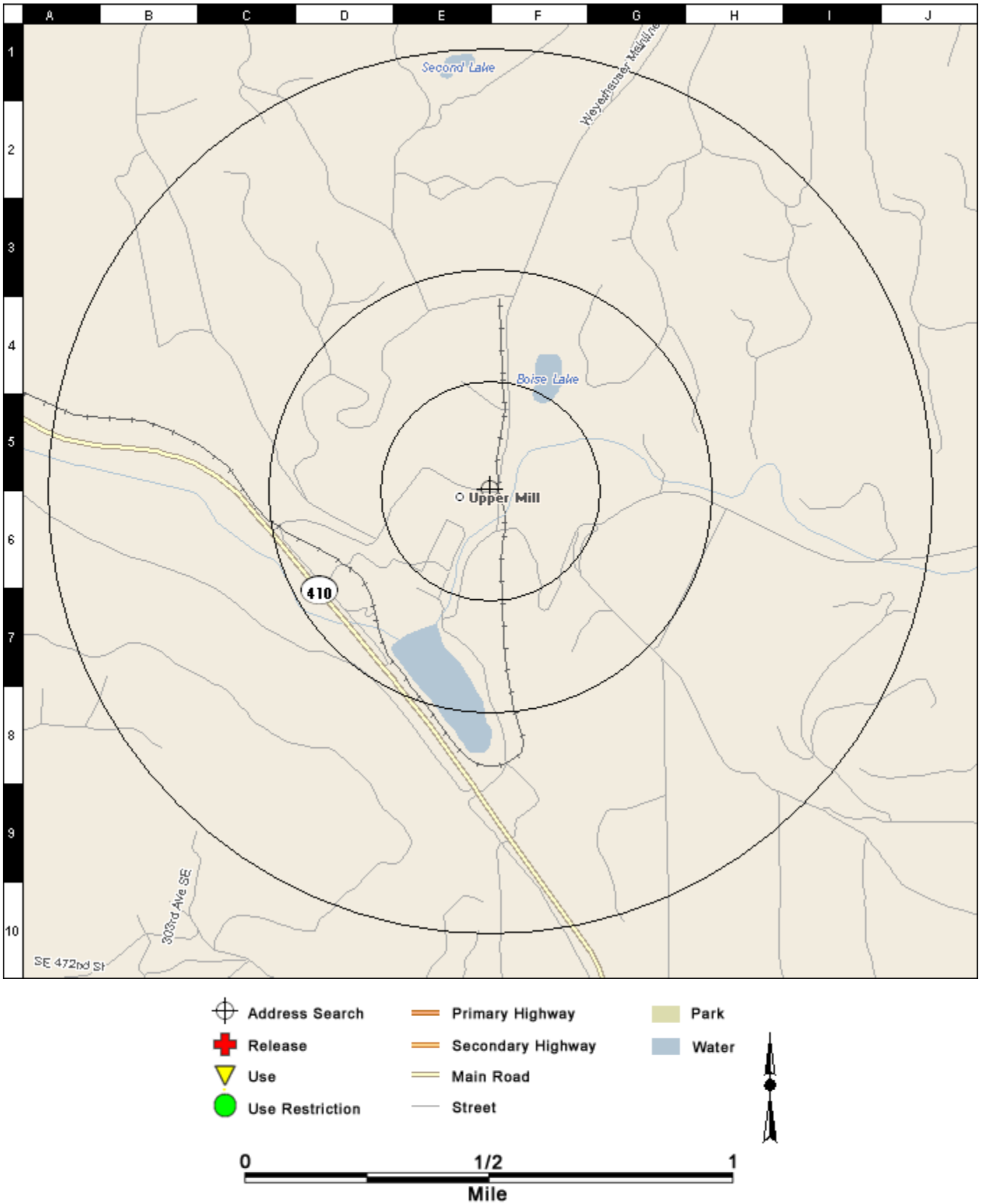
1/4 Mile Detail Map	*1*
Overview Map	*2*
Non-Exact Match Map	*3*
Tabular Summary of Findings	*4*
Exact Match Summary	*5*
Exact Match Details	*6*
Disclaimer	*9*
Government Record Tracking	*10*

1/4 Mile Detail Map

Overview Map



Non-Exact Match Map



Tabular Summary of Findings

RELEASE	+	*A site listed in a database that documents a release of hazardous material(s).*
USE	∇	*A site listed in a database that documents the use of hazardous material(s), but not a release of hazardous material(s).*
USE RESTRICTION	O	*A site listed in a database that documents a restriction on the use of the site related to a release of a hazardous material(s) or a formal oversight decision from a government agency.*

Map Class		Subject Property	Distance					Total by Map Class
			0.00 to 0.25 M	0.25 to 0.50 M	0.50 to 0.75 M	0.75 to 1.00 M	1.00+ M	
RELEASE	+		1					1
USE	∇				1			1
USE RESTRICTION	O							

Database		Search Radius	Subject Property	Distance					Total by Database Type
				0.00 to 0.25 M	0.25 to 0.50 M	0.50 to 0.75 M	0.75 to 1.00 M	1.00+ M	
NPL	+	1.00 M							
RCRA CORRACTS	+	1.00 M							
RCRA TSD	∇	1.00 M							
CERCLIS	+	1.00 M							
CERCLIS NFRAP	+	1.00 M							
ERNS	+	1.00 M							
RCRA LQG	∇	1.00 M							
RCRA SQG	∇	1.00 M		1					1
RCRA CESQG	∇	1.00 M							
LUST ACTIVE TRIBAL	+	1.00 M							
LUST INACTIVE TRIBAL	+	1.00 M							
BROWNFIELDS	O	1.00 M							
INST ENG CONTROLS	O	1.00 M							
HMIRS	+	1.00 M							
TRIS	+	1.00 M							
CSCSL	+	1.00 M		1					1
CSCSL HSL	+	1.00 M							
CSCSL NFA	+	1.00 M							
SWLF STATE	+	1.00 M							
LUST	+	1.00 M							
UST	∇	1.00 M		1		1			2
SWLF SEA	+	1.00 M							
SWLF KING	+	1.00 M							
SWLF STATE	+	1.00 M							
DECISIONS	O	1.00 M							
INST ENG CONTROLS	O	1.00 M							
RCRA ND	∇	1.00 M							
Totals by Distance			0	0	0	0	0	0	0

Exact Match Summary

				MAP CLASS		
				+	▽	○
MAP ID GRID	SITE NAME ADDRESS	PI ID # DISTANCE DIRECTION	DATABASES	RELEASE	USE	USE RESTRICTION
1 F6	WEYERHAEUSER ENUMCLAW MILLPOND 31002 CHINOOK PASS HWY, ENUMCLAW	53001088 0.17177 SE	RCRA SQG CSCSL UST	X	X	
2 E9	WA PARKS FEDERATION FOREST STATE PARK 49201 ENUMCLAW-CHINOOK PASS RD, ENUMCLAW	53021023 0.69211 S	UST		X	

Exact Match Details

Map ID 1 0.172 M SE	GRID F6	PI ID # 53001088	LAT: 47.19165	LON: -121.92239	RELEASE +
	Site Name	WEYERHAEUSER ENUMCLAW MILLPOND	Databases: RCRA SQG CSCSL UST		
	Address	31002 CHINOOK PASS HWY ENUMCLAW, WA 98022			

RCRA SQG **RCRA Small Quantity Generator**

Site: WEYERHAEUSER ENUMCLAW MILLPOND 31002 CHINOOK PASS HWY ENUMCLAW, WA 98022
HANDLER ID: WAD009270885
NAICS DESC: Sawmills and Wood Preservation
CONTACT NAME: NA NA
TSD ACTIVITY: N

Report Submission History

Category	Report Date
LQG	
SQG	12/31/2003, 02/26/2003, 03/03/2004
CESQG	03/05/1996, 03/04/1997, 03/10/1998, 03/01/1999, 03/13/2000, 03/01/2001, 01/17/2002, 05/13/2005
RCRA ND	01/01/1995, 12/31/1990, 12/31/2005, 02/28/2006

Last Report Details:

Site Name: WEYERHAEUSER ENUMCLAW MILLPOND
Seq Number: 12
Received Date: 02/28/2006
Transfer Facility:
Federal Waste Generator: N
State Waste Generator: N

CSCSL **Confirmed and Suspected Contaminated Sites List**

Site: Weyerhaeuser Enumclaw Millpond 31002 CHINOOK PASS HWY ENUMCLAW, WA 98022
Facility Site Id: 2259
County Name: KING
Responsible Unit: NW
Ecology Status Code: Idependent Remedial Action
Program Plan Code: VCP Site
Independent Status Code: Final Independent RA Report received

Affected Id: 3000 (Surface Water / Confirmed)

Confirmed Contaminates	Suspected Contaminates
EPA Priority Pollutants - Metals and Cyanide Metals - Other	

Affected Id: 2999 (Sediment / Confirmed)

Confirmed Contaminates	Suspected Contaminates
EPA Priority Pollutants - Metals and Cyanide Metals - Other Polychlorinated biPhenyles (PCBs) Petroleum Products Phenolic Compounds Polynuclear Aromatic Hydrocarbons (PAH)	Non-Halogenated Solvents

Affected Id: 2998 (Soil / Confirmed)

Confirmed Contaminates	Suspected Contaminates
EPA Priority Pollutants - Metals and Cyanide	Non-Halogenated Solvents

Exact Match Details

Map ID 1 0.172 M SE	GRID F6	PI ID # 53001088	LAT: 47.19165	LON: -121.92239	RELEASE +
	Site Name	WEYERHAEUSER ENUMCLAW MILLPOND	Databases: RCRA SQG CSCSL UST		
	Address	31002 CHINOOK PASS HWY ENUMCLAW, WA 98022			

Polychlorinated biPhenyles (PCBs) Petroleum Products Phenolic Compounds Polynuclear Aromatic Hydrocarbons (PAH)	

Affected Id: 2997 (Groundwater / Confirmed)

Confirmed Contaminates	Suspected Contaminates
EPA Priority Pollutants - Metals and Cyanide Polychlorinated biPhenyles (PCBs) Petroleum Products Phenolic Compounds Polynuclear Aromatic Hydrocarbons (PAH)	Non-Halogenated Solvents

UST *Underground Storage Tanks*

Site: WEYERHAEUSER COMPANY 31002 CHINOOK PASS HWY ENUMCLAW, WA 98022
Facility Site Id: 2259
County: King
Unit: NW

Tank ID	Tank Name	Status	Inst. Date	Capacity	Cmpt./ID	Substance
36212	107	Removed	12/31/1964		1/36727	Unleaded Gasoline
36258	109	Removed	12/31/1964		1/36775	Leaded Gasoline
36335	108	Removed	12/31/1964		1/36852	
12284	1	Temporarily Closed	04/12/1993	10,000 to 19,999 Gallons	1/12474	Diesel
12190	2	Temporarily Closed	04/12/1993	10,000 to 19,999 Gallons	1/12379	Diesel
12399	3	Temporarily Closed	04/12/1993	2,001 to 4,999 Gallons	1/12591	Unleaded Gasoline
12102	4	Temporarily Closed	07/08/1993		1/12291	Used Oil/Waste Oil

Map ID 2 0.692 M S	GRID E9	PI ID # 53021023	LAT: 47.18378	LON: -121.92606	USE ∇
	Site Name	WA PARKS FEDERATION FOREST STATE PARK	Databases: UST		
	Address	49201 ENUMCLAW-CHINOOK PASS RD ENUMCLAW, WA 980228015			

UST *Underground Storage Tanks*

Site: FEDERATION FOREST STATE PARK 49201 ENUMCLAW-CHINOOK PASS RD ENUMCLAW, WA 98022
Facility Site Id: 65697134
County: King
Unit: NW

Exact Match Details

Map ID 2 0.692 M S	GRID E9	PI ID # 53021023	LAT: 47.18378	LON: -121.92606	USE
	Site Name	WA PARKS FEDERATION FOREST STATE PARK		Databases: UST	
	Address	49201 ENUMCLAW-CHINOOK PASS RD ENUMCLAW, WA 980228015			

Tank ID	Tank Name	Status	Inst. Date	Capacity	Cmpt./ID	Substance
11958	1	Removed	01/01/1975	111 TO 1,100 Gallons	1/12147	Unleaded Gasoline

Disclaimer

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Database: *Brownfields Grant Sites*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.epa.gov/brownfields/index.html*
Date of Database: *2007-04-15T00:00:00*

The Brownfields Management System (BMS) is the official U.S. Environmental Protection Agency (EPA0 database of the Brownfields Program. It is designed to assist EPA in collecting, tracking, and updating information, as well as reporting on the major activities and accomplishments of the various Brownfields grant programs. BMS captures data on grantee activities (assessment, cleanup and redevelopment), funding, job training, and details on cooperative partners and leveraging efforts - a central objective of the Brownfields Program.

Database: *CERCLIS No Further Remedial Action Planned*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/sites/cursites/index.htm*
Date of Database: *2006-12-15T00:00:00*

The No Further Remedial Action Planned (NFRAP) or "Archived" designation means that, to the best of the EPA's knowledge, Superfund has completed its assessment at a site, and has determined no further steps to list this site on the NPL will be taken unless information indicating this decision was not appropriate or other considerations make a recommendation for listing appropriate at a later time. The U.S. Environmental Protection Agency (EPA) may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available and in these cases, the Archive designation is removed and the site is returned to the CERCLIS inventory if more sustentative assessment and/or any cleanup work is necessary under the Federal Superfund program. An archive decision does not necessarily mean that there is no hazard associated with a given site; it means only that based upon available information, the location is not judged to be a potential NPL site. Sites are archived as historical records so EPA does not needlessly repeat the investigations in the future. The States will coordinate with EPA to determine if any sites should be returned to CERCLIS because of newly identified contamination problems at the site. It is important to note the sites on CERCLIS and the archived list will change as the sites are being investigated or if new information becomes available.

Database: *Comprehensive Environmental Response, Compensation, and Liability Information System*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/sites/siteinfo.htm*
Date of Database: *2007-03-15T00:00:00*

The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list contains information on hazardous waste sites, potentially hazardous waste sites and remedial activities. CERCLIS is a database used by the U.S. Environmental Protection Agency (EPA) to track activities conducted under its Superfund program. Specific information is tracked for each individual site. The database includes sites that are on the National Priorities List (NPL) or being considered for the NPL. The CERCLIS Database displays site information for NPL sites (i.e., sites proposed to the NPL, currently on the final NPL or deleted from the final NPL. NPL Sites are listed separately on the

NPL data set. Once a site is added to CERCLIS, the next step in evaluating the potential problem is the completion of a preliminary assessment (PA). The purpose of the PA is to determine whether the site warrants further Superfund investigation. The PA is typically an information gathering phase for which sampling does not take place. A PA is usually completed within one year of a site being listed in CERCLIS. Based on the conclusions of the PA, a site could be recommended for a) no further action under the EPA Superfund program; b) a sampling site investigation to collect data for further evaluation and possible nomination to the NPL; or c) an emergency or time-critical removal (short-term cleanup). Active CERCLIS sites are sites at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted under the Superfund program. CERCLIS excludes sites which EPA has assessed and designated "No Further Remedial Action Planned", or archive, sites. EPA is aware that the CERCLIS inventory is often used as a resource in assessing property. People conducting such assessments should not misinterpret the meaning of a site being contained in CERCLIS. Such sites are not necessarily contaminated, and sites not in CERCLIS are not necessarily contaminant-free.

Database: *Confirmed and Suspected Contaminated Sites List No Further Action*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*

Date of Database: *2007-01-01T00:00:00*

No Further Action Site List This data set contains information about sites previously on the Confirmed and Suspected Contaminated Sites list (above) that have received a No Further Action (NFA) determination. Because it is necessary to maintain historical records of sites that have been investigated and cleaned up, sites are not deleted from the database when cleanup activities are completed. Instead, a No Further Action code is entered based upon the type of NFA determination the site received. The NFA code lists the basis for the NFA determination.

Database: *Confirmed and Suspected Contaminated Sites List*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*

Date of Database: *2007-07-15T00:00:00*

The data set contains information about sites that are undergoing cleanup and sites that are awaiting further investigation and/or cleanup by the Department of Ecology Toxics Cleanup Program. Sites on the Hazardous Sites List (i.e., those that have been ranked using the Washington Ranking Model) are included in this data set. Within 90 days of learning of a potentially contaminated site, the Department of Ecology conducts an initial investigation of each site. If the initial investigation shows that further action is needed, the site will appear in the Confirmed & Suspected Contaminated Sites (CSCS) Report. Once remedial action has been completed, the Toxics Cleanup Program's management determines the removal of a site from the CSCS Report. The Hazardous Sites List is a subset of the CSCS Report. It contains those sites that have been ranked using the Washington Ranking Method. Site owners and operators do not necessarily agree with Ecology's determination of site status.

Database: *Confirmed and Suspected Contaminated Sites List Hazardous Site List*

Map Class: *Release*

Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The Hazardous Sites List (HSL) is required by law 173-340-330 WAC. It includes all sites which have been assessed and ranked using the Washington Ranking Method (WARM). Also listed are National Priorities List (NPL) sites. The categories of evaluation are linear and include several steps. The Initial Investigation (II) is a brief investigation conducted within 90 days of receiving a site discovery report. The II step provides enough information to determine if the site needs further investigation, emergency cleanup, or no further action. If further action is required, early notice letters are sent to site owners, operators, etc. inviting them to work cooperatively with us to resolve any contamination problems, AND the site proceeds to the next step. The Site Hazard Assessment (SHA) is an assessment to confirm the presence of hazardous substances and to determine the relative risk the site poses to human health and the environment. (Note: Some SHAs are conducted by Ecology staff while others are conducted by local health districts / departments.) The Hazard Ranking (WARM Score) includes the results of the Site Hazard Assessment step that are used in the Washington Ranking Method (WARM) to yield a WARM score. The WARM score is a number between 1 and 5, where a score of 1 represents the highest level of risk and 5 indicates the lowest assessed risk. A zero indicates that the site is either on the federal National Priorities List (NPL) or is a sub-site or operable unit of an NPL site. NPL sites are ranked under the federal Hazard Ranking System (HRS). This WARM score is not removed at the time of a No Further Action determination as it is kept for historical purposes.

Database: *Ecology Digest 26 (Catalog of Formal Oversight Decision Documents, Orders and Decrees)*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/DIGEST%2026.pdf*
Date of Database:

The Toxics Cleanup Program maintains a list of all formal oversight decision documents under the Model Toxics Control Act that have been agreed to and signed by the Program's manager or designee. These decision documents include all Consent Decrees, Prospective Purchaser Consent Decrees, Agreed Orders, and Enforcement Orders under the Model Toxics Control Act.

Database: *Emergency Response Notification System*
Map Class: *Release*
Contact Number:
Web Page: *http://www.nrc.uscg.mil/wdbcgi/wdbcgi.exe/WWWUSER/WEBDB.foia_query.show_parms*
Date of Database: *2007-01-15T00:00:00*

The Emergency Response Notification System (ERNS) is a national computer data base used to store information on releases of oil and hazardous substances. ERNS supports the Emergency Response and the Title III program. The ERNS program is a cooperative effort among EPA Headquarters, the Department of Transportation (DOT), National Transportation Systems Center (NTSC), the ten EPA Regions, the U.S. Coast Guard (USCG), and the National Response Center (NRC). ERNS provides the most comprehensive data compiled on release notifications of oil and hazardous substances in the United States. When a release report is submitted to Federal authorities (e.g., NRC or Regional offices), the individual reporting is asked a series of questions regarding the release (e.g., type, location, volume). Information concerning all releases originally reported to the NRC or EPA Regional offices is entered into local

computers and transmitted electronically from the NRC or EPA Regional office to the NTSC, where it becomes part of the ERNS national data base. The procedures for maintaining the initial reports differs between the NRC and the EPA Regions. The NRC maintains electronic copies of all spill reports as they were initially received and does not make any changes to spill reports once they have been entered into the system. Reports received by the NRC contain information that may be valuable to the on-scene coordinators, as well as to enforcement personnel. The information received by the NRC is sent to the Regional offices through the Volpe National Transportation Systems Center (VNTSC). Since these reports may be used in enforcement actions, it is necessary to maintain a copy of the spill report as it was originally reported. Each EPA Region maintains its own Region-specific data base, which is a subset of the national data base. Initial spill reports made directly to an EPA Region are maintained as hard copies and kept in the individual Regional office. When additional information on a release notification is obtained, it is also entered at the Regional level and electronically transmitted to the national system. An initial and modified copy of each report is maintained at VNTSC to preserve data integrity.

Database: *Hazardous Materials Information Reporting System*
Map Class: *Release*
Contact Number:
Web Page: *http://hazmat.dot.gov/pubs/inc/hmisframe.htm*
Date of Database: *2007-01-01T00:00:00*

The Hazardous Materials Incident Reporting System (HMIRS) contains data on spills, releases, or other incidents involving hazardous materials during the course of transportation. All modes of transportation are included except pipeline and bulk marine transportation. The data set contains the Incident Report Form 5800.1 data submitted under the requirements of Title 49 CFR 171.15 and 171.16. HMIRS of the Pipeline and Hazardous Materials Safety Administration (PHMSA) was established in 1971 to fulfill the requirements of the federal hazardous materials transportation law. Part 171 of Title 49, Code of Federal Regulations (49 CFR) contains the incident reporting requirements of carriers of hazardous materials. An unintentional release of hazardous materials meeting the criteria set forth in Section 171.16, 49 CFR must be reported on U.S. Department of Transportation (DOT) Form 5800.1, and data from the reports received are subsequently entered in the HMIRS database. All spills meeting the following criteria to be reported to PHMSA: 1) As a direct result of hazardous materials a person is killed or receives injuries requiring hospitalization, estimated property damage exceeds $50,000, an evacuation of the general public lasts for one or more hours, a major transportation artery or facility is closed for one or more hours, or the operational flight pattern or routing of an aircraft is altered, 2) Fire, breakage, spillage, or suspected contamination occurs involving shipment of radioactive materials or infectious substances, 3) There has been a release of a marine pollutant exceeding 450 L or 400 kg, or 4) Any hazardous material is unintentionally released from a package or any quantity of hazardous waste is discharged during transportation.

Database: *Institutional and Engineering Controls*
Map Class: *Use Restriction*
Contact Number:
Web Page: *http://www.epa.gov/superfund/index.htm*
Date of Database: *2007-03-15T00:00:00*

This data set identifies RCRA and NPL sites with institutional and/or engineering controls in place.

Database: *Institutional and Engineering Controls*
Map Class: *Use Restriction*
Contact Number:

Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

This data set is a subset of CSCSL and identifies sites where a remedial action was conducted, residual contamination was left on site and on-going institutional controls required.

Database: *King County Abandoned Landfills*
Map Class: *Release*
Contact Number:
Web Page: *http://www.spl.org/*
Date of Database:

Abandoned landfill study in King County by Seattle-King County Dept. of Public Health. Environmental Health Division, 1985.

Database: *Leaking Underground Storage Tanks*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The LUST data file contains information on UST Cleanup sites and cleanup history. Sites that have been cleaned up and sites currently being cleaned up are included in the data set. Sites are categorized based on the activities taken. Awaiting Cleanup means the site has been discovered or reported release, yet no active cleanup measures taken or Site check (identified the source) begun or completed, yet no active cleanup measures taken or site characterization begun or completed, yet no active cleanup measures taken. Cleanup Started means responsible party has initiated physical, biological, or chemical management of release, e.g. soil excavated, groundwater pumped, vapors extracted, free product removed, oxygen added, etc., site investigations and emergency responses (e.g. venting explosive vapors, providing bottled water) do not qualify as activities under cleanup started. Monitoring means groundwater monitoring is the only activity occurring at the site or site has been characterized, only low levels of soil and/or groundwater contamination remain, and natural attenuation is the chosen cleanup method or conformational monitoring following active cleanup measures. Reported Cleaned Up means owner or consultant reports that contamination has been cleaned up and/or some soil contamination may remain under existing structures or in otherwise inaccessible areas if groundwater is not threatened and there has been no migration of contamination into the structure and cleanup report has not been formally reviewed by Ecology. A formal review could determine that the site has not been cleaned up to MTCA standards. No Further Action means the cleanup report has been formally reviewed by Ecology under the fee-based Voluntary Cleanup Program and resulted in a No Further Action status and Institutional controls may have been required due to soil contamination that may remain under existing structures or in otherwise inaccessible areas.

Database: *National Priority List*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/superfund/index.htm*
Date of Database: *2007-04-23T00:00:00*

The National Priorities List (NPL) is an information and management tool that is a part of the Superfund cleanup process. The NPL serves primarily informational purposes, identifying for the States and the public those sites or other releases that appear to warrant remedial actions. The identification of a site for the NPL is intended primarily to guide the U.S. Environmental Protection Agency (EPA) in: determining which sites warrant further investigation to assess the nature and extent of the human health and environmental risks associated with a site; identifying what Comprehensive Environmental Response Compensation and Liability Act (CERCLA)-financed remedial actions may be appropriate; notifying the public of sites EPA believes warrant further investigation; and serving notice to potentially responsible parties that EPA may initiate CERCLA-financed remedial action. Inclusion of a site on the NPL does not in itself reflect a judgment of the activities of its owner or operator, it does not require those persons to undertake any action, nor does it assign liability to any person. Section 105(a)(8)(B) of CERCLA, as amended, requires that the statutory criteria provided by the Hazard Ranking System (HRS) be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. The NPL list is also known as Appendix B of the National Contingency Plan. The Federal Register (FR) Notices for NPL Updates page provides a list of FR Notices for proposed and final NPL Updates. The Superfund cleanup process begins with site discovery or notification to EPA of possible releases of hazardous substances. Sites are discovered by various parties, including citizens, State agencies, and EPA Regional offices. Once discovered, sites are entered into the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), EPA's computerized inventory of potential hazardous substance release sites (view Superfund Site Information). EPA then evaluates the potential for a release of hazardous substances from the site through these steps in the Superfund cleanup process. Superfund was created in 1980 when Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to clean up the nation's uncontrolled hazardous waste sites. Under the Superfund program, abandoned, accidentally spilled, or illegally dumped hazardous wastes that pose a current or future threat to human health or the environment are cleaned up. EPA works closely with communities, potentially responsible parties, scientists, researchers, contractors, and state, local, tribal, and federal authorities on site cleanup. Together with these groups, EPA identifies hazardous waste sites, tests the conditions of the sites, develops cleanup plans, and cleans up the sites.

Database: *RCRA Conditionally Exempt Small Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Conditionally Exempt Small Quantity Generators (CESQG) generate 100 kilograms or less per month of hazardous waste, or 1 kilogram or less per month of acutely hazardous waste. Requirements for CESQG's include (see also 40 CFR 261.5). CESQG's must identify all the hazardous waste generated. CESQG's may not accumulate more than 1,000 kilograms of hazardous waste at any time. CESQG's must ensure that hazardous waste is delivered to a person or facility who is authorized to manage it.

Database: *RCRA Corrective Action Report*
Map Class: *Release*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/hazwaste/ca/index.htm*
Date of Database: *2007-07-15T00:00:00*

The Resource Conservation and Recovery Act (RCRA) Corrective Action (CORRACTS) list is a summary of those facilities where corrective action is occurring. The RCRA Corrective Action Program, run by EPA and 41 authorized states and territories, compels responsible parties to address the investigation and cleanup of hazardous releases themselves.

RCRA Corrective Action differs from Superfund in that Corrective Action sites generally have viable operators and on-going operations. RCRA grants EPA and authorized states the authority to regulate hazardous waste management facilities that treat, store, or dispose of hazardous waste. Although EPA guidelines are designed to prevent toxic releases at RCRA facilities, accidents or other activities have sometimes released pollutants into soil, ground water, surface water and air. By the year 2020, EPA and the authorized states plan to have largely completed the work of implementing final remedies at all facilities requiring Corrective Action. (See Goal 3 of the Office of Solid Waste's 2020 Vision for more details.) While working toward the 2020 goal, EPA decided to ensure that sites presenting the greatest risk to human health and the environment are dealt with first. Accordingly, the Corrective Action Program has pledged to select a final remedy at 30% and put a final remedy in place at 20% of 1,968 highest-priority sites by 2008.

Database: *RCRA Large Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Large Quantity Generators (LQG) generate 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste. LQG's may only accumulate waste on site for 90 days, but certain exceptions apply. LQG's do not have a limit on the amount of hazardous waste accumulated on site. There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. LQG's must have detailed, written contingency plans for handling emergencies. LQG's must submit a biennial hazardous waste report.

Database: *RCRA No Designation*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

RCRA sites that are identified as having a RCRA generator identified number but that are not identified as a large quantity generator, small quantity generator, conditionally exempt small quantity generator, treatment storage or disposal (TSD) facility, or RCRA corrective action sites.

Database: *RCRA Non Corracts TSD*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/tsds.htm*
Date of Database: *2007-07-15T00:00:00*

Through the Resource Conservation and Recovery Act (RCRA), Congress directed EPA to create regulations to manage hazardous waste from "the cradle to the grave." Under this mandate, EPA developed strict requirements for all aspects

of hazardous waste management including the treatment, storage, and disposal (TSD) of hazardous waste. TSDS include those facilities that treat, store, and/or dispose hazardous waste. TSDS are the last link in the cradle to the grave waste management system. The requirements for TSDS are found in 40 CFR Parts 264 and 265 and are more extensive than those that apply to hazardous waste generators or transporters.

Database: *RCRA Small Quantity Generator*
Map Class: *Use*
Contact Number:
Web Page: *http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm#pagecontents*
Date of Database: *2007-07-15T00:00:00*

Small Quantity Generators (SQG) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month. SQG's may accumulate hazardous waste on site for 180 days without a permit (or 270 days if shipping a distance greater than 200 miles). The quantity of hazardous on site waste must never exceed 6,000 kilograms. There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. SQG's are not required to have detailed, written contingency plans.

Database: *Seattle Abandoned Landfills*
Map Class: *Release*
Contact Number:
Web Page: *http://www.spl.org/*
Date of Database: *1984-07-30T00:00:00*

Abandoned landfill study in the City of Seattle by Seattle-King County Dept. of Public Health. Environmental Health Division, 1984.

Database: *Solid Waste Facility Database*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/biblio/0407019.html*
Date of Database: *2007-01-01T00:00:00*

The solid waste facility database contains disposal information for landfills, incinerators, and transfer facilities. The types of facilities included are those that are permitted under chapter 173-350 WAC, Minimum Functional Standards for Solid Waste Handling and chapter 173-351 WAC, Criteria for Municipal Solid Waste Landfills. Information in the solid waste facility database is obtained through annual reporting forms sent to all landfill types (municipal, inert/demolition, limited purpose/special use, and wood waste landfills) and to waste-to-energy/incinerators.

Database: *Toxic Chemical Release Inventory*
Map Class: *Release*

Contact Number:

Web Page: http://www.epa.gov/tri/index.htm

Date of Database: 2007-01-01T00:00:00

The Toxics Release Inventory (TRI) contains information on releases of nearly 650 chemicals and chemical categories from industries including manufacturing, metal and coal mining, electric utilities, and commercial hazardous waste treatment, among others. The Emergency Planning and Community Right-to-Know Act (EPCRA) primary purpose is to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored on-site to state and local governments in order to help communities prepare to respond to chemical spills and similar emergencies. EPCRA Section 313 requires EPA and the States to annually collect data on releases and transfers of certain toxic chemicals from industrial facilities, and make the data available to the public in the Toxics Release Inventory (TRI). In 1990 Congress passed the Pollution Prevention Act which required that additional data on waste management and source reduction activities be reported under TRI. The goal of TRI is to empower citizens, through information, to hold companies and local governments accountable in terms of how toxic chemicals are managed. EPA compiles the TRI data each year and makes it available. The TRI program has expanded significantly since its inception in 1987. The Agency has issued rules to roughly double the number of chemicals included in the TRI to approximately 650. Seven new industry sectors have been added to expand coverage significantly beyond the original covered industries, i.e. manufacturing industries. Most recently, the Agency has reduced the reporting thresholds for certain persistent, bioaccumulative, and toxic (PBT) chemicals in order to be able to provide additional information to the public on these chemicals.

Database: Tribal Leaking Underground Storage Tanks Active

Map Class: Release

Contact Number:

Web Page: http://www.epa.gov/oust/directiv/od961015.htm

Date of Database: 2006-11-01T00:00:00

The list contains information about "active" leaking underground storage tanks (LUST) sites on federally recognized Native American tribal lands. The sites are considered active because they are still subject to future investigation and/or remediation by the U.S. Environmental Protection Agency. The tribes are sovereign entities subject to federal laws. Underground storage tanks located on tribal lands generally are not subject to state laws. As a result, unless a state acts as a tribe's agent pursuant to a formal agreement with a tribe, EPA and the tribe are responsible for implementing and enforcing the UST program on tribal lands.

Database: Tribal Leaking Underground Storage Tanks Inactive

Map Class: Release

Contact Number:

Web Page: http://www.epa.gov/OUST/directiv/d961015a.htm

Date of Database: 2006-11-01T00:00:00

The list contains information about "inactive" leaking underground storage tanks (LUST) sites on federally recognized Native American tribal lands. The sites are considered inactive because they have been investigated and/or remediated and the U.S. Environmental Protection Agency has concurred with the inactive status. The tribes are sovereign entities subject to federal laws. Underground storage tanks located on tribal lands generally are not subject to state laws. As a result, unless a state acts as a tribe's agent pursuant to a formal agreement with a tribe, EPA and the tribe are responsible for implementing and enforcing the UST program on tribal lands.

Government Record Tracking

Database: *Underground Storage Tanks*
Map Class: *Use*
Contact Number:
Web Page: *http://www.ecy.wa.gov/programs/tcp/sites/SiteLists.htm*
Date of Database: *2007-07-15T00:00:00*

The UST list contains information for UST sites and tanks in Washington. Both operational and closed USTs are on the list. USTs that are excluded from the list include those that have not been registered with the Washington Department of Ecology. Non-registered tanks generally include farm or residential tanks of 1,100 gallons or less capacity storing motor fuel for noncommercial purposes; tanks storing heating oil for use on the premises where stored; Septic tanks; Pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws; Surface impoundments, pits, ponds, or lagoons; Storm water or waste water collection systems; Flow-through process tanks; Liquid traps or associated gathering lines directly related to oil or gas production and gathering operations; Tanks on or above the floor of underground areas, such as basements or tunnels; Tanks with a capacity of 110 gallons or less. The substances covered under the notification requirements apply to USTs.

Database: *Washington Unauthorized Tire Piles*
Map Class: *Release*
Contact Number:
Web Page: *http://www.ecy.wa.gov/biblio/0507043.html*
Date of Database: *2005-11-15T00:00:00*

The Washington Department of Ecology (Ecology) conducted a study of unauthorized tire piles in Washington. The legislature required this study to be completed and submitted by Ecology to the appropriate standing committees of the legislature by November 15, 2005. The report and appendices present a detailed discussion of how this information was collected and assembled. This study identified 54 sites statewide with unauthorized accumulations of scrap tires. Site mapping was completed and the number of scrap tires was estimated. One site (Goldendale-Tire Shredders) accounts for more than two-thirds of the calculated scrap tires and more than half of the total estimated cleanup costs. Of the 54 sites, only five require more than 10 estimated on-site days to complete the individual cleanups.

Overall Rank & Reference No.	Site/Land Use	Address	Capture Zone	Cat. I Rank	Cat. II Rank	Cat. III Rank
1	Residential Land	--	1	1	4	1
2	Bio-soild application	--	1	1	4	2
3	Dairy	--	1	1	4	3
4	HWY 410	--	1	1	7	1
5	Logging	--	1	1	7	2
6	Borrow Pits	--	1	1	7	3
7	Golfcourse	45220 288th Ave SE	1	1	8	1
8	Agricultural Land	--	1	1	8	2
9	Landfill	SE 440th St	2	2	1	
10	Weyerhaeuser Site	31002 Highway 410	5	5	1	
11	Corliss Resources Gravel Mine	29416 Highway 410	5	5	7	1

CITY OF ENUMCLAW
SPILL RESPONSE PLAN
MARCH 2009

Introduction

The purpose of this section is to outline and evaluate spill response procedures and capabilities for jurisdictions within the City of Enumclaw's Wellhead Protection Areas as defined in the City of Enumclaw Wellhead Protection Plan, March 2009. To conduct this evaluation, we reviewed the City's Emergency Response Plan as presented in the 2007 update to the City's Water Comprehensive Plan.

The Emergency Response Plan includes detailed contact information for the City Water Department and the Department of Public Works, as well as other response agencies. The primary function of the Emergency Response Plan is to maintain or restore water service in the event of an interruption. The Spill Response Plan, presented here, provides additional guidance for the proper handling of spills of hazardous materials within the City's Wellhead Protection Areas.

Spill events vary in size and severity. Events may occur under conditions where the spill is easily contained or where cleanup time is plentiful, or they can occur where surface water, waterways, or ground water are under immediate threat. This range of possibilities has prompted a spill response (and emergency response) system which is nationwide in scope and can involve federal agencies, yet is designed to handle the more common, small-scale (yet potentially dangerous) spills. This assessment takes into account this range of possible spills and responses.

The ability of the City of Enumclaw (City) to affect the protocols and procedures of the national and state response systems is limited. However, the majority of spills that take place are small. Small spills generally require a well-coordinated local response with responders that are aware of local concerns. Therefore, for the purposes of this effort, focus is given to local response capabilities and to the needs associated with these local response systems.

Spill Response in the Wellhead Protection Areas

Given the City's reliance on ground water from wells and springs as their source of water supply, hazardous spills could potentially affect the groundwater supply. Should a spill occur within the City's defined WHPAs, a 911 call should be made immediately. The 911 operator will question the caller concerning the location and nature of the spill and dispatch the appropriate units per defined Response Plans. Use of the 911 system will ensure that spill response calls will be appropriately responded to in a timely manner.

State and Regional Support for Local Spill Response Capability

Spill response planning has been ongoing throughout Washington State and within the region for many years. As a result, there are many Response Plans in existence, each focusing on a specific geographical area or type of substance. In addition, organizations involved in the storage and transportation of hazardous materials have been required to develop contingency plans and must conform to a variety of regulations. Accordingly, this assessment of spill response capability and

recommendations for enhanced response is intended to be consistent with existing spill response plans and regulations for the area and the state.

The foundation for systems and procedures outlined in this section are described in documents such as the Northwest Area Contingency Plan – NWACP (2007), and the Washington State Comprehensive Emergency Management Plan – CEMP (2003).

The NWACP serves as both the Area Contingency Plan and the Regional Contingency Plan for the northwest states of Washington, Oregon, and Idaho, two U.S. Coast Guard Captains of the Port Zones (Puget Sound and Portland), and the U.S. Environmental Protection Agency's (EPA's) Inland Zone. The NWACP has been adopted as the state's Oil and Hazardous Substance Spill Prevention and Response Plan as required by statute (Chapter 90.56.060 RCW). The Plan provides spill responders and key agency staff with the information and procedural guidelines necessary to effectively respond to spills. These procedures include such items as enforcement protocols and the best management practices (BMPs).

The following are the spill response plans in effect in Washington State which cover inland (non-marine) areas such as wellhead protection areas and aquifer recharge areas:

- National Oil and Hazardous Substances Pollution and Contingency Plan (NCP) prepared by the EPA.
- Oil and Hazardous Substance Pollution Contingency Plan for Federal Region 10 (RCP) - prepared by Region 10 of EPA.
- Northwest Area Contingency Plan (NWACP) – prepared and developed by EPA Region 10 Regional Response Team and the Northwest Area Committee (RRT/NWAC).
- Local Emergency Response Plans - prepared by city governments.

Spill Response Terminology

Contingency planning for the purpose of this section should be construed to mean "spill response contingency" plans.

In the various contingency plans applicable to Washington State, there are repeated references to an "Incident Commander" (IC) and an "On-Scene (Site) Coordinator" (OSC). The IC is the person who is in command of an incident during its emergency phase and OSC is the person who is in charge of spill or release management and cleanup. While there is an IC in charge of the situation, the OSC takes direction from this person. After the emergency response is complete, the authority is transferred to the OSC for final cleanup.

Spill Response Organizations

Depending on the magnitude of the spill event, numerous organizations at all levels of government, the private sector, and some voluntary organizations, can have a role in spill response and cleanup. Each of the plans mentioned above describes the relationship and roles of these organizations in terms of the particular concern. Listed below are a few of the organizations which might be, depending on the size and nature of the release, involved in a spill response in a wellhead protection area or ground water recharge area.

The Local Response Team (LRT) consists of state and local government agencies, industry personnel, academic organizations, and other private interests that may assist the OSC in pollution response and planning. The composition and level of participation in the LRT is dependent upon the area involved, the hazard posed, and the type of assistance required. Normally, the LRT will consist of the state environmental response agency and clean-up contractors.

The Ecology Spill Response Team consists of Washington State Department of Ecology regional office personnel. This team is responsible for determining the source, cause, and responsible party, as well as initiating appropriate enforcement action. Additional responsibilities include ensuring containment, cleanup, and disposal are carried out adequately. The team coordinates its actions with other state, federal, and local agencies.

The Regional Response Team (RRT) consists of representatives from selected federal and state agencies. The RRT is the regional body responsible for planning and preparedness before spill occurs and provides advice to the OSC following such incidents.

The EPA's Superfund Technical Assessment & Response Team Contracts (START) program combines the previously separate support activities of the Field Investigation Team (FIT) and Technical Assistance Team (TAT) into a single contract. The START contracts provide technical support which includes gathering and analyzing technical information, preparing technical reports on oil and hazardous substance investigation and technical support for cleanup efforts.

The National Response Team (NRT) consists of representatives from the various federal agencies (such as EPA, the US Coast Guard (USCG), Fish and Wildlife Service, etc). It serves as the national body for planning and preparedness actions prior to a spill and as an emergency advisory center when a spill occurs.

The Environmental Response Team (ERT), based in Edison, New Jersey, was established to advise the OSC and Regional Response Team (RRT) on environmental issues surrounding spill containment, cleanup, and damage assessment. ERT personnel have expertise in areas such as treatment technology, biology, chemistry, hydrology, geology, and engineering.

Roles and Responsibilities

Spill response plans stress that for spill response procedures to be effectively executed, each party must be fully aware of their specific roles and responsibilities. Moreover, there must be an understanding of the roles of other parties involved in response activities, as well as effective coordination, cooperation, and communication among responding agencies, organizations, and individuals. This section describes the specific roles and responsibilities of the key parties, including:

- Responsible party or spiller
- Federal and state agencies
- Local government
- Facility owners
- Contractors

The Responsible Party

The primary responsibility for assessing, responding to, and containing an oil spill or hazardous discharge falls upon the individual, agency, or company responsible for the spill incident. The responsible party (RP), whether there is an approved contingency plan or not, is responsible for containment and cleanup of the spill, disposal of contaminated debris, restoration of the environment, and payment of damages. State and federal law specifically require that the removal of a discharge of oil or hazardous substance should be immediate.

Environmental Protection Agency

The EPA has primary responsibility for spills that occur on land and on inland U.S. waters not under USCG jurisdiction. As directed by the NCP, the EPA is pre-designated as OSC for spills occurring in these areas.

Department of Ecology

The Department of Ecology provides an important function in spill management and cleanup. They are not generally considered a "first response" agency, but because of their regional offices and their environmental protection responsibilities, they can provide clean-up or containment advice and services (though usually through contractors). Ecology is the lead state agency for environmental pollution response within the State of Washington. As such, it serves as an advisor to the OSC and the IC for many spills occurring in state jurisdiction. Ecology is the state-designated OSC for all oil spills in water. In the event of a spill occurring on a state highway, Ecology coordinates with the Washington State Patrol, which assumes responsibility as IC and Ecology acts as the lead agency responsible for clean-up activities.

State Patrol

The State Patrol acts as the designated Incident Command agency for incidents on interstate and state highways, and other roads and jurisdictions as delegated.

Washington Military Department Emergency Management Division (EMD)

The State Emergency Management Division (EMD) is tasked with receiving and recording verbal emergency toxic chemical release reports through its 24-hour duty officer system and making appropriate notifications. It activates the State Emergency Operations Center (EOC) as needed to coordinate state resource identification and acquisition in support of Ecology response. The EMD also assists and provides guidance to local emergency planning commissions for preparation of their emergency response plans.

Washington Department of Fish and Wildlife (WDFW)

The WDFW is a state agency with trustee responsibilities for wildlife, game fish, food fish, non-game fish, shellfish, and their associated habitats. The agency is also responsible for state facilities (hatcheries, properties, launching ramps, and related facilities) and assorted equipment. The WDFW Oil Spill Team (OST) provides round-the-clock oil spill response capability to address the needs of fish and wildlife resources. The WDFW may be a participant on the LRT or RRT depending on the location and nature of the incident. WDFW also provides support services for Natural Resources Damage Assessment (NRDA).

Department of Health (DOH)

DOH has the responsibility for beach closures for human health and safety purposes, public health concerns from contaminated food supply (e.g. shellfish), and general health-related matters for the safety of the public. In addition, DOH is to render all appropriate laboratory support and services to the OSC. Health is a participant in the NRDA team.

Department of Transportation (DOT)

The DOT may provide traffic control, equipment, and personnel for non-hazardous clean-up activities on state and interstate highways. The DOT may provide and mobilize equipment necessary in a major spills incident.

Local Responders

The City of Enumclaw Fire Department is the primary local department with responsibility for emergency spill responses. The Fire Department is responsible to provide for immediate protection of health, property, and the environment. It is the Enumclaw Fire Department who determines the need for additional assistance and mobilization of the additional resources mentioned in this section, and will do so based on policies and procedures.

Local Emergency Planning and Emergency Management

Local governments have a duty to be prepared for all disaster emergencies. The Office of Emergency Management Division of King County is charged with establishing local Emergency Planning Committees (LEPC) to facilitate the local planning efforts.

LEPCs have the responsibility to create local emergency response plans. General requirements for local response plans are contained in Title III of SARA (Superfund Amendments & Reauthorization of 1986). Generally, local agencies, particularly fire services and law enforcement agencies, can be activated to provide emergency response services when there is a threat to life and property. Emergency response services may include: fire and explosion controls, investigation and documentation, perimeter control, evacuation, traffic controls, and initial containment or even removal of materials, depending on the nature of the incident. The Enumclaw Police Department is the lead department for Emergency Management within the City of Enumclaw.

Incident Response Management

The party responsible (RP) for a spill is required by state law to notify the National Response Team (NRT) and the state EMD. The RP is also encouraged to contact the nearest appropriate regional office of Ecology. The following is a list of phone numbers for agency notification.

AGENCY	PHONE NUMBER
National Response Center	800-424-8802
Washington State Emergency Management Division	800-258-5990 800-OILS-911
Washington State Department of Ecology Northwest Office - Bellevue Headquarters - Tumwater	 425-649-7000 360-407-6000
City of Enumclaw Fire Department	911
City of Enumclaw Police	911

AGENCY	PHONE NUMBER
City of Enumclaw Police/Fire Dispatch Center (non-emergency)	360-825-3505
Washington State Patrol	253-536-6210
Environmental Protection Agency Region 10- Seattle	206-553-1263

In most spill response situations, the initial call is to a local emergency response agency such as the local fire department or district, local police, or others. The use of a 911 system will activate the local response, as well as ensure that appropriate first responders are dispatched to the scene of the incident. The 911 system is monitored continuously. The first responders provide the initial on-scene control, and manage the scene under the Incident Command System described below.

State Incident Command System

The State of Washington's spill response is organized and managed under a National Incident Management System (NIMS). NIMS is an incident management system that was mandated through a Presidential Directive following the attacks on 9-11-01. Formally the State and local jurisdictions used a similar system named Incident Command System (ICS). It is very similar to NIMS; however NIMS was implemented to standardize terminology and systems throughout the Nation.

Specifically, the system will operate in the following scenarios:

- Single Jurisdiction/Single Agency
- Single Jurisdiction/Multi-Agency
- Multi-Jurisdiction/Multi-Agency

The NIMS concept is built upon teamwork coordination and cooperation between all entities involved (or potentially involved) in a spill response. Teamwork is encouraged throughout all phases of incident management including the preparedness, mitigation, response, and recovery phases for spills of any type or size. Ecology has taken steps to ensure there is effective teamwork, coordination, and participation in the NIMS by appropriate state and local agencies in addition to the USCG and the EPA.

Unified Command Structure

In Washington State, the NIMS will operate using a Unified Command Structure involving representatives of the Ecology, federal government (USCG/EPA), industry, and in some circumstances local government. A Unified Command Structure is called for when the spill is multi-jurisdictional in nature, e.g., when public safety and welfare, as well as environmental damage, is imminent.

Under the Unified Command Structure, the three key On-Site Coordinators (OSC) -- federal, state, and industry -- will share decision-making authority in the command post and consult with each other regarding spill response and clean-up, management issues. Participation in the Unified Command Structure does not mean that agencies such as the USCG, EPA, and Ecology, which have roles and responsibilities set by federal and state statute, are relinquishing or surrendering their authority. Emergency situations, however, may require some actions to be taken outside of the normal permitting process.

The Unified Command Structure is a consistent, systematic means of organizing a variety of agencies having jurisdictional responsibilities surrounding an incident, into one concerted effort. The concept offers uniform and traceable procedures that enable all emergency response agencies to perform their roles effectively, yet in unison. A Unified Command is located as close to the site of the spill as practicable, without interfering in the actual spill response activities.

Organization and Staffing Principles of NIMS

The NIMS organization is functionally oriented around four major areas: command, planning, logistics, and administration. The flexibility to expand this organization as situations dictate is designed within the NIMS, without the need to conduct major organizational changes or a cumbersome transition into a different operational system during a spill response. For example, in a minor incident a single person may serve as the OSC and perform all functions. In a major incident, the command may consist of a united command with federal and state representatives, the RP, the OSC, a staff, and a group of sections and functional units. Participants in the Unified Command/Command Post and the OSCs are normally pre-designated, any remaining sections or functions are assigned as needed.

It is important for those parties and agencies participating in NIMS to understand that the key to its effective operation is the acknowledgment that the IC is in charge of the entire operation, the OSC is in charge of spill cleanup during the incident, while the section chiefs and functional unit leaders are in charge of their units or sections. As a rule, sections should have a single individual in charge with the authority to make decisions and to give orders. Without this authority, the system will fail. Accordingly, it is a maxim of NIMS that section chiefs should be selected based on their experience and qualifications, not rank or seniority within their relative agency or organization.

The staffing requirements of the NIMS should be viewed as a dynamic activity, not one based upon maintaining a precisely defined level. Flexibility is a key element of NIMS, allowing the command structure to be as large and sophisticated, or as small and compact, as the spill event requires. As long as common sense is used, the system can be modified to fit any incident. The size of the NIMS will be determined by the IC.

Recommended Spill Response Improvements

Update Wellhead Protection Area Maps

The Wellhead Protection Area map (Figure 1) in the Emergency Response Plan in the City's Water Comprehensive Plan should be updated with the current map. Additionally, first responders should be made aware of the updates to the City's Wellhead Protection Areas. Additional discussions with first responders regarding wellhead protection concerns should take place once the updated maps have been provided.

Complete Mutual Aid Agreements

The Enumclaw Fire Department currently maintains mutual aid and automatic aid agreements for HAZMAT response. Response scenarios involving other potential first responders (such as the State Patrol or others) should be reviewed to assure that the response protocols are clearly understood and the response system is as streamlined as possible.

Establish Responder Group

As part of the implementation of this plan, a spill responder group (consisting of local fire, police, emergency management, and water department) should be established to discuss spill response in the WHPA. Efforts should be made to communicate the extent of capture zones to the first responder organizations. This "forum" for discussion of WHP issues could take the form of a sub-group of Emergency Management, or could be developed independently.

Discuss Wellhead Precautions

Through a local "responders" group, discussion should focus not only on the locations of the capture zones, but also on specific protocols and procedures for response in the zones. For example, certain types of responses may be more protective than others, depending on the chemical, the location within the zones, and the tradeoffs affecting immediate public health and safety.

APPENDIX N

COMPLETE MODELING RESULTS

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1	3.85	566.48	859.6	127.01
J10	3.85	741.1	864.89	53.64
J100	3.85	746.17	862.71	50.49
J1000	2.67	916.3	1084.39	72.83
J1001	3.85	749.82	860.55	47.98
J1002	2.67	836.78	1084.38	107.29
J1003	2.67	894.03	1084.38	82.48
J1004	2.67	882.91	1084.39	87.3
J1005	0	794.26	1084.38	125.71
J1006	0	826.5	899.21	31.51
J1007	1.65	785.8	899.21	49.14
J1008	1.65	746.77	899.2	66.05
J101	3.85	741.65	862.59	52.4
J1011	3.85	751.78	860.94	47.3
J1015	3.85	739.77	865.33	54.41
J1016	3.85	714.9	861.16	63.38
J1017	3.85	722.76	861.16	59.97
J1018	3.85	741.36	864.12	53.19
J1019	3.85	752.8	860.98	46.87
J102	3.85	740.23	862.36	52.92
J1020	3.85	531.5	857.5	141.25
J1021	3.85	622.73	857.6	101.77
J1022	3.85	739.58	865.77	54.68
J1023	3.85	754.87	860.98	45.98
J1024	3.85	742.05	860.35	51.26
J1025	3.85	729.63	859.88	56.44
J1026	3.85	738.8	860.26	52.63
J1027	3.85	736.1	860.26	53.8
J1028	3.85	721.15	859.68	60.02
J1029	3.85	720.66	859.51	60.16
J103	3.85	746.38	863.88	50.91
J1030	3.85	717.88	859.48	61.35
J1031	3.85	714.15	859.47	62.97
J1032	3.85	710.41	859.42	64.57
J1033	3.85	712.48	859.42	63.67
J1034	3.85	747.5	867.1	51.82
J1035	3.85	743.72	861.76	51.15
J1037	3.85	744.88	861.85	50.68
J1038	3.85	744.8	861.9	50.74
J1039	3.85	743.6	862.87	51.68
J104	3.85	754.11	864.29	47.74
J1040	3.85	752.33	866.55	49.49
J1041	3.85	699.48	858.77	69.02
J1042	3.85	698.5	858.76	69.44
J1044	3.85	746.87	861.72	49.76
J1045	3.85	711.82	865.94	66.78
J1046	3.85	699.29	866.03	72.25
J1047	3.85	728.73	866.11	59.53
J1048	3.85	730.17	866.16	58.93
J1049	3.85	537.34	857.43	138.7
J105	3.85	752.36	864.97	48.79
J1051	3.85	650.41	859.03	90.4
J1053	3.85	752.69	861.15	46.99
J1054	3.85	775.92	868.46	40.1
J1055	3.85	778.94	868.46	38.79
J1056	2.82	781.4	982.17	86.99
J1057	2.82	777.6	982.17	88.64
J1058	3.85	634.8	857.6	96.54

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1059	3.85	646.26	857.61	91.58
J106	3.85	754.4	864.18	47.57
J1060	3.85	614.47	857.51	105.31
J1061	3.85	564.87	857.5	126.8
J1062	3.85	577.51	857.5	121.32
J1063	3.85	635.78	860.28	97.27
J1064	3.85	538.42	857.43	138.23
J1065	3.85	528.73	852.85	140.44
J1066	3.85	522.02	852.57	143.23
J1067	3.85	612.1	857.64	106.39
J1068	3.85	612.88	857.64	106.05
J1069	3.85	596.02	857.59	113.34
J107	3.85	755.1	863.96	47.17
J1070	3.85	595.77	857.65	113.47
J1071	3.85	605.21	857.84	109.46
J1072	3.85	639.18	858.18	94.89
J1073	3.85	645.1	858.19	92.33
J1074	3.85	624.13	859.34	101.91
J1075	3.85	646.73	859.34	92.12
J1076	3.85	710.56	858.82	64.24
J1077	3.85	728.72	860.29	57.01
J1078	3.85	675.75	858.7	79.27
J1079	3.85	672.22	858.35	80.65
J108	3.85	756.54	864.82	46.92
J1080	3.85	730.1	860.24	56.39
J1081	3.85	728.94	860.34	56.94
J1082	3.85	733.95	860.59	54.87
J1083	3.85	735.94	860.75	54.08
J1084	3.85	755.84	864.96	47.28
J1085	3.85	720.65	860.35	60.53
J1086	3.85	684.09	863.67	77.81
J1087	3.85	746.31	863.67	50.85
J109	3.85	760.71	864.9	45.15
J1091	3.85	756.36	861.12	45.39
J1095	3.85	757.17	861.11	45.04
J1097	3.85	752.15	861.21	47.26
J1099	3.85	753.67	860.7	46.38
J11	3.85	742.91	865.21	52.99
J110	3.85	747.22	865.13	51.09
J1101	3.85	748.04	861.51	49.17
J1103	3.85	747.28	861.44	49.47
J1109	3.85	745.47	861.59	50.31
J111	3.85	759.09	864.96	45.87
J1115	3.85	745.58	861.34	50.16
J1119	3.85	745.05	861.34	50.39
J112	3.85	766.64	863.96	42.17
J1121	3.85	742.97	861.8	51.49
J1125	3.85	739.81	861.51	52.73
J1127	3.85	741.68	861.5	51.92
J113	3.85	761.2	863.44	44.3
J1137	3.85	742.89	862.15	51.67
J1139	3.85	745.38	862.15	50.6
J114	3.85	758.13	863.23	45.54
J1141	3.85	746.67	862.18	50.05
J1145	3.85	741.98	862.35	52.15
J115	3.85	764.34	863.98	43.18
J1153	3.85	746.22	862.47	50.37
J1155	3.85	744.18	862.36	51.21

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1157	3.85	743.07	862.45	51.73
J116	3.85	765.33	863.45	42.51
J1163	3.85	743.69	842.51	42.82
J1165	3.85	747.48	861.32	49.33
J1169	3.85	747.67	861.31	49.24
J117	3.85	750.05	863.14	49.01
J1175	3.85	746.61	861.39	49.73
J1177	3.85	747.98	860.33	48.68
J1179	3.85	747.38	860.33	48.94
J118	3.85	745.53	863.02	50.91
J1181	3.85	748.67	861.28	48.79
J1183	3.85	749.7	861.26	48.34
J1187	3.85	746.04	861.69	50.11
J119	3.85	741.48	863.24	52.76
J1195	3.85	747.16	861.47	49.53
J1199	3.85	743.87	856.84	48.95
J12	3.85	632.47	844.98	92.08
J120	3.85	740.23	862.57	53.01
J1205	3.85	750.28	862.01	48.41
J1207	3.85	746.49	861.8	49.96
J121	3.85	740.41	863.2	53.21
J1211	3.85	740.75	861.83	52.47
J122	3.85	741.44	863.47	52.88
J1223	3.85	748.19	857.41	47.33
J1229	3.85	752.25	857.19	45.47
J123	3.85	739.89	863.7	53.64
J1233	3.85	748.58	862.97	49.57
J1235	3.85	750.31	862.59	48.65
J1237	3.85	753.08	862.46	47.39
J124	3.85	746.44	863.82	50.86
J1241	3.85	750.1	861.33	48.2
J1243	3.85	749.92	861.22	48.23
J1245	3.85	750.39	861.31	48.06
J125	3.85	741.36	863.91	53.1
J1251	3.85	746.16	863.06	50.65
J1253	3.85	753.91	861.38	46.57
J1255	3.85	753.86	861.12	46.48
J1259	3.85	754.31	861.38	46.39
J126	3.85	741.06	864.2	53.36
J1263	3.85	749.59	862.24	48.81
J1265	3.85	749.68	862.39	48.84
J1267	3.85	751.61	862.53	48.06
J1269	3.85	752.06	862.29	47.76
J127	3.85	749.17	864.1	49.8
J1271	3.85	748.04	862.28	49.5
J1273	3.85	743.74	861.9	51.2
J1275	3.85	745.02	861.9	50.64
J1277	3.85	743.22	861.9	51.42
J128	3.85	739.86	864.32	53.93
J1281	3.85	741.34	864.04	53.16
J1283	3.85	741.23	864.05	53.22
J129	3.85	741.08	864.54	53.49
J1291	3.85	740.99	864.05	53.32
J1295	3.85	738.46	864	54.4
J1299	3.85	741.54	864.65	53.34
J13	0	758.4	864.92	46.16
J130	3.85	751.82	864.42	48.79
J1303	3.85	739.98	862.95	53.28

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1307	3.85	746.37	863.68	50.83
J131	3.85	742.47	864.62	52.93
J1311	3.85	751.74	863.53	48.43
J1319	3.85	741.38	864.81	53.48
J132	3.85	748.62	864.65	50.27
J1321	3.85	743.72	863.6	51.95
J1323	3.85	750.98	863.28	48.66
J1325	3.85	742.2	863.19	52.42
J1327	3.85	756.31	863.03	46.24
J1329	3.85	745.93	864.12	51.21
J133	3.85	739.7	864.77	54.19
J1331	3.85	745.23	864.11	51.51
J1333	3.85	740.49	864.05	53.54
J1335	3.85	739.68	864.26	53.98
J1339	3.85	742.24	864.53	52.99
J134	3.85	750.79	865.12	49.54
J1345	3.85	742.6	864.59	52.86
J1347	3.85	741.53	864.61	53.33
J135	3.85	744.98	865.21	52.09
J1351	3.85	741.73	864.66	53.26
J1353	3.85	746.46	864.45	51.13
J1355	3.85	746.24	864.45	51.22
J1357	3.85	746.08	864.38	51.26
J1359	3.85	741.4	864.73	53.44
J136	3.85	739.83	865.37	54.39
J1361	3.85	742.36	864.68	53
J1363	3.85	742.09	864.56	53.06
J1367	3.85	741.71	864.68	53.28
J137	3.85	744.32	865.25	52.4
J1371	3.85	744.19	862.18	51.12
J1373	3.85	759.7	863.11	44.81
J1375	3.85	762.51	863.34	43.69
J1379	3.85	754.86	863.03	46.87
J138	3.85	739.45	865.91	54.8
J1381	3.85	759.63	864.18	45.3
J1385	3.85	767.59	863.73	41.66
J1389	3.85	756.58	864.46	46.74
J139	3.85	740.18	864.78	53.99
J1391	3.85	765.7	863.88	42.54
J1393	3.85	764.85	863.73	42.84
J14	3.85	733.87	865.02	56.83
J140	3.85	740.77	864.78	53.74
J1401	3.85	757.87	863.16	45.62
J1403	3.85	757.54	863.09	45.73
J1405	3.85	742.15	864.73	53.11
J1407	3.85	740.89	865.33	53.92
J1409	3.85	753.94	864.66	47.98
J141	3.85	741.9	864.11	52.96
J1411	3.85	763.72	864.66	43.74
J1417	3.85	754.55	864.63	47.7
J1419	3.85	753.3	861.46	46.86
J142	3.85	741.21	865.07	53.67
J1423	3.85	741.79	865.35	53.54
J1429	3.85	761.27	863.03	44.09
J143	3.85	738.01	864.25	54.7
J1431	3.85	762.04	863.15	43.81
J1433	3.85	760.52	863.3	44.53
J144	3.85	740.71	866.95	54.7

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1445	3.85	758.7	863.41	45.37
J1447	3.85	752.69	843.43	39.32
J1449	3.85	763.05	863.75	43.63
J145	3.85	742.55	865.11	53.11
J1451	3.85	749.98	864.09	49.45
J1453	3.85	750.83	864.09	49.08
J1459	3.85	752.45	864.27	48.45
J146	3.85	740.17	865.49	54.3
J1463	3.85	751.66	864.1	48.72
J1465	3.85	754.17	864.1	47.63
J1467	3.85	753.66	864.28	47.93
J147	3.85	742.06	864.65	53.12
J1471	3.85	752.96	863.97	48.1
J1475	3.85	752	859.14	46.42
J1479	3.85	752.48	861.2	47.11
J148	3.85	740.91	867.08	54.67
J1483	3.85	750.05	864.88	49.75
J149	3.85	739.28	867.14	55.4
J1491	3.85	749.43	861.05	48.37
J1493	3.85	740.49	865.25	54.06
J15	3.85	727.38	866.69	60.37
J150	3.85	740.18	868.15	55.45
J1500	3.85	722.88	859.98	59.41
J1501	3.85	746.03	860.03	49.4
J1502	3.85	739.88	860.02	52.06
J1503	3.85	701.03	862.19	69.83
J1504	3.85	567.12	860.49	127.12
J1505	3.85	600.6	860.25	112.51
J1506	3.85	645.4	861.42	93.6
J1507	3.85	658.85	861.71	87.9
J1508	3.85	704.61	863.64	68.91
J1509	3.85	699.26	863.64	71.22
J151	3.85	740.22	869.85	56.17
J1510	3.85	679.71	863.64	79.7
J1511	3.85	693.44	863.64	73.75
J1512	3.85	746.27	910.08	70.98
J1513	3.85	767.92	905.41	59.58
J1515	0	737.23	870.16	57.6
J1517	3.85	742.24	862.92	52.29
J152	3.85	770.31	878.25	46.77
J1521	3.85	745	860.25	49.94
J1523	3.85	745.77	866.22	52.19
J1525	3.85	691.98	864.3	74.67
J1527	3.85	698.37	864.87	72.15
J153	3.85	750.52	878.24	55.34
J1531	3.85	722.8	862.44	60.51
J1533	3.85	724.44	862.25	59.71
J1535	3.85	723.63	859.93	59.06
J1537	3.85	685.66	859.72	75.42
J1539	3.85	712.41	860.9	64.34
J154	3.85	761.73	878.25	50.49
J1541	3.85	638.17	859.47	95.89
J1543	3.85	634.04	857.49	96.82
J1545	3.85	648.09	858.38	91.12
J1547	3.85	630.17	858.3	98.85
J1549	3.85	656.5	859.39	87.91
J155	0	855.1	886.86	13.76
J1551	3.85	645.64	859.75	92.77

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1553	3.85	632.57	858.12	97.73
J1557	3.85	659.68	858.2	86.02
J1559	3.85	577.06	859.22	122.26
J156	3.85	746.06	860.58	49.62
J1561	3.85	573.68	858.87	123.57
J1565	3.85	748.49	862.54	49.42
J1567	3.85	738.82	863.53	54.04
J157	3.85	767.25	874.93	46.66
J1571	3.85	737.25	863.52	54.71
J1575	3.85	739.09	863.6	53.95
J1577	3.85	738.3	863.6	54.29
J1579	3.85	737.28	863.74	54.8
J158	3.85	771.36	874.78	44.81
J1581	3.85	737.72	863.74	54.6
J1583	3.85	741.08	863.93	53.23
J1585	3.85	740.39	863.93	53.53
J1587	3.85	741.15	864.03	53.24
J1589	3.85	741.63	864.02	53.03
J159	3.85	772.92	874.76	44.13
J1591	3.85	742.52	864.13	52.69
J1593	3.85	740.99	864.12	53.35
J1595	3.85	741.94	867.05	54.21
J16	3.85	748.08	868.25	52.07
J160	3.85	744.05	871.4	55.18
J1601	3.85	743.23	867.01	53.64
J1605	3.85	742.95	866.95	53.73
J1609	3.85	740.46	867.11	54.88
J161	0	744.35	993.37	107.9
J1613	3.85	742.25	866.98	54.04
J1617	3.85	742.23	867.11	54.11
J1619	3.85	742.84	867.1	53.84
J162	0	736.72	915.08	77.28
J163	0	737.98	915.7	77.01
J1633	3.85	742.51	867.11	53.99
J1637	3.85	742.23	867.14	54.12
J1639	3.85	741.19	867.15	54.58
J164	3.85	777.69	878.32	43.6
J1641	3.85	741.35	868.02	54.89
J1645	3.85	743.56	867.14	53.55
J1649	3.85	742.93	867.14	53.82
J165	2.82	772.37	982.19	90.92
J1651	3.85	742.67	867.81	54.22
J1653	3.85	743.71	867.78	53.76
J1657	3.85	744.9	869.32	53.91
J166	2.82	775.14	982.2	89.72
J1661	3.85	743.02	869.25	54.7
J1665	3.85	744.32	869.83	54.38
J1667	3.85	746.51	869.9	53.46
J1669	3.85	740.14	869.54	56.07
J167	2.82	859.91	982.24	53.01
J1673	3.85	744.08	868.57	53.94
J1675	3.85	744.11	868.57	53.93
J168	3.85	739.58	865.22	54.44
J1681	3.85	781.08	870	38.53
J1687	3.85	760.07	870	47.63
J1689	3.85	766.73	870	44.75
J169	2.82	777.05	982.17	88.88
J1691	3.85	776.53	870	40.5

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1693	3.85	779.6	870	39.17
J1695	3.85	760.57	870	47.42
J1697	3.85	757.53	870	48.73
J17	0	746.62	930.28	79.58
J170	3.85	761.47	868.47	46.36
J1701	3.85	770.55	870	43.09
J1703	3.85	766.91	870	44.67
J1707	3.85	770.73	870	43.01
J1709	3.85	761.97	870	46.81
J171	3.85	741.48	864.92	53.49
J1711	3.85	774.28	870	41.47
J1713	3.85	769.23	870	43.66
J1719	3.85	771.02	878.36	46.51
J172	3.85	742.92	861.08	51.2
J1721	3.85	773.5	878.42	45.46
J1725	3.85	776.37	878.47	44.24
J1729	3.85	785.67	863.67	33.8
J173	3.85	746.41	860.38	49.38
J1731	3.85	788.18	863.63	32.69
J1735	3.85	769.91	865.26	41.32
J1737	3.85	765.23	865.99	43.66
J174	3.85	748.74	860.08	48.24
J1741	3.85	764.49	874.79	47.8
J1743	3.85	773.75	874.78	43.78
J1747	3.85	770.6	874.78	45.14
J175	0	735.33	780	19.35
J1751	3.85	765.07	874.75	47.53
J1753	3.85	734.25	868.07	57.99
J1757	3.85	737.99	868.64	56.61
J176	3.85	736.23	860.57	53.87
J1761	3.85	757.16	868.36	48.18
J1763	3.85	744.39	868.36	53.72
J1765	3.85	752.82	882.69	56.27
J1767	3.85	749.51	882.69	57.7
J1769	3.85	743.83	875.1	56.88
J177	0	734.29	861.4	55.08
J1771	3.85	741.03	874.56	57.86
J1773	3.85	744.07	874.56	56.54
J1775	3.85	743.51	874.56	56.78
J1777	3.85	742.83	873.05	56.42
J1779	0	832.76	908.6	32.86
J178	3.85	735.31	861.49	54.67
J1781	0	817.09	908.91	39.79
J1783	0.21	785.55	1084.36	129.47
J1785	2.67	901.55	1084.32	79.19
J1787	3.85	685.16	861.8	76.53
J1789	3.85	710.37	861.79	65.61
J179	3.85	738.11	861.22	53.34
J1793	3.85	687.02	861.84	75.75
J1795	3.85	743.89	860.32	50.45
J1797	3.85	743.81	860.32	50.48
J18	0	746.28	995.03	107.78
J180	3.85	738.68	860.97	52.98
J1801	3.85	747.02	860.32	49.09
J1803	3.85	746.38	860.32	49.37
J1805	3.85	747.1	860.32	49.05
J1807	3.85	749.92	860.46	47.9
J181	3.85	744.02	861.16	50.76

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1811	3.85	734.43	860.1	54.45
J1815	3.85	731.82	860.22	55.64
J1817	3.85	731.57	859.93	55.62
J182	3.85	730.68	860.34	56.18
J1821	3.85	729.95	859.9	56.31
J1823	3.85	727.31	859.88	57.44
J1825	3.85	729.84	859.85	56.33
J1827	3.85	730.96	860.34	56.06
J183	3.85	731.24	860.18	55.87
J1831	3.85	741.42	865.4	53.72
J1833	3.85	735.42	864.12	55.77
J1835	3.85	740.21	862.29	52.9
J1839	3.85	737.1	862.19	54.2
J184	3.85	731.64	860.16	55.69
J1843	3.85	737.44	861.81	53.89
J1845	3.85	741.21	864.89	53.59
J1847	3.85	740.63	864.7	53.76
J185	3.85	728.5	860.23	57.08
J1851	3.85	742.51	858.93	50.45
J1853	3.85	741.08	864.78	53.6
J1859	3.85	741.91	864.77	53.24
J186	3.85	728.33	860.23	57.15
J1863	3.85	738.11	865.76	55.31
J1867	3.85	739.43	862.07	53.14
J1869	3.85	739.04	865.81	54.93
J187	3.85	729.6	860.23	56.6
J1871	3.85	742.58	865.34	53.19
J1875	3.85	742.5	865.35	53.23
J1879	3.85	746.94	864.43	50.91
J188	3.85	722.47	859.98	59.59
J1883	3.85	727.19	862.44	58.6
J1885	3.85	745.04	863.39	51.28
J1887	3.85	744.92	863.5	51.38
J1889	3.85	746.37	862.28	50.22
J189	3.85	691.68	859.92	72.9
J1891	3.85	746.06	862.08	50.27
J1893	3.85	741.24	861.82	52.25
J1895	3.85	751.72	862.47	47.99
J1897	3.85	739.54	861.84	52.99
J1899	3.85	746.75	861.55	49.74
J19	0	747.17	930.27	79.34
J190	3.85	676.7	859.43	79.18
J1901	3.85	745.64	861.7	50.28
J1903	3.85	752.04	861.31	47.35
J1905	3.85	758.48	861.28	44.54
J1907	3.85	749.59	861.19	48.36
J1909	3.85	751.9	861.27	47.39
J191	3.85	719.72	859.42	60.53
J1911	3.85	747.26	861.34	49.43
J1913	3.85	740.58	861.98	52.6
J1915	3.85	743.1	862.3	51.65
J1917	3.85	742.18	862.62	52.19
J1919	3.85	741.81	863.07	52.54
J192	3.85	721	859.68	60.09
J1921	3.85	741.73	863.38	52.71
J1923	3.85	750.87	863.59	48.84
J1925	3.85	739.72	864	53.85
J1927	3.85	741.08	864.05	53.28

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1929	3.85	743.81	864.65	52.36
J193	3.85	724.78	859.75	58.48
J1931	3.85	742.11	864.82	53.17
J1933	3.85	740.96	864.61	53.58
J1935	3.85	741.02	864.59	53.54
J1937	3.85	741.09	864.83	53.62
J1939	3.85	742.09	864.77	53.16
J194	3.85	729.34	860.09	56.65
J1941	3.85	738.3	865.76	55.23
J1943	3.85	739.72	867.14	55.21
J1945	3.85	746.16	861.7	50.06
J1947	3.85	738.43	862.29	53.67
J1949	3.85	743.92	863.68	51.89
J195	3.85	734.24	860.25	54.6
J1951	3.85	744.57	861.81	50.8
J1953	3.85	752.17	864.11	48.5
J1955	3.85	758.28	863.96	45.79
J1957	3.85	761.2	863.95	44.52
J1959	3.85	757.4	863.75	46.08
J196	3.85	707.45	858.9	65.62
J1961	3.85	764.5	863.95	43.09
J1963	3.85	765.92	864.57	42.75
J1965	3.85	758.36	864.25	45.88
J1967	3.85	768.22	863.96	41.48
J1969	3.85	767.3	863.96	41.88
J197	3.85	678.58	858.71	78.05
J1971	3.85	754.17	864.48	47.8
J1973	3.85	740.42	865.35	54.13
J1975	3.85	744.01	864.7	52.3
J1977	3.85	750.1	864.8	49.7
J1979	3.85	764.58	863.44	42.84
J198	3.85	681.72	858.71	76.69
J1981	3.85	742.11	865.35	53.4
J1983	3.85	747.79	866.53	51.45
J1985	3.85	745.22	864.17	51.54
J1987	3.85	754.99	864.57	47.48
J1989	3.85	747.72	863.98	50.38
J199	3.85	703.69	858.82	67.22
J1991	3.85	752.43	864.94	48.75
J1993	3.85	749.73	865.04	49.96
J1995	3.85	749.21	865.06	50.2
J1997	3.85	730.81	860.34	56.12
J1999	3.85	746.43	860.56	49.45
J2	3.85	570.33	859.23	125.18
J20	3.85	767.9	868.51	43.6
J200	2.82	834.32	982.22	64.09
J2001	3.85	753.19	860.99	46.71
J2003	3.85	753.69	860.94	46.47
J2005	3.85	736.56	861.81	54.27
J2007	3.85	734.36	861.29	55
J2009	3.85	737.27	861.13	53.67
J201	3.85	750.28	861.36	48.13
J2011	3.85	742.07	861.07	51.56
J2013	3.85	738.87	861.16	52.99
J2015	3.85	736.3	860.79	53.94
J2017	3.85	737.34	860.7	53.45
J2019	3.85	735.06	860.9	54.53
J202	3.85	752.15	861.24	47.27

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2021	3.85	745.69	860.58	49.78
J2023	3.85	742.26	860.58	51.27
J2025	3.85	735.04	860.48	54.35
J2027	3.85	739.94	860.3	52.15
J2029	3.85	732.18	860.22	55.48
J203	3.85	762.75	875.6	48.9
J2031	3.85	732.25	860.1	55.39
J2033	3.85	743.38	860.33	50.67
J2035	3.85	729.65	859.84	56.41
J2037	3.85	728.91	859.87	56.74
J2039	3.85	728.5	859.87	56.92
J204	3.85	736.81	861.65	54.09
J2041	3.85	729.76	859.9	56.39
J2043	3.85	729.51	859.9	56.5
J2045	3.85	731.27	859.82	55.7
J2047	3.85	729.96	859.85	56.28
J2049	3.85	729	859.85	56.7
J205	3.85	716.96	859.47	61.75
J2051	3.85	729.5	859.82	56.47
J2053	3.85	655.71	858.43	87.84
J2055	3.85	721.09	859.68	60.05
J2057	3.85	689.9	861.85	74.51
J2059	3.85	750.76	863.97	49.05
J206	3.85	716.87	859.1	61.63
J2061	3.85	769.08	875.59	46.15
J2063	3.85	768.08	865.3	42.13
J2065	3.85	768.02	875.23	46.46
J2067	3.85	767.51	875.23	46.67
J2069	3.85	766.04	875.95	47.62
J207	3.85	731.59	860.1	55.68
J2071	3.85	755.25	874.26	51.57
J2073	3.85	755.05	874.26	51.66
J2075	3.85	766.43	875.95	47.45
J2077	3.85	764.3	877.28	48.95
J2079	3.85	773.1	875.59	44.41
J208	3.85	733.15	860.09	55
J2081	3.85	744.11	872.33	55.56
J2083	3.85	742.08	871.58	56.11
J2085	3.85	745.97	871.56	54.42
J2087	3.85	771.82	874.78	44.61
J2089	3.85	768.2	874.78	46.18
J209	3.85	734.65	860.09	54.35
J2091	3.85	767.95	874.78	46.29
J2093	3.85	755.64	874.77	51.62
J2095	3.85	766.14	874.77	47.07
J2097	3.85	772.58	874.76	44.27
J2099	3.85	757.51	874.99	50.91
J21	3.85	771.68	868.85	42.1
J210	3.85	634.32	859.04	97.37
J2101	3.85	774.22	878.47	45.17
J2103	3.85	745.21	868.57	53.45
J2105	3.85	741.64	869.26	55.3
J2107	3.85	743.15	869.19	54.61
J2109	3.85	744.66	869.41	54.05
J211	3.85	739.03	861.17	52.92
J2111	3.85	740.01	867.11	55.07
J2113	3.85	742	867.11	54.21
J2115	3.85	743.3	867.11	53.65

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2117	3.85	742.76	867.12	53.89
J2119	3.85	744.54	867.12	53.12
J212	3.85	737.57	860.95	53.46
J2121	3.85	741.3	860.55	51.67
J2123	0	804.66	898.16	40.51
J2125	0	860.5	886.86	11.42
J2127	0	860.5	886.86	11.42
J2129	0	856.5	886.86	13.16
J213	3.85	733.63	861	55.19
J2131	0	860.5	886.86	11.42
J2133	3.85	719.5	861.77	61.64
J2135	3.85	650.5	858.43	90.09
J2137	3.85	654.5	858.43	88.36
J2139	3.85	739.41	861.9	53.07
J214	3.85	744.28	860.63	50.42
J2141	3.85	739.41	861.75	53.01
J2143	3.85	750.78	861.31	47.89
J2145	3.85	750.88	865.01	49.45
J2147	3.85	741.58	865.43	53.66
J2149	3.85	741.39	865.41	53.74
J215	3.85	739.7	860.63	52.4
J2151	3.85	740.57	865.45	54.11
J2155	3.85	740.19	865.44	54.27
J2157	3.85	741.3	865.44	53.79
J2159	3.85	746.61	865.15	51.37
J216	3.85	745.45	895.86	65.17
J2161	3.85	757.12	861	45.01
J2163	3.85	747.32	861.91	49.65
J2165	3.85	697.36	861.79	71.25
J2167	0	764.82	863.73	42.86
J2169	0	755.95	860.89	45.47
J217	0	852.1	887.29	15.25
J2171	0	782.75	885.8	44.65
J2173	0	750.26	866.27	50.27
J2175	0	741.57	864.57	53.3
J2177	0	739.55	864.19	54.01
J2179	0	638	858.62	95.6
J218	0	850.25	886.51	15.71
J219	3.85	745.41	885.53	60.72
J22	3.85	737.78	869.24	56.96
J220	3.85	746.04	878.07	57.21
J221	3.85	743.78	865.25	52.63
J222	3.85	744.1	868.86	54.06
J223	3.85	746.97	870.79	53.65
J224	3.85	750.01	869.17	51.63
J225	3.85	744.04	866.76	53.18
J226	3.85	747.76	866.63	51.51
J227	3.85	747.93	866.47	51.37
J228	3.85	752.61	866.28	49.25
J229	3.85	745.28	865.18	51.95
J23	3.85	714.66	865.65	65.42
J230	3.85	755.26	866.27	48.1
J231	3.85	750.14	864.28	49.46
J232	3.85	676.34	866.09	82.22
J233	3.85	668.84	865.46	85.2
J234	3.85	669.87	864.92	84.51
J235	3.85	665.41	864.4	86.22
J236	3.85	674.91	863.9	81.89

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J237	3.85	677.27	863.56	80.72
J238	3.85	663.98	862.99	86.23
J239	3.85	707.04	862.06	67.17
J24	3.85	692.37	865.58	75.05
J240	3.85	698.76	862.29	70.86
J241	3.85	706.7	862.35	67.44
J242	3.85	713.03	862.47	64.75
J243	3.85	676.5	861.42	80.12
J244	3.85	735.38	861.66	54.72
J245	3.85	739.5	861.69	52.95
J246	3.85	733.24	861.58	55.61
J247	3.85	743.14	861.5	51.28
J248	3.85	723.11	860.96	59.73
J249	3.85	747	861.61	49.66
J25	3.85	738.98	867.28	55.59
J250	3.85	749.44	861.42	48.52
J251	3.85	747.37	861.42	49.42
J252	3.85	754.59	861.3	46.24
J253	3.85	747.71	861.32	49.23
J254	3.85	742.3	861.62	51.7
J255	3.85	744.33	861.79	50.9
J256	3.85	748.7	862.67	49.38
J257	3.85	757.4	861.04	44.91
J258	3.85	760.5	861.26	43.66
J259	3.85	744.21	861.52	50.83
J26	3.85	748.16	872.37	53.82
J260	3.85	729.03	860.33	56.89
J261	3.85	745.11	860.47	49.98
J262	3.85	752.69	860.9	46.89
J263	3.85	757.5	860.71	44.72
J264	3.85	754.21	860.58	46.09
J265	3.85	731.79	860.33	55.7
J266	3.85	728.28	860.34	57.22
J267	3.85	737.87	860.35	53.07
J268	3.85	736.96	860.3	53.45
J269	3.85	736.98	860.3	53.43
J27	3.85	744.93	866.22	52.55
J270	3.85	731.17	859.85	55.76
J271	3.85	743.33	860.31	50.69
J272	3.85	744.12	860.35	50.36
J273	3.85	742.79	860.47	50.99
J274	3.85	763.81	878.25	49.59
J275	3.85	739.78	860.29	52.21
J276	3.85	740.51	862.04	52.66
J277	3.85	737.13	861.64	53.95
J278	3.85	737.09	861.29	53.82
J279	3.85	734.46	861.29	54.95
J28	3.85	750.72	866.24	50.06
J280	3.85	734.18	861.35	55.1
J281	3.85	733.14	861.75	55.73
J282	0	828.26	898.69	30.51
J283	3.85	734.46	862.48	55.47
J284	3.85	767.9	874.8	46.32
J285	3.85	742.9	871.4	55.68
J286	3.85	735.01	862.88	55.41
J287	3.85	738.52	863.47	54.14
J288	3.85	737.3	863.6	54.73
J289	3.85	740.46	863.69	53.4

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J29	3.85	754.1	866.31	48.62
J290	3.85	739.21	863.84	54.01
J291	3.85	739.16	863.83	54.02
J292	3.85	738.57	863.74	54.24
J293	3.85	740.15	863.93	53.63
J294	3.85	740.53	864.03	53.51
J295	3.85	741.18	864.13	53.27
J296	3.85	742.64	864.25	52.69
J297	3.85	742.59	864.07	52.64
J298	3.85	742.38	864.38	52.86
J299	3.85	740.24	864.56	53.87
J3	3.85	569.67	860.26	125.91
J30	3.85	749.68	861.29	48.36
J300	3.85	741.16	863.06	52.82
J301	3.85	741.83	861.66	51.92
J302	3.85	746.63	860.68	49.42
J303	3.85	755.22	868.49	49.08
J304	3.85	753.99	868.51	49.62
J305	3.85	753.9	868.52	49.67
J306	3.85	752.14	868.53	50.43
J307	3.85	744.65	868.56	53.69
J308	0	736.45	780	18.87
J31	3.85	741.12	861.89	52.33
J310	0	734.49	968.92	101.58
J311	3.85	740.22	869.05	55.82
J312	3.85	740.72	867.76	55.05
J313	3.85	742.31	867.15	54.09
J314	3.85	742.94	867.81	54.11
J315	3.85	726.61	860.34	57.95
J316	3.85	742.91	867.13	53.82
J317	3.85	741.99	867.12	54.22
J318	3.85	741.18	867.11	54.57
J319	3.85	742.29	867.11	54.08
J32	3.85	725.46	866.75	61.22
J320	3.85	741.71	867.11	54.33
J321	3.85	741.82	867.1	54.28
J322	3.85	742.9	864.77	52.8
J323	3.85	740.61	864.8	53.81
J324	3.85	738.56	866.05	55.24
J325	3.85	741.79	864.55	53.19
J326	3.85	742.96	864.63	52.72
J327	3.85	742.61	864.69	52.9
J328	3.85	740.47	864.76	53.85
J329	3.85	739.09	863.96	54.11
J33	3.85	743.9	864.69	52.34
J330	3.85	741.62	865.3	53.59
J331	3.85	737.08	866.42	56.04
J332	3.85	735.92	866.69	56.66
J333	3.85	737.3	869.29	57.19
J334	3.85	744.5	865.36	52.37
J335	3.85	740.83	865.36	53.96
J336	3.85	741.67	865.48	53.65
J337	3.85	742.05	865.67	53.56
J338	3.85	744.35	866.2	52.8
J339	3.85	741.73	865.43	53.6
J34	3.85	736.01	863.2	55.11
J340	3.85	739.71	865.46	54.49
J341	3.85	737.83	865.47	55.31

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J342	3.85	738.31	865.57	55.14
J343	3.85	740.81	866.65	54.52
J344	3.85	735.38	867.49	57.24
J345	3.85	730.14	868.12	59.79
J346	3.85	744.34	866.67	53
J347	3.85	748.57	860.51	48.5
J348	3.85	759.08	868.47	47.4
J349	3.85	746.42	860.25	49.32
J35	3.85	719.59	863.34	62.29
J350	3.85	743.58	860.14	50.51
J351	3.85	745.5	860.08	49.65
J352	0	860.5	888.96	12.33
J353	3.85	684.65	866.5	78.8
J354	3.85	694.99	859.93	71.47
J355	3.85	695.72	860.03	71.19
J356	3.85	724.25	860.08	58.85
J357	3.85	730.27	860.16	56.28
J358	3.85	733.89	860.31	54.78
J359	3.85	734.9	860.09	54.25
J36	3.85	713.97	862.41	64.32
J360	3.85	721.99	859.56	59.61
J361	3.85	717.48	859.48	61.53
J362	3.85	675.07	859.44	79.89
J363	3.85	722.29	859.25	59.35
J364	3.85	711.8	859	63.78
J365	3.85	703.45	858.81	67.32
J366	3.85	697.5	858.89	69.93
J367	3.85	701.46	859.18	68.34
J368	3.85	710.5	859.39	64.51
J369	3.85	715.14	859.64	62.61
J37	3.85	677.65	863.06	80.34
J370	3.85	726.55	859.87	57.77
J371	3.85	728.1	860.09	57.19
J372	3.85	654.82	859.03	88.48
J373	3.85	652.94	859.11	89.33
J374	3.85	650.34	859.23	90.51
J375	3.85	655.64	860.3	88.68
J376	3.85	696.57	860.34	70.96
J377	3.85	726.11	860.37	58.17
J378	3.85	650.76	860.31	90.8
J379	3.85	644.76	859.64	93.11
J38	3.85	678.66	862.27	79.56
J380	3.85	641.79	860.04	94.57
J381	3.85	648.7	860.51	91.78
J382	3.85	650.7	860.72	91
J383	3.85	646.07	860.29	92.82
J384	3.85	638.72	860.28	96
J385	3.85	642.88	860.27	94.2
J386	3.85	738.45	866.07	55.3
J387	3.85	751.37	860.58	47.32
J388	3.85	747.43	860.52	49
J389	3.85	746.74	860.58	49.33
J39	3.85	648.95	861.64	92.16
J390	3.85	749.7	860.48	48
J391	3.85	751.27	860.5	47.33
J392	3.85	753.64	860.5	46.3
J393	3.85	750.15	860.46	47.8
J394	3.85	748.92	860.44	48.32

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J395	3.85	750.3	860.43	47.72
J396	3.85	749.59	860.45	48.03
J397	3.85	750.19	860.58	47.83
J398	3.85	757.06	868.37	48.23
J399	3.85	767.79	868.64	43.7
J4	3.85	563.76	860.26	128.47
J40	3.85	654.76	860.27	89.05
J400	3.85	752.67	869.04	50.42
J401	3.85	733.52	868.66	58.55
J402	3.85	742.59	869.68	55.07
J403	0	737.47	913.57	76.3
J404	3.85	736.3	870.54	58.17
J405	3.85	743.52	872.33	55.81
J407	3.85	766.06	882.69	50.53
J408	3.85	745.37	882.69	59.5
J409	3.85	745.93	878.24	57.33
J41	3.85	647.75	860.27	92.09
J410	3.85	772.06	882.69	47.94
J411	3.85	781.77	882.69	43.73
J412	3.85	776.06	882.7	46.21
J413	3.85	738.9	870.75	57.13
J414	3.85	746.29	873.3	55.03
J415	3.85	778.03	878.3	43.45
J416	3.78	784.18	883.23	42.92
J417	2.82	788.86	982.19	83.77
J418	0	945.64	982.29	15.88
J419	2.82	777.5	982.18	88.69
J42	3.85	641.05	858.34	94.15
J420	3.85	555.78	857.42	130.7
J421	3.85	577.17	857.42	121.43
J422	3.85	621.21	857.48	102.38
J423	3.85	618.82	857.6	103.46
J424	3.85	620.57	857.61	102.71
J425	3.85	617.63	857.64	103.99
J426	3.85	629.03	857.63	99.05
J427	3.85	637.37	857.61	95.43
J428	3.85	638.64	857.62	94.89
J429	3.85	628.62	857.73	99.27
J43	3.85	647.5	858.31	91.34
J430	3.85	545.92	857.43	134.98
J431	3.85	553.27	857.47	131.81
J432	3.85	603.53	857.5	110.05
J433	3.85	603.62	857.53	110.02
J434	3.85	630.32	857.62	98.49
J435	3.85	598.57	857.75	112.3
J436	3.85	626.94	857.86	100.06
J437	3.85	622.69	858.11	102.01
J438	3.85	636.37	858.36	96.19
J439	3.85	638.3	858.52	95.42
J44	3.85	642.94	858.32	93.33
J440	3.85	646.5	858.69	91.94
J441	3.85	652.5	858.86	89.42
J442	3.85	643.14	858.59	93.36
J443	3.85	570.64	858.97	124.93
J444	3.85	571.17	859.75	125.04
J445	3.85	574.81	859.87	123.52
J446	3.85	584.58	860.01	119.35
J447	3.85	623.13	860.15	102.7

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J448	3.85	584.44	860.26	119.51
J449	3.85	574.21	860.25	123.94
J45	3.85	636.55	858.17	96.03
J450	3.85	638.3	857.71	95.07
J451	3.85	639.38	857.95	94.71
J452	3.85	636.21	857.8	96.01
J453	3.85	641.25	858.08	93.95
J454	3.85	638.93	857.95	94.9
J455	3.85	640.4	858.2	94.37
J456	3.85	640.34	858.19	94.39
J457	3.85	640.97	858.19	94.12
J458	3.85	635.34	858.25	96.59
J459	3.85	640.66	858.27	94.29
J46	3.85	649.37	858.41	90.58
J460	3.85	646.52	858.22	91.73
J461	3.85	645.71	858.33	92.13
J462	3.85	637.77	858.35	95.58
J463	3.85	643.85	858.29	92.92
J464	3.85	636.19	858.31	96.24
J465	3.85	637.08	858.48	95.93
J466	3.85	635.13	858.72	96.88
J467	3.85	647.69	858.51	91.35
J468	3.85	674.74	858.7	79.71
J469	3.85	676.34	858.7	79.02
J47	3.85	657.1	858.44	87.24
J470	3.85	634.97	858.99	97.07
J471	3.85	638.98	859.13	95.39
J472	3.85	649.78	858.59	90.48
J473	3.85	689.82	858.74	73.19
J474	3.85	683.94	858.71	75.73
J475	3.85	654.94	858.77	88.32
J476	3.85	694.79	858.74	71.04
J477	3.85	584.5	860.5	119.59
J478	3.85	643.57	861.02	94.22
J479	3.85	655.15	861.49	89.41
J48	3.85	600.43	858.43	111.79
J480	3.85	655.08	861.57	89.47
J481	3.85	680.01	861.95	78.84
J482	3.85	682.82	862.07	77.67
J483	3.85	677.17	862.2	80.17
J484	3.85	701.14	862.5	69.92
J485	3.85	686.94	863.15	76.35
J486	3.85	634.99	859.34	97.21
J487	3.85	612.01	859.8	107.36
J488	3.85	638.07	860.16	96.23
J489	3.85	650.78	860.9	91.05
J49	3.85	599.64	857.52	111.74
J490	3.85	646.1	861.28	93.24
J491	3.85	650.57	861.99	91.61
J492	3.85	669.42	862.35	83.6
J493	3.85	675.83	863.66	81.38
J494	3.85	684.98	864.28	77.69
J495	3.85	685.29	864.73	77.75
J496	3.85	696.81	865.43	73.06
J497	3.85	699.69	865.44	71.82
J498	3.85	703.54	865.48	70.17
J499	3.85	707.08	865.53	68.66
J5	3.85	655.93	861.42	89.04

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J50	3.85	602.7	857.59	110.44
J500	3.85	686.41	865.99	77.81
J501	3.85	695.06	864.98	73.63
J502	3.85	695.71	864.53	73.15
J503	3.85	685.35	864.09	77.45
J504	3.85	686.63	863.87	76.8
J505	3.85	680.5	863.66	79.36
J506	3.85	691.2	863.65	74.72
J507	3.85	697.82	863.64	71.85
J508	3.85	710.92	863.64	66.17
J509	2.67	860.18	1084.38	97.15
J51	3.85	569.42	857.42	124.79
J510	2.67	823.27	1084.4	113.15
J511	0.21	883.93	1084.41	86.87
J512	2.67	904.36	1084.42	78.02
J513	0.21	947.39	1084.43	59.38
J514	0	759.15	987.58	98.98
J515	3.85	654.1	860.27	89.33
J516	3.85	748.89	864.96	50.29
J517	1.65	743.15	864.98	52.79
J518	3.85	742.02	865.11	53.33
J519	3.85	737.82	865.21	55.2
J52	3.85	545.16	857.44	135.31
J520	3.85	723.36	865.42	61.55
J521	3.85	723.42	866.31	61.91
J522	3.85	724.74	867.26	61.76
J523	3.85	728.61	867.69	60.27
J524	3.85	728.83	867.28	59.99
J525	3.85	739.65	864.43	54.07
J526	3.85	730.85	860.28	56.08
J527	3.85	755.82	863.2	46.53
J528	3.85	763.33	864.66	43.91
J529	3.85	744.79	865.21	52.18
J53	3.85	621.31	857.65	102.41
J530	3.85	736.03	862.2	54.67
J531	3.85	745.7	862.52	50.61
J532	3.85	750.07	862.95	48.91
J533	3.85	738.58	863.4	54.09
J534	3.85	747.82	865	50.77
J535	3.85	739.09	863.19	53.77
J536	3.85	749.46	861.08	48.36
J537	3.85	750.57	861.05	47.87
J538	3.85	753.32	861.02	46.66
J539	3.85	755.22	860.98	45.83
J54	3.85	622.02	857.64	102.1
J540	3.85	752.92	860.94	46.81
J541	3.85	606.13	857.55	108.94
J542	3.85	731.49	863.35	57.14
J543	3.85	634.66	859.35	97.36
J544	3.85	628.32	859.34	100.1
J545	3.85	627.66	859.34	100.39
J546	3.85	627.81	859.34	100.32
J547	3.85	626.52	859.34	100.88
J548	3.85	631.35	859.34	98.79
J549	3.85	733.55	860.41	54.97
J55	3.85	622.17	857.68	102.05
J550	3.85	733.31	860.2	54.98
J551	3.85	731.64	860.16	55.69

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J552	3.85	728.45	860.08	57.04
J553	3.85	731.87	860.1	55.56
J554	3.85	731.9	860.02	55.51
J555	3.85	732.56	859.93	55.19
J556	3.85	730.08	859.9	56.25
J557	3.85	729.95	859.87	56.29
J558	3.85	729.03	859.86	56.69
J559	3.85	727.5	859.84	57.34
J56	3.85	631.55	857.61	97.95
J560	3.85	730.55	859.81	56.01
J561	3.85	739.27	860.34	52.46
J562	3.85	746.05	860.35	49.52
J563	3.85	761.31	864.91	44.89
J564	3.85	742.16	865.47	53.43
J565	3.85	742.22	860.35	51.19
J566	3.85	739.76	860.35	52.25
J567	3.85	739.34	860.35	52.44
J568	3.85	740.98	865.39	53.9
J569	3.85	740.58	860.36	51.9
J57	3.85	636.31	857.65	95.91
J570	3.85	742.59	865.49	53.25
J571	3.85	745.41	860.37	49.81
J572	3.85	745.52	860.38	49.77
J573	3.85	746.57	860.37	49.31
J574	3.85	743.24	867.4	53.8
J575	3.85	754.85	866.3	48.29
J576	3.85	743.63	860.36	50.58
J577	3.85	741.82	860.36	51.36
J578	3.85	745.8	860.47	49.69
J579	3.85	753.28	866.31	48.97
J58	3.85	640.44	858.2	94.35
J580	3.85	640.6	842.1	87.31
J581	3.85	738.84	867.13	55.59
J582	3.85	743.94	860.47	50.49
J583	3.85	746.61	860.44	49.32
J584	3.85	745.05	860.4	49.98
J585	3.85	742.38	860.37	51.12
J586	3.85	742.44	865.4	53.28
J587	3.85	744.88	860.33	50.02
J588	3.85	746.89	862.63	50.15
J589	3.85	746.58	862.06	50.04
J59	3.85	640.89	858.2	94.16
J590	3.85	745.36	861.38	50.27
J591	3.85	640.47	858.2	94.34
J592	3.85	613.06	859.95	106.98
J593	3.85	650.36	858.41	90.15
J594	3.85	570.08	860.25	125.73
J595	3.85	658.46	861.72	88.07
J596	3.85	694.06	865.39	74.24
J597	3.85	740.88	868.86	55.45
J598	0	940.61	1084.43	62.32
J599	0	946.59	987	17.51
J6	3.85	658.02	861.72	88.26
J60	3.85	646.39	858.19	91.77
J600	0	953.99	982.3	12.27
J601	3.85	765.91	877.28	48.26
J602	3.85	767.5	880.28	48.87
J603	3.85	773.18	881.34	46.87

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J604	3.85	777.06	882.69	45.77
J605	3.85	774.13	882.69	47.04
J606	0	873.85	907.36	14.52
J607	2.82	789.7	982.17	83.4
J608	3.85	769.15	878.26	47.28
J61	3.85	639.59	858.37	94.8
J610	3.85	638.83	841.22	87.7
J611	3.85	739.92	864.05	53.79
J612	3.85	646.57	857.61	91.44
J614	3.85	779.53	878.26	42.78
J616	3.85	646.1	852.61	89.48
J618	3.85	746.06	860.33	49.51
J619	0	860.5	886.86	11.42
J62	3.85	636.37	858.59	96.29
J620	0	745.32	930.41	80.2
J621	0	739.59	955.33	93.48
J622	3.85	744.6	878.25	57.91
J623	0	851	886.69	15.46
J624	3.11	944.37	1167.84	96.83
J625	3.11	990.71	1167.83	76.75
J626	2.82	887.1	982.24	41.22
J627	2.67	931.28	1084.42	66.35
J628	2.67	907.3	1084.38	76.73
J629	1.65	779.76	899.2	51.76
J63	3.85	647.97	858.44	91.2
J630	1.65	790.7	899.21	47.02
J631	3.85	749.43	861.28	48.47
J632	3.85	750.94	861.26	47.8
J633	3.85	684	863.67	77.85
J634	3.85	754.78	880.95	54.67
J635	3.85	752.6	868.64	50.28
J636	3.85	753.32	868.51	49.91
J637	3.85	737.88	868.51	56.6
J638	3.85	659.69	858.69	86.23
J639	3.85	638.41	857.86	95.09
J64	3.85	642.28	859.36	94.06
J640	3.85	641.37	857.85	93.8
J641	3.85	752.78	861.26	47.01
J642	3.85	751.23	861.27	47.68
J643	3.85	754.53	861.39	46.3
J645	3.85	726.5	861.55	58.52
J646	3.85	743.85	861.49	50.97
J647	3.85	744.8	861.45	50.54
J648	3.85	649.59	847.09	85.58
J649	3.85	753.44	864.93	48.31
J65	3.85	689.17	858.97	73.57
J650	3.85	736.39	861.56	54.24
J651	3.85	749.28	861.6	48.67
J652	3.85	744.44	861.63	50.77
J653	3.85	727.28	861.67	58.23
J654	3.85	651.82	845.34	83.85
J655	3.85	722.97	861.66	60.09
J656	3.85	728.49	861.66	57.7
J657	3.85	724.48	861.66	59.44
J658	3.85	723.36	861.67	59.93
J659	3.85	745.49	861.67	50.34
J66	3.85	650.32	860.3	90.98
J660	3.85	719.57	861.66	61.57

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J661	3.85	747.82	862.03	49.49
J662	3.85	723.41	862.45	60.25
J663	3.85	718.35	862.45	62.44
J664	3.85	731.62	862.95	56.9
J665	3.85	737.16	862.95	54.51
J666	3.85	747.01	865.17	51.2
J667	3.85	749.78	865.17	50
J668	3.85	747.89	865.46	50.94
J669	3.85	749.76	865.46	50.13
J67	3.85	644.65	860.3	93.44
J670	3.85	747.15	866.27	51.61
J671	3.85	749.19	870.17	52.42
J672	3.85	747.46	875.55	55.5
J673	3.85	748.85	864.96	50.31
J674	3.85	740.87	870.4	56.12
J675	3.85	740.67	865.34	54.02
J676	3.85	740.66	869.55	55.85
J677	3.85	743.84	865.25	52.61
J678	3.85	746.67	864.68	51.13
J679	3.85	740.46	869.72	56.01
J68	3.85	669.21	860.32	82.81
J680	3.85	741.3	864.8	53.51
J681	3.85	740.73	864.9	53.8
J682	3.85	741.9	864.86	53.28
J683	3.85	742.08	864.82	53.18
J684	3.85	741.25	864.04	53.21
J685	3.85	743.77	869.71	54.57
J686	3.85	743.32	863.87	52.24
J687	3.85	740.45	863.58	53.35
J688	3.85	740.28	863.23	53.27
J689	3.85	740.16	861.76	52.69
J69	3.85	690.69	861.16	73.86
J690	3.85	744.91	861.95	50.71
J691	3.85	742.33	861.17	51.49
J692	3.85	746.1	861.25	49.89
J693	3.85	743.87	861.27	50.87
J694	3.85	742.9	861.48	51.38
J695	3.85	741.56	861.17	51.83
J696	3.85	738.03	861.17	53.36
J697	3.85	737.53	861.17	53.57
J698	3.85	657.22	844.66	81.22
J699	3.85	749.25	862.03	48.87
J7	3.85	694.08	862.66	73.05
J70	3.85	713.01	860.39	63.86
J700	3.85	757.12	860.61	44.84
J701	3.85	751.78	860.71	47.2
J703	3.85	735.5	860.56	54.19
J705	3.85	738.5	860.5	52.86
J706	3.85	741.84	860.46	51.4
J707	3.85	739.19	860.41	52.53
J708	3.85	736.93	860.36	53.48
J709	3.85	735.55	860.33	54.07
J71	3.85	721.78	861.68	60.62
J710	3.85	739.87	860.64	52.33
J711	3.85	733.29	860.32	55.04
J712	3.85	717.81	859.06	61.2
J713	3.85	731.13	860.33	55.98
J715	3.85	735.13	860.26	54.22

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J716	3.85	737.95	860.26	53
J717	3.85	740.21	860.26	52.02
J718	3.85	739.84	869.07	56
J719	3.85	740.55	869.04	55.68
J72	3.85	746.09	861.39	49.96
J720	3.85	739.17	863.53	53.88
J721	3.85	742.33	869.85	55.25
J722	3.85	744.79	870.03	54.27
J723	3.85	746.34	869.78	53.49
J724	3.85	746.61	869.9	53.42
J725	3.85	763.44	870	46.17
J726	3.85	740.07	868.15	55.5
J727	3.85	742.78	867.79	54.17
J728	3.85	742.8	867.78	54.16
J729	3.85	742.31	867.78	54.37
J73	3.85	729.71	861.77	57.22
J730	3.85	772.75	875.59	44.56
J731	3.85	781.32	882.69	43.92
J732	0	800.35	882.69	35.68
J733	0	778.44	882.69	45.17
J734	0	805.46	882.69	33.47
J735	0	807.96	882.69	32.38
J736	0	804.38	882.69	33.93
J737	3.85	757.42	878.25	52.36
J738	3.85	763.18	878.25	49.86
J739	3.85	771.94	878.25	46.06
J74	3.85	741.25	861.81	52.24
J740	3.85	774.36	878.29	45.04
J741	3.85	775.23	878.57	44.78
J742	3.85	776.23	878.69	44.39
J743	3.85	739.62	868.98	56.05
J744	3.85	741.66	869.04	55.19
J745	3.85	778.16	879.03	43.71
J746	3.85	778.53	878.86	43.47
J747	3.85	732.09	867.82	58.81
J748	3.85	740.04	868.18	55.52
J749	3.85	730.5	868.06	59.6
J75	3.85	755.06	861.38	46.07
J750	3.85	731.5	867.99	59.14
J751	0	868.14	886.86	8.11
J752	0	874.74	1196.74	139.52
J753	0.23	818.07	1006.84	81.79
J754	0.23	793.12	1006.84	92.6
J755	0	875.61	1006.85	56.87
J756	0	820.41	914.51	40.77
J757	3.85	755.11	870	49.78
J758	3.85	718.82	859.27	60.86
J759	0	737.79	971.68	101.35
J76	3.85	755.06	861.12	45.95
J760	3.85	722.87	861.69	60.15
J761	3.85	731.27	860.34	55.93
J762	3.85	747.32	865.14	51.05
J763	3.85	743.88	875.1	56.85
J764	3.85	742.75	874.56	57.11
J766	3.85	658.59	861.71	88.01
J767	3.85	687.5	861.8	75.52
J768	3.85	693.02	861.74	73.11
J769	3.85	682.38	861.73	77.71

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J77	3.85	729.22	862.08	57.56
J770	3.85	676.03	861.72	80.46
J771	3.85	715.05	861.72	63.55
J772	3.85	712.25	861.73	64.77
J773	3.85	731.78	861.72	56.3
J774	3.85	706.34	861.72	67.32
J775	0	945.07	1272.48	141.87
J776	3.85	762.52	861.71	42.98
J777	3.85	692.32	861.72	73.4
J778	3.85	763.22	861.72	42.68
J779	6.66	751.59	973.72	96.25
J78	3.85	736.82	861.85	54.18
J780	3.85	720.79	861.68	61.05
J781	6.66	798.64	973.61	75.82
J782	6.66	841.45	973.57	57.25
J783	3.85	724.99	861.65	59.21
J784	0	723.75	1062.36	146.72
J785	3.85	676.57	861.72	80.22
J786	3.85	740.26	869.38	55.95
J787	3.85	741.85	869.37	55.26
J788	3.85	742.08	869.54	55.23
J789	3.85	744.75	869.68	54.14
J79	3.85	730.11	862.44	57.34
J790	3.85	744.49	869.66	54.24
J791	3.85	752.92	866.37	49.16
J793	3.85	738.36	862.19	53.66
J794	3.85	724.19	856.46	57.31
J795	3.85	741.16	863.7	53.1
J796	3.85	652.69	861.71	90.57
J797	3.85	651.84	861.71	90.94
J798	3.85	696.81	861.93	71.55
J799	3.85	749.41	880.32	56.72
J8	3.85	684.38	863.67	77.69
J80	3.85	734.94	861.87	55
J800	0	725.02	973.85	107.82
J801	3.85	653.5	858.44	88.8
J802	3.85	724.24	856.19	57.17
J804	3.85	701.05	859.61	68.7
J806	3.85	690.17	858.91	73.11
J808	3.85	740.46	865.12	54.01
J809	3.85	740.16	865.24	54.19
J81	3.85	741.25	861.69	52.19
J810	3.85	646.57	858.72	91.93
J811	3.85	731.55	867.94	59.1
J812	3.85	725.34	859.42	58.1
J816	3.85	742.5	865.97	53.5
J817	3.85	737.7	866.64	55.87
J819	0	782.75	885.8	44.65
J82	3.85	745.64	861.51	50.21
J820	0	785.26	885.36	43.37
J821	0	785.34	982.18	85.29
J822	0	782.84	982.18	86.38
J823	0	782.68	1224.76	191.55
J824	3.85	781.93	868.46	37.49
J825	2.82	781.61	982.17	86.9
J826	0	781.87	868.46	37.52
J827	3.85	729.42	860.34	56.73
J828	3.85	748.75	862.68	49.36

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J829	2.67	906.5	1084.39	77.08
J83	3.85	729.14	860.32	56.84
J830	0	940.13	987	20.31
J831	0	903.75	987.24	36.18
J832	3.85	753.82	862.82	47.23
J833	3.85	738.49	860.35	52.8
J834	3.85	761.36	864.9	44.86
J835	3.85	725.53	860.34	58.41
J836	3.85	761.19	863.27	44.23
J837	3.85	759.45	863.24	44.97
J838	2.82	775.59	982.21	89.53
J839	3.85	779.19	982.18	87.96
J84	3.85	756.26	860.89	45.34
J840	2.82	780.99	982.18	87.18
J841	0	802.45	982.18	77.88
J842	0	817.46	982.18	71.38
J843	0	817.77	982.18	71.24
J844	0	841.74	982.18	60.85
J845	0	818.56	982.18	70.9
J846	0	817.59	982.18	71.32
J847	0	824.15	982.18	68.48
J848	0	814.1	982.18	72.83
J849	0	837.89	982.18	62.52
J85	3.85	755.58	861.26	45.79
J850	0	827.38	982.18	67.08
J851	0	815.81	982.18	72.09
J852	0	818.55	982.18	70.9
J853	0	797.41	982.18	80.06
J854	0	830.05	982.18	65.92
J855	0	825.43	982.18	67.92
J856	0	796.7	982.18	80.37
J857	0	788.15	982.18	84.08
J858	0	789.12	982.18	83.65
J859	0	780.6	982.18	87.35
J86	3.85	736.7	862.54	54.53
J860	0	782.53	982.18	86.51
J861	3.85	731.85	860.25	55.63
J862	0	777.39	982.18	88.74
J863	3.85	742.95	869.11	54.67
J864	3.85	746.1	868.34	52.97
J865	0	814.15	982.18	72.81
J866	3.85	745.71	869.77	53.76
J867	0	860.5	889.2	12.44
J868	3.85	747	869.89	53.25
J869	3.85	751.26	870.01	51.45
J87	3.85	743.22	861.8	51.38
J870	0	860.5	886.86	11.42
J871	0	803.5	886.08	35.78
J872	0	836.95	886.02	21.26
J873	0	807.37	886.11	34.12
J874	3.85	752.03	870	51.12
J875	3.85	748.29	870.07	52.77
J876	3.85	747.89	870.03	52.92
J877	3.85	731.96	859.76	55.37
J88	3.85	744.7	861.68	50.69
J881	3.85	739.96	860.13	52.07
J885	3.85	741.52	860.33	51.48
J887	3.85	741.27	860.18	51.52

2022 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J889	3.85	734.32	860.32	54.6
J89	3.85	744.43	861.45	50.71
J893	3.85	735.02	860.43	54.34
J895	3.85	748.91	860.47	48.34
J897	3.85	747.98	860.46	48.74
J899	3.85	751.32	860.45	47.29
J9	3.85	711.1	863.64	66.09
J90	3.85	743.32	863.18	51.94
J901	3.85	750.36	860.45	47.7
J903	3.85	738.76	860.34	52.68
J907	3.85	744.6	860.34	50.15
J91	3.85	746.64	862.06	50.01
J913	3.85	748.2	860.36	48.6
J915	3.85	738.76	860.36	52.69
J92	3.85	749.05	861.98	48.93
J921	3.85	745.5	860.54	49.85
J925	3.85	741.11	860.7	51.82
J93	3.85	748.47	862.03	49.21
J931	3.85	741.47	860.79	51.7
J935	3.85	732.92	860.9	55.45
J937	3.85	751.69	860.52	47.16
J939	3.85	752.27	860.52	46.9
J94	3.85	746.47	862.09	50.1
J941	3.85	752.36	860.51	46.86
J943	3.85	738.67	861.17	53.08
J945	3.85	737.34	861.16	53.65
J95	3.85	742.52	862.09	51.81
J955	3.85	735.05	861.29	54.7
J96	3.85	740.95	861.89	52.4
J963	3.85	738.62	861	53.03
J965	3.85	740.24	861.08	52.36
J969	3.85	740.83	860.96	52.05
J97	3.85	745.71	864.28	51.38
J973	3.85	742.41	860.88	51.33
J98	3.85	744.92	863.27	51.28
J983	3.85	741.27	860.17	51.52
J987	3.85	731.06	860.34	56.02
J99	3.85	752.09	862.74	47.94
J993	3.85	726.44	860.33	58.01
J997	3.85	746.15	860.55	49.57
J999	3.85	747.74	860.55	48.88

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1	4.39	566.48	851.72	123.59
J10	4.39	741.1	858.32	50.79
J100	4.39	746.17	855.58	47.41
J1000	3.05	916.3	1084.37	72.83
J1001	4.39	749.82	852.86	44.65
J1002	3.05	836.78	1084.37	107.28
J1003	3.05	894.03	1084.37	82.47
J1004	3.05	882.91	1084.37	87.29
J1005	0	794.26	1084.36	125.7
J1006	0	826.5	899.2	31.5
J1007	1.88	785.8	899.2	49.14
J1008	1.88	746.77	899.2	66.05
J101	4.39	741.65	855.43	49.3
J1011	4.39	751.78	853.34	44.01
J1015	4.39	739.77	858.97	51.65
J1016	4.39	714.9	853.65	60.12
J1017	4.39	722.76	853.65	56.71
J1018	4.39	741.36	857.35	50.26
J1019	4.39	752.8	853.4	43.59
J102	4.39	740.23	855.13	49.78
J1020	4.39	531.5	848.99	137.57
J1021	4.39	622.73	849.12	98.1
J1022	4.39	739.58	859.38	51.91
J1023	4.39	754.87	853.39	42.69
J1024	4.39	742.05	852.59	47.9
J1025	4.39	729.63	851.97	53.01
J1026	4.39	738.8	852.47	49.26
J1027	4.39	736.1	852.46	50.42
J1028	4.39	721.15	851.73	56.58
J1029	4.39	720.66	851.51	56.69
J103	4.39	746.38	857.12	47.98
J1030	4.39	717.88	851.47	57.88
J1031	4.39	714.15	851.47	59.5
J1032	4.39	710.41	851.4	61.09
J1033	4.39	712.48	851.4	60.19
J1034	4.39	747.5	860.97	49.17
J1035	4.39	743.72	854.38	47.95
J1037	4.39	744.88	854.5	47.5
J1038	4.39	744.8	854.58	47.57
J1039	4.39	743.6	855.83	48.63
J104	4.39	754.11	857.65	44.86
J1040	4.39	752.33	860.59	46.91
J1041	4.39	699.48	850.59	65.47
J1042	4.39	698.5	850.58	65.89
J1044	4.39	746.87	854.33	46.56
J1045	4.39	711.82	859.8	64.12
J1046	4.39	699.29	859.93	69.6
J1047	4.39	728.73	860.03	56.9
J1048	4.39	730.17	860.1	56.3
J1049	4.39	537.34	848.91	135
J105	4.39	752.36	858.51	46
J1051	4.39	650.41	850.93	86.89
J1053	4.39	752.69	853.61	43.73
J1054	4.39	775.92	862.64	37.58
J1055	4.39	778.94	862.64	36.26
J1056	3.22	781.4	982.13	86.98
J1057	3.22	777.6	982.14	88.62
J1058	4.39	634.8	849.12	92.86

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1059	4.39	646.26	849.13	87.9
J106	4.39	754.4	857.5	44.67
J1060	4.39	614.47	849	101.62
J1061	4.39	564.87	848.99	123.11
J1062	4.39	577.51	848.99	117.63
J1063	4.39	635.78	852.53	93.92
J1064	4.39	538.42	848.91	134.53
J1065	4.39	528.73	843.06	136.2
J1066	4.39	522.02	842.71	138.96
J1067	4.39	612.1	849.17	102.72
J1068	4.39	612.88	849.17	102.38
J1069	4.39	596.02	849.1	109.66
J107	4.39	755.1	857.21	44.25
J1070	4.39	595.77	849.18	109.8
J1071	4.39	605.21	849.42	105.82
J1072	4.39	639.18	849.85	91.28
J1073	4.39	645.1	849.87	88.72
J1074	4.39	624.13	851.33	98.44
J1075	4.39	646.73	851.33	88.65
J1076	4.39	710.56	850.66	60.7
J1077	4.39	728.72	852.51	53.64
J1078	4.39	675.75	850.5	75.72
J1079	4.39	672.22	850.05	77.05
J108	4.39	756.54	858.31	44.1
J1080	4.39	730.1	852.44	53.01
J1081	4.39	728.94	852.56	53.56
J1082	4.39	733.95	852.86	51.52
J1083	4.39	735.94	853.06	50.75
J1084	4.39	755.84	859.07	44.73
J1085	4.39	720.65	852.6	57.18
J1086	4.39	684.09	856.99	74.91
J1087	4.39	746.31	856.98	47.95
J109	4.39	760.71	858.41	42.34
J1091	4.39	756.36	853.57	42.12
J1095	4.39	757.17	853.56	41.76
J1097	4.39	752.15	853.69	43.99
J1099	4.39	753.67	853.03	43.05
J11	4.39	742.91	858.79	50.21
J110	4.39	747.22	858.71	48.31
J1101	4.39	748.04	854.07	45.94
J1103	4.39	747.28	853.99	46.24
J1109	4.39	745.47	854.16	47.1
J111	4.39	759.09	858.49	43.07
J1115	4.39	745.58	853.84	46.91
J1119	4.39	745.05	853.84	47.14
J112	4.39	766.64	857.2	39.24
J1121	4.39	742.97	854.43	48.29
J1125	4.39	739.81	854.06	49.5
J1127	4.39	741.68	854.05	48.69
J113	4.39	761.2	856.54	41.31
J1137	4.39	742.89	854.87	48.52
J1139	4.39	745.38	854.88	47.45
J114	4.39	758.13	856.26	42.52
J1141	4.39	746.67	854.92	46.9
J1145	4.39	741.98	855.12	49.02
J115	4.39	764.34	857.22	40.25
J1153	4.39	746.22	855.29	47.26
J1155	4.39	744.18	855.15	48.08

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1157	4.39	743.07	855.25	48.61
J116	4.39	765.33	856.54	39.52
J1163	4.39	743.69	829.85	37.33
J1165	4.39	747.48	853.83	46.08
J1169	4.39	747.67	853.83	46
J117	4.39	750.05	856.14	45.97
J1175	4.39	746.61	853.92	46.5
J1177	4.39	747.98	852.58	45.32
J1179	4.39	747.38	852.58	45.59
J118	4.39	745.53	855.98	47.86
J1181	4.39	748.67	853.78	45.54
J1183	4.39	749.7	853.76	45.09
J1187	4.39	746.04	854.3	46.91
J119	4.39	741.48	856.26	49.73
J1195	4.39	747.16	854.02	46.3
J1199	4.39	743.87	848.13	45.18
J12	4.39	632.47	833.04	86.91
J120	4.39	740.23	855.39	49.9
J1205	4.39	750.28	854.71	45.25
J1207	4.39	746.49	854.46	46.78
J121	4.39	740.41	856.21	50.17
J1211	4.39	740.75	854.5	49.29
J122	4.39	741.44	856.55	49.88
J1223	4.39	748.19	848.85	43.62
J1229	4.39	752.25	848.56	41.73
J123	4.39	739.89	856.83	50.67
J1233	4.39	748.58	855.96	46.53
J1235	4.39	750.31	855.47	45.56
J1237	4.39	753.08	855.31	44.29
J124	4.39	746.44	856.99	47.9
J1241	4.39	750.1	853.86	44.96
J1243	4.39	749.92	853.73	44.98
J1245	4.39	750.39	853.84	44.82
J125	4.39	741.36	857.1	50.15
J1251	4.39	746.16	856.07	47.63
J1253	4.39	753.91	853.92	43.34
J1255	4.39	753.86	853.59	43.21
J1259	4.39	754.31	853.92	43.16
J126	4.39	741.06	857.46	50.44
J1263	4.39	749.59	855	45.68
J1265	4.39	749.68	855.19	45.72
J1267	4.39	751.61	855.37	44.96
J1269	4.39	752.06	855.06	44.63
J127	4.39	749.17	857.35	46.88
J1271	4.39	748.04	855.05	46.37
J1273	4.39	743.74	854.58	48.02
J1275	4.39	745.02	854.58	47.47
J1277	4.39	743.22	854.58	48.25
J128	4.39	739.86	857.62	51.02
J1281	4.39	741.34	857.25	50.22
J1283	4.39	741.23	857.28	50.28
J129	4.39	741.08	857.9	50.62
J1291	4.39	740.99	857.28	50.39
J1295	4.39	738.46	857.21	51.45
J1299	4.39	741.54	858.03	50.47
J13	0	758.4	859.04	43.61
J130	4.39	751.82	857.76	45.9
J1303	4.39	739.98	855.88	50.22

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1307	4.39	746.37	856.81	47.86
J131	4.39	742.47	858.01	50.07
J1311	4.39	751.74	856.62	45.44
J1319	4.39	741.38	858.23	50.63
J132	4.39	748.62	858.07	47.42
J1321	4.39	743.72	856.71	48.96
J1323	4.39	750.98	856.31	45.64
J1325	4.39	742.2	856.19	49.39
J1327	4.39	756.31	855.99	43.19
J1329	4.39	745.93	857.37	48.29
J133	4.39	739.7	858.2	51.35
J1331	4.39	745.23	857.36	48.59
J1333	4.39	740.49	857.28	50.61
J1335	4.39	739.68	857.55	51.07
J1339	4.39	742.24	857.9	50.11
J134	4.39	750.79	858.7	46.76
J1345	4.39	742.6	857.96	49.99
J1347	4.39	741.53	857.99	50.46
J135	4.39	744.98	858.81	49.32
J1351	4.39	741.73	858.05	50.4
J1353	4.39	746.46	857.8	48.25
J1355	4.39	746.24	857.81	48.34
J1357	4.39	746.08	857.71	48.37
J1359	4.39	741.4	858.16	50.59
J136	4.39	739.83	859.01	51.64
J1361	4.39	742.36	858.09	50.15
J1363	4.39	742.09	857.93	50.19
J1367	4.39	741.71	858.09	50.43
J137	4.39	744.32	858.87	49.64
J1371	4.39	744.19	854.91	47.98
J1373	4.39	759.7	856.11	41.77
J1375	4.39	762.51	856.4	40.68
J1379	4.39	754.86	856	43.83
J138	4.39	739.45	859.71	52.11
J1381	4.39	759.63	857.48	42.4
J1385	4.39	767.59	856.91	38.7
J1389	4.39	756.58	857.83	43.87
J139	4.39	740.18	858.2	51.14
J1391	4.39	765.7	857.1	39.61
J1393	4.39	764.85	856.91	39.89
J14	4.39	733.87	859.12	54.27
J140	4.39	740.77	858.2	50.88
J1401	4.39	757.87	856.17	42.6
J1403	4.39	757.54	856.08	42.7
J1405	4.39	742.15	858.16	50.27
J1407	4.39	740.89	858.96	51.16
J1409	4.39	753.94	858.11	45.14
J141	4.39	741.9	857.34	50.02
J1411	4.39	763.72	858.11	40.9
J1417	4.39	754.55	858.05	44.85
J1419	4.39	753.3	854.03	43.65
J142	4.39	741.21	858.53	50.84
J1423	4.39	741.79	858.99	50.78
J1429	4.39	761.27	856.02	41.06
J143	4.39	738.01	857.5	51.77
J1431	4.39	762.04	856.17	40.79
J1433	4.39	760.52	856.37	41.53
J144	4.39	740.71	860.8	52.04

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1445	4.39	758.7	856.51	42.38
J1447	4.39	752.69	831.05	33.95
J1449	4.39	763.05	856.94	40.68
J145	4.39	742.55	858.59	50.28
J1451	4.39	749.98	857.39	46.54
J1453	4.39	750.83	857.39	46.17
J1459	4.39	752.45	857.63	45.58
J146	4.39	740.17	859.04	51.5
J1463	4.39	751.66	857.39	45.82
J1465	4.39	754.17	857.39	44.73
J1467	4.39	753.66	857.64	45.05
J147	4.39	742.06	857.96	50.22
J1471	4.39	752.96	857.23	45.18
J1475	4.39	752	851.08	42.93
J1479	4.39	752.48	853.71	43.86
J148	4.39	740.91	860.96	52.02
J1483	4.39	750.05	858.4	46.95
J149	4.39	739.28	861.03	52.75
J1491	4.39	749.43	853.52	45.11
J1493	4.39	740.49	858.86	51.29
J15	4.39	727.38	860.95	57.87
J150	4.39	740.18	862.28	52.9
J1500	4.39	722.88	852.1	55.99
J1501	4.39	746.03	852.15	45.98
J1502	4.39	739.88	852.15	48.65
J1503	4.39	701.03	855.07	66.75
J1504	4.39	567.12	852.87	123.82
J1505	4.39	600.6	852.56	109.18
J1506	4.39	645.4	854.07	90.42
J1507	4.39	658.85	854.44	84.75
J1508	4.39	704.61	856.94	66.01
J1509	4.39	699.26	856.94	68.32
J151	4.39	740.22	864.37	53.79
J1510	4.39	679.71	856.94	76.8
J1511	4.39	693.44	856.94	70.85
J1512	4.39	746.27	909.9	70.9
J1513	4.39	767.92	905.24	59.5
J1515	0	737.23	865.22	55.46
J1517	4.39	742.24	855.9	49.25
J152	4.39	770.31	874.74	45.25
J1521	4.39	745	852.56	46.61
J1523	4.39	745.77	860.17	49.57
J1525	4.39	691.98	857.85	71.87
J1527	4.39	698.37	858.59	69.42
J153	4.39	750.52	874.8	53.85
J1531	4.39	722.8	855.28	57.4
J1533	4.39	724.44	855.03	56.58
J1535	4.39	723.63	852.07	55.65
J1537	4.39	685.66	851.81	72
J1539	4.39	712.41	853.32	61.06
J154	4.39	761.73	874.75	48.98
J1541	4.39	638.17	851.49	92.43
J1543	4.39	634.04	848.98	93.13
J1545	4.39	648.09	850.11	87.54
J1547	4.39	630.17	850.01	95.25
J1549	4.39	656.5	851.39	84.45
J155	0	855.1	886.65	13.67
J1551	4.39	645.64	851.85	89.35

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1553	4.39	632.57	849.78	94.12
J1557	4.39	659.68	849.89	82.42
J1559	4.39	577.06	851.22	118.79
J156	4.39	746.06	852.88	46.29
J1561	4.39	573.68	850.77	120.07
J1565	4.39	748.49	855.37	46.31
J1567	4.39	738.82	856.54	51.01
J157	4.39	767.25	871.33	45.1
J1571	4.39	737.25	856.53	51.68
J1575	4.39	739.09	856.63	50.93
J1577	4.39	738.3	856.62	51.27
J1579	4.39	737.28	856.8	51.79
J158	4.39	771.36	871.14	43.23
J1581	4.39	737.72	856.8	51.6
J1583	4.39	741.08	857.04	50.24
J1585	4.39	740.39	857.03	50.54
J1587	4.39	741.15	857.16	50.26
J1589	4.39	741.63	857.15	50.06
J159	4.39	772.92	871.1	42.54
J1591	4.39	742.52	857.28	49.73
J1593	4.39	740.99	857.27	50.39
J1595	4.39	741.94	860.91	51.55
J16	4.39	748.08	862.84	49.72
J160	4.39	744.05	866.8	53.19
J1601	4.39	743.23	860.86	50.97
J1605	4.39	742.95	860.78	51.06
J1609	4.39	740.46	860.98	52.22
J161	0	744.35	993.37	107.9
J1613	4.39	742.25	860.82	51.37
J1617	4.39	742.23	860.98	51.46
J1619	4.39	742.84	860.98	51.19
J162	0	736.72	914.9	77.2
J163	0	737.98	915.52	76.93
J1633	4.39	742.51	860.99	51.34
J1637	4.39	742.23	861.03	51.48
J1639	4.39	741.19	861.03	51.93
J164	4.39	777.69	874.69	42.03
J1641	4.39	741.35	862.11	52.33
J1645	4.39	743.56	861.03	50.9
J1649	4.39	742.93	861.03	51.17
J165	3.22	772.37	982.16	90.9
J1651	4.39	742.67	861.85	51.64
J1653	4.39	743.71	861.82	51.17
J1657	4.39	744.9	863.7	51.48
J166	3.22	775.14	982.18	89.71
J1661	4.39	743.02	863.62	52.26
J1665	4.39	744.32	864.33	52
J1667	4.39	746.51	864.41	51.09
J1669	4.39	740.14	863.97	53.66
J167	3.22	859.91	982.22	53
J1673	4.39	744.08	862.77	51.43
J1675	4.39	744.11	862.77	51.42
J168	4.39	739.58	858.81	51.66
J1681	4.39	781.08	864.53	36.16
J1687	4.39	760.07	864.53	45.27
J1689	4.39	766.73	864.53	42.38
J169	3.22	777.05	982.13	88.86
J1691	4.39	776.53	864.53	38.13

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1693	4.39	779.6	864.53	36.8
J1695	4.39	760.57	864.53	45.05
J1697	4.39	757.53	864.53	46.37
J17	0	746.62	930.13	79.52
J170	4.39	761.47	862.64	43.84
J1701	4.39	770.55	864.53	40.72
J1703	4.39	766.91	864.53	42.3
J1707	4.39	770.73	864.53	40.65
J1709	4.39	761.97	864.53	44.44
J171	4.39	741.48	858.27	50.61
J1711	4.39	774.28	864.53	39.11
J1713	4.39	769.23	864.53	41.29
J1719	4.39	771.02	874.79	44.97
J172	4.39	742.92	853.47	47.9
J1721	4.39	773.5	874.84	43.91
J1725	4.39	776.37	874.88	42.68
J1729	4.39	785.67	856.99	30.9
J173	4.39	746.41	852.59	46.01
J1731	4.39	788.18	856.93	29.79
J1735	4.39	769.91	859.01	38.61
J1737	4.39	765.23	859.94	41.04
J174	4.39	748.74	852.22	44.84
J1741	4.39	764.49	871.15	46.22
J1743	4.39	773.75	871.14	42.2
J1747	4.39	770.6	871.14	43.56
J175	0	735.33	780	19.35
J1751	4.39	765.07	871.1	45.94
J1753	4.39	734.25	862.56	55.6
J1757	4.39	737.99	863.32	54.31
J176	4.39	736.23	852.85	50.53
J1761	4.39	757.16	862.97	45.85
J1763	4.39	744.39	862.97	51.38
J1765	4.39	752.82	880.94	55.52
J1767	4.39	749.51	880.93	56.95
J1769	4.39	743.83	870.88	55.05
J177	0	734.29	853.91	51.83
J1771	4.39	741.03	870.22	55.97
J1773	4.39	744.07	870.22	54.66
J1775	4.39	743.51	870.21	54.9
J1777	4.39	742.83	868.33	54.38
J1779	0	832.76	908.6	32.86
J178	4.39	735.31	854.03	51.44
J1781	0	817.09	908.91	39.79
J1783	0.24	785.55	1084.33	129.46
J1785	3.05	901.55	1084.29	79.18
J1787	4.39	685.16	854.54	73.39
J1789	4.39	710.37	854.53	62.47
J179	4.39	738.11	853.68	50.08
J1793	4.39	687.02	854.59	72.61
J1795	4.39	743.89	852.55	47.08
J1797	4.39	743.81	852.55	47.12
J18	0	746.28	995.03	107.78
J180	4.39	738.68	853.36	49.69
J1801	4.39	747.02	852.55	45.73
J1803	4.39	746.38	852.55	46
J1805	4.39	747.1	852.55	45.69
J1807	4.39	749.92	852.72	44.55
J181	4.39	744.02	853.61	47.48

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1811	4.39	734.43	852.25	51.05
J1815	4.39	731.82	852.41	52.25
J1817	4.39	731.57	852.04	52.2
J182	4.39	730.68	852.56	52.81
J1821	4.39	729.95	852	52.89
J1823	4.39	727.31	851.97	54.02
J1825	4.39	729.84	851.94	52.91
J1827	4.39	730.96	852.56	52.69
J183	4.39	731.24	852.36	52.48
J1831	4.39	741.42	858.91	50.91
J1833	4.39	735.42	857.35	52.83
J1835	4.39	740.21	855.04	49.76
J1839	4.39	737.1	854.92	51.05
J184	4.39	731.64	852.33	52.3
J1843	4.39	737.44	854.43	50.69
J1845	4.39	741.21	858.31	50.74
J1847	4.39	740.63	858.08	50.89
J185	4.39	728.5	852.42	53.69
J1851	4.39	742.51	850.74	46.9
J1853	4.39	741.08	858.2	50.75
J1859	4.39	741.91	858.21	50.39
J186	4.39	728.33	852.42	53.77
J1863	4.39	738.11	859.37	52.54
J1867	4.39	739.43	854.67	49.93
J1869	4.39	739.04	859.41	52.16
J187	4.39	729.6	852.42	53.22
J1871	4.39	742.58	858.98	50.44
J1875	4.39	742.5	859	50.48
J1879	4.39	746.94	857.78	48.03
J188	4.39	722.47	852.1	56.17
J1883	4.39	727.19	855.28	55.5
J1885	4.39	745.04	856.49	48.29
J1887	4.39	744.92	856.63	48.4
J1889	4.39	746.37	855.06	47.1
J189	4.39	691.68	852.02	69.47
J1891	4.39	746.06	854.8	47.12
J1893	4.39	741.24	854.47	49.07
J1895	4.39	751.72	855.31	44.89
J1897	4.39	739.54	854.5	49.81
J1899	4.39	746.75	854.12	46.52
J19	0	747.17	930.13	79.27
J190	4.39	676.7	851.41	75.7
J1901	4.39	745.64	854.3	47.08
J1903	4.39	752.04	853.82	44.1
J1905	4.39	758.48	853.77	41.29
J1907	4.39	749.59	853.66	45.09
J1909	4.39	751.9	853.76	44.14
J191	4.39	719.72	851.4	57.06
J1911	4.39	747.26	853.85	46.19
J1913	4.39	740.58	854.65	49.43
J1915	4.39	743.1	855.07	48.51
J1917	4.39	742.18	855.48	49.09
J1919	4.39	741.81	856.04	49.5
J192	4.39	721	851.73	56.65
J1921	4.39	741.73	856.43	49.7
J1923	4.39	750.87	856.7	45.85
J1925	4.39	739.72	857.22	50.91
J1927	4.39	741.08	857.28	50.35

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1929	4.39	743.81	858.03	49.49
J193	4.39	724.78	851.81	55.04
J1931	4.39	742.11	858.23	50.32
J1933	4.39	740.96	857.99	50.71
J1935	4.39	741.02	857.96	50.67
J1937	4.39	741.09	858.26	50.77
J1939	4.39	742.09	858.21	50.31
J194	4.39	729.34	852.25	53.25
J1941	4.39	738.3	859.37	52.46
J1943	4.39	739.72	861.03	52.56
J1945	4.39	746.16	854.3	46.86
J1947	4.39	738.43	855.04	50.53
J1949	4.39	743.92	856.81	48.92
J195	4.39	734.24	852.45	51.22
J1951	4.39	744.57	854.46	47.61
J1953	4.39	752.17	857.41	45.6
J1955	4.39	758.28	857.2	42.86
J1957	4.39	761.2	857.2	41.6
J1959	4.39	757.4	856.94	43.13
J196	4.39	707.45	850.75	62.09
J1961	4.39	764.5	857.2	40.17
J1963	4.39	765.92	857.99	39.89
J1965	4.39	758.36	857.56	42.99
J1967	4.39	768.22	857.2	38.56
J1969	4.39	767.3	857.21	38.96
J197	4.39	678.58	850.51	74.49
J1971	4.39	754.17	857.86	44.92
J1973	4.39	740.42	858.99	51.38
J1975	4.39	744.01	858.13	49.45
J1977	4.39	750.1	858.27	46.87
J1979	4.39	764.58	856.54	39.85
J198	4.39	681.72	850.51	73.14
J1981	4.39	742.11	859	50.65
J1983	4.39	747.79	860.56	48.86
J1985	4.39	745.22	857.5	48.65
J1987	4.39	754.99	857.99	44.63
J1989	4.39	747.72	857.24	47.46
J199	4.39	703.69	850.66	63.68
J1991	4.39	752.43	858.47	45.95
J1993	4.39	749.73	858.6	47.17
J1995	4.39	749.21	858.62	47.41
J1997	4.39	730.81	852.59	52.76
J1999	4.39	746.43	852.86	46.12
J2	4.39	570.33	851.23	121.72
J20	4.39	767.9	863.16	41.28
J200	3.22	834.32	982.2	64.08
J2001	4.39	753.19	853.4	43.42
J2003	4.39	753.69	853.35	43.18
J2005	4.39	736.56	854.43	51.07
J2007	4.39	734.36	853.77	51.74
J2009	4.39	737.27	853.57	50.39
J201	4.39	750.28	853.89	44.89
J2011	4.39	742.07	853.49	48.28
J2013	4.39	738.87	853.61	49.72
J2015	4.39	736.3	853.13	50.62
J2017	4.39	737.34	853.02	50.13
J2019	4.39	735.06	853.28	51.22
J202	4.39	752.15	853.73	44.01

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2021	4.39	745.69	852.88	46.44
J2023	4.39	742.26	852.88	47.93
J2025	4.39	735.04	852.75	51
J2027	4.39	739.94	852.52	48.78
J2029	4.39	732.18	852.41	52.1
J203	4.39	762.75	872.18	47.41
J2031	4.39	732.25	852.25	52
J2033	4.39	743.38	852.55	47.3
J2035	4.39	729.65	851.92	52.98
J2037	4.39	728.91	851.96	53.32
J2039	4.39	728.5	851.96	53.5
J204	4.39	736.81	854.22	50.88
J2041	4.39	729.76	852	52.97
J2043	4.39	729.51	852	53.08
J2045	4.39	731.27	851.9	52.27
J2047	4.39	729.96	851.94	52.86
J2049	4.39	729	851.94	53.27
J205	4.39	716.96	851.46	58.28
J2051	4.39	729.5	851.9	53.04
J2053	4.39	655.71	850.19	84.27
J2055	4.39	721.09	851.73	56.61
J2057	4.39	689.9	854.6	71.37
J2059	4.39	750.76	857.23	46.13
J206	4.39	716.87	850.99	58.11
J2061	4.39	769.08	872.17	44.67
J2063	4.39	768.08	859.06	39.42
J2065	4.39	768.02	871.71	44.93
J2067	4.39	767.51	871.71	45.15
J2069	4.39	766.04	872.63	46.18
J207	4.39	731.59	852.26	52.29
J2071	4.39	755.25	870.47	49.92
J2073	4.39	755.05	870.47	50.01
J2075	4.39	766.43	872.63	46.02
J2077	4.39	764.3	874.34	47.68
J2079	4.39	773.1	872.17	42.93
J208	4.39	733.15	852.25	51.6
J2081	4.39	744.11	867.99	53.68
J2083	4.39	742.08	867.03	54.14
J2085	4.39	745.97	867	52.44
J2087	4.39	771.82	871.14	43.03
J2089	4.39	768.2	871.14	44.6
J209	4.39	734.65	852.25	50.96
J2091	4.39	767.95	871.14	44.71
J2093	4.39	755.64	871.12	50.04
J2095	4.39	766.14	871.12	45.49
J2097	4.39	772.58	871.1	42.69
J2099	4.39	757.51	871.41	49.35
J21	4.39	771.68	863.58	39.82
J210	4.39	634.32	850.96	93.87
J2101	4.39	774.22	874.88	43.62
J2103	4.39	745.21	862.77	50.94
J2105	4.39	741.64	863.63	52.86
J2107	4.39	743.15	863.54	52.17
J2109	4.39	744.66	863.81	51.63
J211	4.39	739.03	853.63	49.65
J2111	4.39	740.01	860.98	52.42
J2113	4.39	742	860.98	51.56
J2115	4.39	743.3	860.99	50.99

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2117	4.39	742.76	861	51.23
J2119	4.39	744.54	861	50.46
J212	4.39	737.57	853.33	50.16
J2121	4.39	741.3	852.83	48.33
J2123	0	804.66	897.99	40.44
J2125	0	860.5	886.65	11.33
J2127	0	860.5	886.65	11.33
J2129	0	856.5	886.65	13.06
J213	4.39	733.63	853.4	51.89
J2131	0	860.5	886.65	11.33
J2133	4.39	719.5	854.42	58.46
J2135	4.39	650.5	850.18	86.52
J2137	4.39	654.5	850.18	84.79
J2139	4.39	739.41	854.55	49.89
J214	4.39	744.28	852.94	47.08
J2141	4.39	739.41	854.37	49.81
J2143	4.39	750.78	853.82	44.65
J2145	4.39	750.88	858.56	46.65
J2147	4.39	741.58	859.1	50.92
J2149	4.39	741.39	859.08	51
J215	4.39	739.7	852.93	49.06
J2151	4.39	740.57	859.13	51.37
J2155	4.39	740.19	859.12	51.53
J2157	4.39	741.3	859.11	51.05
J2159	4.39	746.61	858.74	48.59
J216	4.39	745.45	895.71	65.11
J2161	4.39	757.12	853.42	41.73
J2163	4.39	747.32	854.58	46.48
J2165	4.39	697.36	854.54	68.11
J2167	0	764.82	856.91	39.9
J2169	0	755.95	853.28	42.17
J217	0	852.1	887.15	15.19
J2171	0	782.75	882.17	43.08
J2173	0	750.26	860.21	47.64
J2175	0	741.57	857.91	50.41
J2177	0	739.55	857.43	51.08
J2179	0	638	850.42	92.04
J218	0	850.25	886.29	15.62
J219	4.39	745.41	885.03	60.5
J22	4.39	737.78	864.06	54.72
J220	4.39	746.04	875.43	56.07
J221	4.39	743.78	858.86	49.87
J222	4.39	744.1	863.59	51.77
J223	4.39	746.97	866.06	51.6
J224	4.39	750.01	863.96	49.37
J225	4.39	744.04	860.87	50.62
J226	4.39	747.76	860.69	48.93
J227	4.39	747.93	860.49	48.77
J228	4.39	752.61	860.23	46.63
J229	4.39	745.28	858.8	49.19
J23	4.39	714.66	859.68	62.84
J230	4.39	755.26	860.22	45.48
J231	4.39	750.14	857.64	46.58
J232	4.39	676.34	860.01	79.58
J233	4.39	668.84	859.2	82.48
J234	4.39	669.87	858.5	81.73
J235	4.39	665.41	857.82	83.37
J236	4.39	674.91	857.18	78.98

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J237	4.39	677.27	856.74	77.77
J238	4.39	663.98	856	83.2
J239	4.39	707.04	854.8	64.02
J24	4.39	692.37	859.43	72.39
J240	4.39	698.76	855.1	67.74
J241	4.39	706.7	855.17	64.33
J242	4.39	713.03	855.31	61.65
J243	4.39	676.5	853.97	76.9
J244	4.39	735.38	854.28	51.52
J245	4.39	739.5	854.33	49.75
J246	4.39	733.24	854.18	52.4
J247	4.39	743.14	854.08	48.07
J248	4.39	723.11	853.39	56.45
J249	4.39	747	854.21	46.46
J25	4.39	738.98	861.55	53.11
J250	4.39	749.44	853.97	45.29
J251	4.39	747.37	853.97	46.19
J252	4.39	754.59	853.82	42.99
J253	4.39	747.71	853.84	45.98
J254	4.39	742.3	854.22	48.49
J255	4.39	744.33	854.42	47.7
J256	4.39	748.7	855.54	46.29
J257	4.39	757.4	853.48	41.63
J258	4.39	760.5	853.75	40.41
J259	4.39	744.21	854.08	47.6
J26	4.39	748.16	868.1	51.97
J260	4.39	729.03	852.58	53.53
J261	4.39	745.11	852.75	46.64
J262	4.39	752.69	853.29	43.59
J263	4.39	757.5	853.04	41.4
J264	4.39	754.21	852.88	42.75
J265	4.39	731.79	852.57	52.33
J266	4.39	728.28	852.58	53.86
J267	4.39	737.87	852.59	49.71
J268	4.39	736.96	852.52	50.07
J269	4.39	736.98	852.52	50.06
J27	4.39	744.93	860.15	49.92
J270	4.39	731.17	851.94	52.33
J271	4.39	743.33	852.53	47.32
J272	4.39	744.12	852.58	47
J273	4.39	742.79	852.73	47.64
J274	4.39	763.81	874.75	48.07
J275	4.39	739.78	852.5	48.84
J276	4.39	740.51	854.74	49.5
J277	4.39	737.13	854.22	50.73
J278	4.39	737.09	853.78	50.56
J279	4.39	734.46	853.77	51.7
J28	4.39	750.72	860.18	47.43
J280	4.39	734.18	853.84	51.85
J281	4.39	733.14	854.33	52.51
J282	0	828.26	898.52	30.44
J283	4.39	734.46	855.23	52.33
J284	4.39	767.9	871.16	44.74
J285	4.39	742.9	866.8	53.69
J286	4.39	735.01	855.73	52.31
J287	4.39	738.52	856.47	51.11
J288	4.39	737.3	856.63	51.7
J289	4.39	740.46	856.74	50.38

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J29	4.39	754.1	860.27	46
J290	4.39	739.21	856.93	51.01
J291	4.39	739.16	856.92	51.02
J292	4.39	738.57	856.8	51.23
J293	4.39	740.15	857.04	50.65
J294	4.39	740.53	857.16	50.53
J295	4.39	741.18	857.28	50.31
J296	4.39	742.64	857.43	49.74
J297	4.39	742.59	857.22	49.67
J298	4.39	742.38	857.59	49.92
J299	4.39	740.24	857.85	50.96
J3	4.39	569.67	852.57	122.58
J30	4.39	749.68	853.79	45.11
J300	4.39	741.16	855.95	49.74
J301	4.39	741.83	854.19	48.69
J302	4.39	746.63	852.97	46.07
J303	4.39	755.22	862.67	46.56
J304	4.39	753.99	862.7	47.1
J305	4.39	753.9	862.71	47.15
J306	4.39	752.14	862.72	47.91
J307	4.39	744.65	862.76	51.18
J308	0	736.45	780	18.87
J31	4.39	741.12	854.54	49.15
J310	0	734.49	968.92	101.58
J311	4.39	740.22	863.38	53.36
J312	4.39	740.72	861.79	52.46
J313	4.39	742.31	861.04	51.44
J314	4.39	742.94	861.85	51.52
J315	4.39	726.61	852.59	54.59
J316	4.39	742.91	861.01	51.17
J317	4.39	741.99	860.99	51.57
J318	4.39	741.18	860.98	51.91
J319	4.39	742.29	860.99	51.43
J32	4.39	725.46	860.87	58.67
J320	4.39	741.71	860.98	51.68
J321	4.39	741.82	860.97	51.63
J322	4.39	742.9	858.17	49.95
J323	4.39	740.61	858.23	50.97
J324	4.39	738.56	859.89	52.57
J325	4.39	741.79	857.91	50.31
J326	4.39	742.96	858.02	49.85
J327	4.39	742.61	858.1	50.04
J328	4.39	740.47	858.18	51.01
J329	4.39	739.09	857.16	51.16
J33	4.39	743.9	858.18	49.52
J330	4.39	741.62	858.93	50.83
J331	4.39	737.08	860.36	53.42
J332	4.39	735.92	860.71	54.07
J333	4.39	737.3	864.08	54.93
J334	4.39	744.5	859.02	49.62
J335	4.39	740.83	859.01	51.21
J336	4.39	741.67	859.16	50.91
J337	4.39	742.05	859.43	50.86
J338	4.39	744.35	860.12	50.17
J339	4.39	741.73	859.11	50.86
J34	4.39	736.01	856.25	52.1
J340	4.39	739.71	859.15	51.75
J341	4.39	737.83	859.15	52.57

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J342	4.39	738.31	859.29	52.42
J343	4.39	740.81	860.7	51.95
J344	4.39	735.38	861.79	54.77
J345	4.39	730.14	862.6	57.4
J346	4.39	744.34	860.74	50.44
J347	4.39	748.57	852.75	45.14
J348	4.39	759.08	862.65	44.88
J349	4.39	746.42	852.43	45.94
J35	4.39	719.59	856.43	59.29
J350	4.39	743.58	852.29	47.11
J351	4.39	745.5	852.22	46.24
J352	0	860.5	888.8	12.26
J353	4.39	684.65	860.59	76.23
J354	4.39	694.99	852.03	68.04
J355	4.39	695.72	852.16	67.78
J356	4.39	724.25	852.22	55.45
J357	4.39	730.27	852.33	52.89
J358	4.39	733.89	852.52	51.41
J359	4.39	734.9	852.25	50.85
J36	4.39	713.97	855.24	61.21
J360	4.39	721.99	851.57	56.15
J361	4.39	717.48	851.47	58.06
J362	4.39	675.07	851.43	76.41
J363	4.39	722.29	851.18	55.85
J364	4.39	711.8	850.87	60.26
J365	4.39	703.45	850.64	63.77
J366	4.39	697.5	850.74	66.4
J367	4.39	701.46	851.11	64.84
J368	4.39	710.5	851.38	61.04
J369	4.39	715.14	851.69	59.17
J37	4.39	677.65	856.18	77.36
J370	4.39	726.55	852	54.36
J371	4.39	728.1	852.27	53.81
J372	4.39	654.82	850.93	84.97
J373	4.39	652.94	851.03	85.83
J374	4.39	650.34	851.19	87.03
J375	4.39	655.64	852.55	85.32
J376	4.39	696.57	852.6	67.61
J377	4.39	726.11	852.63	54.82
J378	4.39	650.76	852.56	87.44
J379	4.39	644.76	851.71	89.67
J38	4.39	678.66	855.07	76.44
J380	4.39	641.79	852.23	91.18
J381	4.39	648.7	852.82	88.44
J382	4.39	650.7	853.08	87.69
J383	4.39	646.07	852.54	89.46
J384	4.39	638.72	852.53	92.65
J385	4.39	642.88	852.52	90.84
J386	4.39	738.45	859.74	52.55
J387	4.39	751.37	852.88	43.98
J388	4.39	747.43	852.8	45.66
J389	4.39	746.74	852.88	45.99
J39	4.39	648.95	854.33	88.99
J390	4.39	749.7	852.75	44.65
J391	4.39	751.27	852.77	43.98
J392	4.39	753.64	852.77	42.95
J393	4.39	750.15	852.72	44.44
J394	4.39	748.92	852.7	44.97

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J395	4.39	750.3	852.69	44.36
J396	4.39	749.59	852.71	44.68
J397	4.39	750.19	852.88	44.49
J398	4.39	757.06	862.98	45.89
J399	4.39	767.79	863.32	41.4
J4	4.39	563.76	852.57	125.14
J40	4.39	654.76	852.52	85.69
J400	4.39	752.67	863.81	48.16
J401	4.39	733.52	863.3	56.23
J402	4.39	742.59	864.61	52.87
J403	0	737.47	913.4	76.23
J404	4.39	736.3	865.68	56.06
J405	4.39	743.52	867.99	53.93
J407	4.39	766.06	880.94	49.78
J408	4.39	745.37	880.94	58.74
J409	4.39	745.93	874.8	55.84
J41	4.39	647.75	852.52	88.73
J410	4.39	772.06	880.94	47.18
J411	4.39	781.77	880.94	42.97
J412	4.39	776.06	880.95	45.45
J413	4.39	738.9	865.48	54.85
J414	4.39	746.29	868.65	53.02
J415	4.39	778.03	874.72	41.9
J416	3.78	784.18	879.6	41.35
J417	3.22	788.86	982.15	83.75
J418	0	945.64	982.29	15.88
J419	3.22	777.5	982.14	88.67
J42	4.39	641.05	850.06	90.56
J420	4.39	555.78	848.89	127
J421	4.39	577.17	848.89	117.74
J422	4.39	621.21	848.97	98.69
J423	4.39	618.82	849.12	99.79
J424	4.39	620.57	849.13	99.04
J425	4.39	617.63	849.17	100.32
J426	4.39	629.03	849.15	95.38
J427	4.39	637.37	849.13	91.76
J428	4.39	638.64	849.14	91.21
J429	4.39	628.62	849.28	95.61
J43	4.39	647.5	850.02	87.75
J430	4.39	545.92	848.9	131.28
J431	4.39	553.27	848.96	128.12
J432	4.39	603.53	848.99	106.36
J433	4.39	603.62	849.02	106.33
J434	4.39	630.32	849.15	94.82
J435	4.39	598.57	849.31	108.65
J436	4.39	626.94	849.45	96.41
J437	4.39	622.69	849.77	98.4
J438	4.39	636.37	850.09	92.61
J439	4.39	638.3	850.29	91.86
J44	4.39	642.94	850.04	89.74
J440	4.39	646.5	850.51	88.4
J441	4.39	652.5	850.73	85.89
J442	4.39	643.14	850.39	89.8
J443	4.39	570.64	850.9	121.43
J444	4.39	571.17	851.91	121.64
J445	4.39	574.81	852.07	120.14
J446	4.39	584.58	852.25	115.98
J447	4.39	623.13	852.44	99.36

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J448	4.39	584.44	852.57	116.18
J449	4.39	574.21	852.56	120.61
J45	4.39	636.55	849.85	92.42
J450	4.39	638.3	849.25	91.4
J451	4.39	639.38	849.56	91.07
J452	4.39	636.21	849.36	92.36
J453	4.39	641.25	849.72	90.33
J454	4.39	638.93	849.57	91.27
J455	4.39	640.4	849.88	90.77
J456	4.39	640.34	849.87	90.79
J457	4.39	640.97	849.87	90.52
J458	4.39	635.34	849.94	92.99
J459	4.39	640.66	849.97	90.7
J46	4.39	649.37	850.16	87
J460	4.39	646.52	849.91	88.13
J461	4.39	645.71	850.05	88.54
J462	4.39	637.77	850.07	91.99
J463	4.39	643.85	849.99	89.32
J464	4.39	636.19	850.02	92.65
J465	4.39	637.08	850.23	92.36
J466	4.39	635.13	850.54	93.33
J467	4.39	647.69	850.27	87.78
J468	4.39	674.74	850.5	76.16
J469	4.39	676.34	850.5	75.46
J47	4.39	657.1	850.19	83.67
J470	4.39	634.97	850.89	93.56
J471	4.39	638.98	851.06	91.89
J472	4.39	649.78	850.37	86.92
J473	4.39	689.82	850.54	69.64
J474	4.39	683.94	850.51	72.18
J475	4.39	654.94	850.6	84.78
J476	4.39	694.79	850.55	67.49
J477	4.39	584.5	852.88	116.29
J478	4.39	643.57	853.55	90.98
J479	4.39	655.15	854.16	86.23
J48	4.39	600.43	850.18	108.22
J480	4.39	655.08	854.26	86.31
J481	4.39	680.01	854.76	75.72
J482	4.39	682.82	854.91	74.57
J483	4.39	677.17	855.08	77.09
J484	4.39	701.14	855.48	66.87
J485	4.39	686.94	856.31	73.39
J486	4.39	634.99	851.34	93.74
J487	4.39	612.01	851.92	103.95
J488	4.39	638.07	852.38	92.86
J489	4.39	650.78	853.35	87.78
J49	4.39	599.64	849.01	108.05
J490	4.39	646.1	853.85	90.02
J491	4.39	650.57	854.79	88.49
J492	4.39	669.42	855.25	80.52
J493	4.39	675.83	856.95	78.48
J494	4.39	684.98	857.75	74.86
J495	4.39	685.29	858.34	74.98
J496	4.39	696.81	859.28	70.4
J497	4.39	699.69	859.31	69.16
J498	4.39	703.54	859.39	67.53
J499	4.39	707.08	859.47	66.03
J5	4.39	655.93	854.07	85.86

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J50	4.39	602.7	849.11	106.77
J500	4.39	686.41	859.95	75.19
J501	4.39	695.06	858.68	70.89
J502	4.39	695.71	858.1	70.37
J503	4.39	685.35	857.53	74.61
J504	4.39	686.63	857.25	73.93
J505	4.39	680.5	856.97	76.46
J506	4.39	691.2	856.96	71.82
J507	4.39	697.82	856.95	68.95
J508	4.39	710.92	856.95	63.27
J509	3.05	860.18	1084.36	97.14
J51	4.39	569.42	848.89	121.09
J510	3.05	823.27	1084.39	113.14
J511	0.24	883.93	1084.4	86.86
J512	3.05	904.36	1084.42	78.02
J513	0.24	947.39	1084.42	59.38
J514	0	759.15	987.44	98.92
J515	4.39	654.1	852.52	85.97
J516	4.39	748.89	859.07	47.74
J517	1.88	743.15	859.09	50.24
J518	4.39	742.02	859.2	50.77
J519	4.39	737.82	859.28	52.63
J52	4.39	545.16	848.92	131.62
J520	4.39	723.36	859.47	58.98
J521	4.39	723.42	860.48	59.39
J522	4.39	724.74	861.63	59.32
J523	4.39	728.61	862.16	57.87
J524	4.39	728.83	861.56	57.51
J525	4.39	739.65	857.71	51.16
J526	4.39	730.85	852.48	52.7
J527	4.39	755.82	856.22	43.5
J528	4.39	763.33	858.11	41.07
J529	4.39	744.79	858.81	49.4
J53	4.39	621.31	849.18	98.74
J530	4.39	736.03	854.97	51.53
J531	4.39	745.7	855.37	47.52
J532	4.39	750.07	855.91	45.86
J533	4.39	738.58	856.51	51.1
J534	4.39	747.82	858.54	47.97
J535	4.39	739.09	856.23	50.76
J536	4.39	749.46	853.52	45.09
J537	4.39	750.57	853.48	44.59
J538	4.39	753.32	853.44	43.38
J539	4.39	755.22	853.4	42.54
J54	4.39	622.02	849.17	98.43
J540	4.39	752.92	853.34	43.51
J541	4.39	606.13	849.05	105.26
J542	4.39	731.49	856.45	54.15
J543	4.39	634.66	851.35	93.89
J544	4.39	628.32	851.34	96.63
J545	4.39	627.66	851.33	96.92
J546	4.39	627.81	851.33	96.85
J547	4.39	626.52	851.33	97.41
J548	4.39	631.35	851.33	95.32
J549	4.39	733.55	852.65	51.6
J55	4.39	622.17	849.22	98.38
J550	4.39	733.31	852.38	51.59
J551	4.39	731.64	852.33	52.3

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J552	4.39	728.45	852.24	53.64
J553	4.39	731.87	852.26	52.17
J554	4.39	731.9	852.16	52.11
J555	4.39	732.56	852.04	51.77
J556	4.39	730.08	852	52.83
J557	4.39	729.95	851.97	52.87
J558	4.39	729.03	851.95	53.26
J559	4.39	727.5	851.92	53.91
J56	4.39	631.55	849.13	94.28
J560	4.39	730.55	851.9	52.58
J561	4.39	739.27	852.58	49.1
J562	4.39	746.05	852.59	46.16
J563	4.39	761.31	858.43	42.08
J564	4.39	742.16	859.15	50.69
J565	4.39	742.22	852.59	47.83
J566	4.39	739.76	852.59	48.89
J567	4.39	739.34	852.59	49.07
J568	4.39	740.98	859.05	51.16
J569	4.39	740.58	852.6	48.54
J57	4.39	636.31	849.18	92.24
J570	4.39	742.59	859.18	50.52
J571	4.39	745.41	852.61	46.45
J572	4.39	745.52	852.63	46.41
J573	4.39	746.57	852.62	45.95
J574	4.39	743.24	861.33	51.17
J575	4.39	754.85	860.25	45.67
J576	4.39	743.63	852.6	47.22
J577	4.39	741.82	852.6	48
J578	4.39	745.8	852.74	46.33
J579	4.39	753.28	860.26	46.35
J58	4.39	640.44	849.88	90.75
J580	4.39	640.6	829.37	81.79
J581	4.39	738.84	861.35	53.08
J582	4.39	743.94	852.73	47.14
J583	4.39	746.61	852.7	45.96
J584	4.39	745.05	852.65	46.62
J585	4.39	742.38	852.6	47.76
J586	4.39	742.44	858.91	50.47
J587	4.39	744.88	852.58	46.66
J588	4.39	746.89	855.49	47.06
J589	4.39	746.58	854.78	46.88
J59	4.39	640.89	849.87	90.55
J590	4.39	745.36	853.92	47.04
J591	4.39	640.47	849.88	90.74
J592	4.39	613.06	852.11	103.58
J593	4.39	650.36	850.15	86.57
J594	4.39	570.08	852.56	122.4
J595	4.39	658.46	854.46	84.93
J596	4.39	694.06	859.21	71.56
J597	4.39	740.88	863.13	52.97
J598	0	940.61	1084.43	62.32
J599	0	946.59	987	17.51
J6	4.39	658.02	854.45	85.12
J60	4.39	646.39	849.87	88.17
J600	0	953.99	982.3	12.27
J601	4.39	765.91	874.34	46.98
J602	4.39	767.5	878.18	47.96
J603	4.39	773.18	879.54	46.08

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J604	4.39	777.06	881.27	45.15
J605	4.39	774.13	881.27	46.42
J606	0	873.85	907.36	14.52
J607	3.22	789.7	982.13	83.38
J608	4.39	769.15	874.74	45.76
J61	4.39	639.59	850.1	91.21
J610	4.39	638.83	828.25	82.08
J611	4.39	739.92	857.28	50.85
J612	4.39	646.57	849.13	87.77
J614	4.39	779.53	874.74	41.26
J616	4.39	646.1	842.76	85.21
J618	4.39	746.06	852.58	46.16
J619	0	860.5	886.65	11.33
J62	4.39	636.37	850.38	92.73
J620	0	745.32	930.27	80.14
J621	0	739.59	955.33	93.48
J622	4.39	744.6	874.74	56.39
J623	0	851	886.52	15.39
J624	3.55	944.37	1167.84	96.83
J625	3.55	990.71	1167.83	76.74
J626	3.22	887.1	982.22	41.21
J627	3.05	931.28	1084.41	66.35
J628	3.05	907.3	1084.37	76.72
J629	1.88	779.76	899.2	51.75
J63	4.39	647.97	850.18	87.62
J630	1.88	790.7	899.2	47.01
J631	4.39	749.43	853.78	45.22
J632	4.39	750.94	853.76	44.55
J633	4.39	684	856.99	74.96
J634	4.39	754.78	878.54	53.62
J635	4.39	752.6	863.32	47.98
J636	4.39	753.32	863.16	47.59
J637	4.39	737.88	863.15	54.28
J638	4.39	659.69	850.5	82.68
J639	4.39	638.41	849.45	91.44
J64	4.39	642.28	851.36	90.59
J640	4.39	641.37	849.44	90.16
J641	4.39	752.78	853.76	43.76
J642	4.39	751.23	853.77	44.43
J643	4.39	754.53	853.93	43.07
J645	4.39	726.5	854.14	55.31
J646	4.39	743.85	854.06	47.75
J647	4.39	744.8	854.01	47.32
J648	4.39	649.59	835.72	80.65
J649	4.39	753.44	858.46	45.5
J65	4.39	689.17	850.85	70.05
J650	4.39	736.39	854.16	51.03
J651	4.39	749.28	854.21	45.46
J652	4.39	744.44	854.24	47.57
J653	4.39	727.28	854.3	55.04
J654	4.39	651.82	833.5	78.72
J655	4.39	722.97	854.28	56.9
J656	4.39	728.49	854.28	54.51
J657	4.39	724.48	854.28	56.24
J658	4.39	723.36	854.3	56.74
J659	4.39	745.49	854.3	47.15
J66	4.39	650.32	852.55	87.63
J660	4.39	719.57	854.28	58.37

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J661	4.39	747.82	854.74	46.33
J662	4.39	723.41	855.29	57.15
J663	4.39	718.35	855.29	59.34
J664	4.39	731.62	855.93	53.86
J665	4.39	737.16	855.93	51.46
J666	4.39	747.01	858.8	48.44
J667	4.39	749.78	858.8	47.24
J668	4.39	747.89	859.17	48.22
J669	4.39	749.76	859.17	47.41
J67	4.39	644.65	852.55	90.08
J670	4.39	747.15	860.21	48.99
J671	4.39	749.19	864.75	50.07
J672	4.39	747.46	871.45	53.73
J673	4.39	748.85	858.49	47.51
J674	4.39	740.87	865.04	53.8
J675	4.39	740.67	858.98	51.26
J676	4.39	740.66	863.99	53.44
J677	4.39	743.84	858.86	49.84
J678	4.39	746.67	858.11	48.28
J679	4.39	740.46	864.19	53.61
J68	4.39	669.21	852.58	79.45
J680	4.39	741.3	858.23	50.67
J681	4.39	740.73	858.34	50.96
J682	4.39	741.9	858.29	50.43
J683	4.39	742.08	858.26	50.34
J684	4.39	741.25	857.26	50.27
J685	4.39	743.77	864.18	52.18
J686	4.39	743.32	857.05	49.28
J687	4.39	740.45	856.68	50.37
J688	4.39	740.28	856.24	50.25
J689	4.39	740.16	854.38	49.49
J69	4.39	690.69	853.65	70.61
J690	4.39	744.91	854.62	47.54
J691	4.39	742.33	853.63	48.22
J692	4.39	746.1	853.73	46.64
J693	4.39	743.87	853.76	47.61
J694	4.39	742.9	854.03	48.15
J695	4.39	741.56	853.62	48.56
J696	4.39	738.03	853.62	50.09
J697	4.39	737.53	853.62	50.3
J698	4.39	657.22	832.62	76
J699	4.39	749.25	854.73	45.71
J7	4.39	694.08	855.68	70.02
J70	4.39	713.01	852.66	60.51
J700	4.39	757.12	852.92	41.51
J701	4.39	751.78	853.04	43.88
J703	4.39	735.5	852.84	50.84
J705	4.39	738.5	852.77	49.51
J706	4.39	741.84	852.72	48.04
J707	4.39	739.19	852.66	49.17
J708	4.39	736.93	852.59	50.12
J709	4.39	735.55	852.55	50.7
J71	4.39	721.78	854.31	57.43
J710	4.39	739.87	852.95	48.99
J711	4.39	733.29	852.54	51.67
J712	4.39	717.81	850.94	57.68
J713	4.39	731.13	852.55	52.61
J715	4.39	735.13	852.46	50.84

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J716	4.39	737.95	852.46	49.62
J717	4.39	740.21	852.47	48.64
J718	4.39	739.84	863.4	53.54
J719	4.39	740.55	863.36	53.21
J72	4.39	746.09	853.93	46.73
J720	4.39	739.17	856.54	50.85
J721	4.39	742.33	864.35	52.87
J722	4.39	744.79	864.57	51.9
J723	4.39	746.34	864.26	51.1
J724	4.39	746.61	864.41	51.04
J725	4.39	763.44	864.54	43.81
J726	4.39	740.07	862.28	52.95
J727	4.39	742.78	861.82	51.58
J728	4.39	742.8	861.82	51.57
J729	4.39	742.31	861.82	51.78
J73	4.39	729.71	854.42	54.04
J730	4.39	772.75	872.17	43.08
J731	4.39	781.32	881.27	43.31
J732	0	800.35	881.27	35.06
J733	0	778.44	881.27	44.56
J734	0	805.46	881.27	32.85
J735	0	807.96	881.27	31.77
J736	0	804.38	881.27	33.32
J737	4.39	757.42	874.75	50.84
J738	4.39	763.18	874.75	48.34
J739	4.39	771.94	874.75	44.55
J74	4.39	741.25	854.47	49.06
J740	4.39	774.36	874.74	43.5
J741	4.39	775.23	874.97	43.22
J742	4.39	776.23	875.08	42.83
J743	4.39	739.62	863.28	53.58
J744	4.39	741.66	863.36	52.73
J745	4.39	778.16	875.4	42.13
J746	4.39	778.53	875.24	41.9
J747	4.39	732.09	862.25	56.4
J748	4.39	740.04	862.71	53.16
J749	4.39	730.5	862.55	57.22
J75	4.39	755.06	853.92	42.84
J750	4.39	731.5	862.47	56.75
J751	0	868.14	886.64	8.02
J752	0	874.74	1196.49	139.41
J753	0.27	818.07	1006.83	81.79
J754	0.27	793.12	1006.84	92.6
J755	0	875.61	1006.85	56.87
J756	0	820.41	914.51	40.77
J757	4.39	755.11	864.54	47.41
J758	4.39	718.82	851.21	57.36
J759	0	737.79	971.68	101.35
J76	4.39	755.06	853.57	42.68
J760	4.39	722.87	854.33	56.96
J761	4.39	731.27	852.59	52.57
J762	4.39	747.32	858.72	48.27
J763	4.39	743.88	870.88	55.03
J764	4.39	742.75	870.22	55.23
J766	4.39	658.59	854.44	84.86
J767	4.39	687.5	854.54	72.38
J768	4.39	693.02	854.46	69.96
J769	4.39	682.38	854.45	74.56

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J77	4.39	729.22	854.81	54.42
J770	4.39	676.03	854.44	77.31
J771	4.39	715.05	854.44	60.4
J772	4.39	712.25	854.45	61.61
J773	4.39	731.78	854.44	53.15
J774	4.39	706.34	854.44	64.17
J775	0	945.07	1271.53	141.45
J776	4.39	762.52	854.43	39.82
J777	4.39	692.32	854.44	70.25
J778	4.39	763.22	854.44	39.53
J779	7.6	751.59	973.68	96.23
J78	4.39	736.82	854.52	51
J780	4.39	720.79	854.39	57.89
J781	7.6	798.64	973.55	75.79
J782	7.6	841.45	973.5	57.22
J783	4.39	724.99	854.35	56.05
J784	0	723.75	1053.35	142.81
J785	4.39	676.57	854.44	77.07
J786	4.39	740.26	863.77	53.52
J787	4.39	741.85	863.77	52.83
J788	4.39	742.08	863.97	52.82
J789	4.39	744.75	864.15	51.74
J79	4.39	730.11	855.27	54.23
J790	4.39	744.49	864.12	51.84
J791	4.39	752.92	860.34	46.55
J793	4.39	738.36	854.92	50.51
J794	4.39	724.19	847.62	53.48
J795	4.39	741.16	856.75	50.08
J796	4.39	652.69	854.45	87.42
J797	4.39	651.84	854.44	87.79
J798	4.39	696.81	854.71	68.42
J799	4.39	749.41	877.66	55.58
J8	4.39	684.38	856.99	74.79
J80	4.39	734.94	854.54	51.82
J800	0	725.02	973.85	107.82
J801	4.39	653.5	850.2	85.23
J802	4.39	724.24	847.28	53.31
J804	4.39	701.05	851.62	65.24
J806	4.39	690.17	850.73	69.57
J808	4.39	740.46	858.67	51.22
J809	4.39	740.16	858.83	51.42
J81	4.39	741.25	854.31	48.99
J810	4.39	646.57	850.49	88.36
J811	4.39	731.55	862.41	56.7
J812	4.39	725.34	851.38	54.62
J816	4.39	742.5	859.57	50.73
J817	4.39	737.7	860.65	53.27
J819	0	782.75	882.17	43.08
J82	4.39	745.64	854.07	46.99
J820	0	785.26	881.73	41.8
J821	0	785.34	982.15	85.28
J822	0	782.84	982.15	86.36
J823	0	782.68	1224.76	191.55
J824	4.39	781.93	862.64	34.97
J825	3.22	781.61	982.13	86.89
J826	0	781.87	862.64	34.99
J827	4.39	729.42	852.59	53.37
J828	4.39	748.75	855.55	46.28

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J829	3.05	906.5	1084.38	77.08
J83	4.39	729.14	852.56	53.48
J830	0	940.13	987	20.31
J831	0	903.75	987.18	36.15
J832	4.39	753.82	855.74	44.16
J833	4.39	738.49	852.6	49.44
J834	4.39	761.36	858.41	42.05
J835	4.39	725.53	852.59	55.06
J836	4.39	761.19	856.3	41.21
J837	4.39	759.45	856.28	41.96
J838	3.22	775.59	982.18	89.52
J839	4.39	779.19	982.15	87.94
J84	4.39	756.26	853.28	42.04
J840	3.22	780.99	982.15	87.16
J841	0	802.45	982.15	77.87
J842	0	817.46	982.15	71.36
J843	0	817.77	982.15	71.23
J844	0	841.74	982.15	60.84
J845	0	818.56	982.15	70.88
J846	0	817.59	982.15	71.3
J847	0	824.15	982.15	68.46
J848	0	814.1	982.15	72.82
J849	0	837.89	982.15	62.51
J85	4.39	755.58	853.75	42.54
J850	0	827.38	982.15	67.06
J851	0	815.81	982.15	72.07
J852	0	818.55	982.15	70.89
J853	0	797.41	982.15	80.05
J854	0	830.05	982.15	65.9
J855	0	825.43	982.15	67.91
J856	0	796.7	982.15	80.35
J857	0	788.15	982.15	84.06
J858	0	789.12	982.15	83.64
J859	0	780.6	982.15	87.33
J86	4.39	736.7	855.4	51.43
J860	0	782.53	982.15	86.5
J861	4.39	731.85	852.42	52.24
J862	0	777.39	982.15	88.72
J863	4.39	742.95	863.44	52.21
J864	4.39	746.1	862.49	50.43
J865	0	814.15	982.15	72.79
J866	4.39	745.71	864.26	51.37
J867	0	860.5	889.04	12.37
J868	4.39	747	864.4	50.87
J869	4.39	751.26	864.55	49.09
J87	4.39	743.22	854.45	48.2
J870	0	860.5	886.65	11.33
J871	0	803.5	885.6	35.58
J872	0	836.95	885.54	21.05
J873	0	807.37	885.65	33.92
J874	4.39	752.03	864.54	48.75
J875	4.39	748.29	864.62	50.4
J876	4.39	747.89	864.57	50.56
J877	4.39	731.96	851.8	51.92
J88	4.39	744.7	854.28	47.48
J881	4.39	739.96	852.3	48.67
J885	4.39	741.52	852.55	48.11
J887	4.39	741.27	852.36	48.14

2033 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J889	4.39	734.32	852.54	51.22
J89	4.39	744.43	853.99	47.47
J893	4.39	735.02	852.68	50.98
J895	4.39	748.91	852.74	44.99
J897	4.39	747.98	852.73	45.39
J899	4.39	751.32	852.71	43.93
J9	4.39	711.1	856.94	63.19
J90	4.39	743.32	856.23	48.92
J901	4.39	750.36	852.71	44.35
J903	4.39	738.76	852.57	49.32
J907	4.39	744.6	852.58	46.79
J91	4.39	746.64	854.78	46.86
J913	4.39	748.2	852.6	45.23
J915	4.39	738.76	852.6	49.33
J92	4.39	749.05	854.67	45.76
J921	4.39	745.5	852.83	46.5
J925	4.39	741.11	853.02	48.49
J93	4.39	748.47	854.73	46.05
J931	4.39	741.47	853.13	48.38
J935	4.39	732.92	853.28	52.15
J937	4.39	751.69	852.8	43.81
J939	4.39	752.27	852.79	43.56
J94	4.39	746.47	854.8	46.94
J941	4.39	752.36	852.79	43.51
J943	4.39	738.67	853.62	49.81
J945	4.39	737.34	853.61	50.38
J95	4.39	742.52	854.8	48.65
J955	4.39	735.05	853.77	51.44
J96	4.39	740.95	854.54	49.22
J963	4.39	738.62	853.4	49.73
J965	4.39	740.24	853.5	49.08
J969	4.39	740.83	853.35	48.76
J97	4.39	745.71	857.64	48.5
J973	4.39	742.41	853.25	48.03
J98	4.39	744.92	856.33	48.27
J983	4.39	741.27	852.33	48.12
J987	4.39	731.06	852.59	52.66
J99	4.39	752.09	855.63	44.86
J993	4.39	726.44	852.57	54.65
J997	4.39	746.15	852.86	46.24
J999	4.39	747.74	852.85	45.54

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1	4.58	566.48	848.6	122.24
J10	4.58	741.1	855.65	49.63
J100	4.58	746.17	852.72	46.17
J1000	3.18	916.3	1084.37	72.82
J1001	4.58	749.82	849.79	43.32
J1002	3.18	836.78	1084.36	107.28
J1003	3.18	894.03	1084.36	82.47
J1004	3.18	882.91	1084.37	87.29
J1005	0	794.26	1084.36	125.7
J1006	0	826.5	899.19	31.5
J1007	1.96	785.8	899.19	49.13
J1008	1.96	746.77	899.18	66.04
J101	4.58	741.65	852.55	48.05
J1011	4.58	751.78	850.33	42.7
J1015	4.58	739.77	856.37	50.52
J1016	4.58	714.9	850.67	58.83
J1017	4.58	722.76	850.67	55.42
J1018	4.58	741.36	854.61	49.07
J1019	4.58	752.8	850.38	42.28
J102	4.58	740.23	852.22	48.52
J1020	4.58	531.5	845.66	136.12
J1021	4.58	622.73	845.8	96.66
J1022	4.58	739.58	856.76	50.78
J1023	4.58	754.87	850.38	41.38
J1024	4.58	742.05	849.51	46.56
J1025	4.58	729.63	848.84	51.65
J1026	4.58	738.8	849.38	47.92
J1027	4.58	736.1	849.37	49.08
J1028	4.58	721.15	848.58	55.21
J1029	4.58	720.66	848.34	55.32
J103	4.58	746.38	854.39	46.8
J1030	4.58	717.88	848.3	56.51
J1031	4.58	714.15	848.3	58.13
J1032	4.58	710.41	848.22	59.72
J1033	4.58	712.48	848.22	58.82
J1034	4.58	747.5	858.49	48.09
J1035	4.58	743.72	851.54	46.72
J1037	4.58	744.88	851.56	46.22
J1038	4.58	744.8	851.65	46.3
J1039	4.58	743.6	853.01	47.41
J104	4.58	754.11	854.96	43.69
J1040	4.58	752.33	858.14	45.85
J1041	4.58	699.48	847.35	64.07
J1042	4.58	698.5	847.34	64.49
J1044	4.58	746.87	851.38	45.28
J1045	4.58	711.82	857.29	63.03
J1046	4.58	699.29	857.43	68.52
J1047	4.58	728.73	857.54	55.82
J1048	4.58	730.17	857.61	55.22
J1049	4.58	537.34	845.57	133.56
J105	4.58	752.36	855.87	44.85
J1051	4.58	650.41	847.73	85.5
J1053	4.58	752.69	850.56	42.41
J1054	4.58	775.92	860.27	36.55
J1055	4.58	778.94	860.27	35.24
J1056	3.36	781.4	981.88	86.87
J1057	3.36	777.6	981.88	88.51
J1058	4.58	634.8	845.8	91.43

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1059	4.58	646.26	845.81	86.46
J106	4.58	754.4	854.79	43.5
J1060	4.58	614.47	845.67	100.18
J1061	4.58	564.87	845.66	121.67
J1062	4.58	577.51	845.66	116.19
J1063	4.58	635.78	849.46	92.59
J1064	4.58	538.42	845.57	133.09
J1065	4.58	528.73	839.3	134.57
J1066	4.58	522.02	838.93	137.32
J1067	4.58	613.5	845.86	100.68
J1068	4.58	602.5	845.85	105.45
J1069	4.58	596.02	845.78	108.22
J107	4.58	755.1	854.48	43.06
J1070	4.58	595.77	845.87	108.37
J1071	4.58	605.21	846.12	104.38
J1072	4.58	639.18	846.58	89.87
J1073	4.58	645.1	846.6	87.31
J1074	4.58	624.13	848.17	97.08
J1075	4.58	646.73	848.18	87.29
J1076	4.58	710.56	847.43	59.3
J1077	4.58	728.72	849.43	52.3
J1078	4.58	675.75	847.26	74.31
J1079	4.58	672.22	846.77	75.64
J108	4.58	756.54	855.66	42.95
J1080	4.58	730.1	849.34	51.67
J1081	4.58	728.94	849.46	52.22
J1082	4.58	733.95	849.78	50.19
J1083	4.58	735.94	849.99	49.42
J1084	4.58	755.84	856.68	43.7
J1085	4.58	720.65	849.54	55.85
J1086	4.58	684.09	854.29	73.75
J1087	4.58	746.31	854.29	46.79
J109	4.58	760.71	855.77	41.19
J1091	4.58	756.36	850.54	40.81
J1095	4.58	757.17	850.55	40.46
J1097	4.58	752.15	850.69	42.7
J1099	4.58	753.67	849.98	41.73
J11	4.58	742.91	856.16	49.07
J110	4.58	747.22	856.07	47.17
J1101	4.58	748.04	851.11	44.66
J1103	4.58	747.28	851.01	44.95
J1109	4.58	745.47	851.21	45.82
J111	4.58	759.09	855.85	41.92
J1115	4.58	745.58	850.86	45.62
J1119	4.58	745.05	850.86	45.85
J112	4.58	766.64	854.46	38.06
J1121	4.58	742.97	851.47	47.01
J1125	4.58	739.81	851.22	48.27
J1127	4.58	741.68	851.12	47.42
J113	4.58	761.2	853.73	40.1
J1137	4.58	742.89	851.95	47.26
J1139	4.58	745.38	851.96	46.18
J114	4.58	758.13	853.43	41.29
J1141	4.58	746.67	852	45.64
J1145	4.58	741.98	852.22	47.76
J115	4.58	764.34	854.49	39.06
J1153	4.58	746.22	852.41	46.01
J1155	4.58	744.18	852.25	46.83

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1157	4.58	743.07	852.36	47.35
J116	4.58	765.33	853.73	38.31
J1163	4.58	743.69	824.88	35.18
J1165	4.58	747.48	850.85	44.79
J1169	4.58	747.67	850.84	44.7
J117	4.58	750.05	853.31	44.75
J1175	4.58	746.61	850.92	45.2
J1177	4.58	747.98	849.52	44
J1179	4.58	747.38	849.52	44.26
J118	4.58	745.53	853.14	46.63
J1181	4.58	748.67	850.79	44.25
J1183	4.58	749.7	850.77	43.79
J1187	4.58	746.04	851.35	45.63
J119	4.58	741.48	853.42	48.5
J1195	4.58	747.16	851.06	45.02
J1199	4.58	743.87	844.72	43.7
J12	4.58	632.47	828.48	84.93
J120	4.58	740.23	852.5	48.65
J1205	4.58	750.28	851.84	44.01
J1207	4.58	746.49	851.54	45.52
J121	4.58	740.41	853.36	48.94
J1211	4.58	740.75	851.57	48.02
J122	4.58	741.44	853.74	48.66
J1223	4.58	748.19	845.56	42.19
J1229	4.58	752.25	845.14	40.25
J123	4.58	739.89	854.04	49.46
J1233	4.58	748.58	853.15	45.31
J1235	4.58	750.31	852.61	44.32
J1237	4.58	753.08	852.44	43.05
J124	4.58	746.44	854.22	46.7
J1241	4.58	750.1	850.64	43.57
J1243	4.58	749.92	850.51	43.59
J1245	4.58	750.39	850.57	43.41
J125	4.58	741.36	854.34	48.95
J1251	4.58	746.16	853.28	46.41
J1253	4.58	753.91	850.95	42.05
J1255	4.58	753.86	850.56	41.9
J1259	4.58	754.31	850.95	41.87
J126	4.58	741.06	854.73	49.25
J1263	4.58	749.59	852.09	44.42
J1265	4.58	749.68	852.31	44.47
J1267	4.58	751.61	852.51	43.72
J1269	4.58	752.06	852.17	43.38
J127	4.58	749.17	854.61	45.69
J1271	4.58	748.04	852.15	45.11
J1273	4.58	743.74	851.64	46.75
J1275	4.58	745.02	851.64	46.2
J1277	4.58	743.22	851.64	46.98
J128	4.58	739.86	854.9	49.84
J1281	4.58	741.34	854.5	49.03
J1283	4.58	741.23	854.53	49.09
J129	4.58	741.08	855.21	49.45
J1291	4.58	740.99	854.53	49.19
J1295	4.58	738.46	854.46	50.26
J1299	4.58	741.54	855.34	49.31
J13	0	758.4	856.66	42.58
J130	4.58	751.82	855.05	44.73
J1303	4.58	739.98	853.02	48.98

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1307	4.58	746.37	854.02	46.65
J131	4.58	742.47	855.32	48.9
J1311	4.58	751.74	853.81	44.23
J1319	4.58	741.38	855.55	49.47
J132	4.58	748.62	855.38	46.26
J1321	4.58	743.72	853.91	47.75
J1323	4.58	750.98	853.48	44.41
J1325	4.58	742.2	853.35	48.16
J1327	4.58	756.31	853.13	41.95
J1329	4.58	745.93	854.63	47.1
J133	4.58	739.7	855.53	50.19
J1331	4.58	745.23	854.62	47.4
J1333	4.58	740.49	854.53	49.41
J1335	4.58	739.68	854.82	49.89
J1339	4.58	742.24	855.2	48.94
J134	4.58	750.79	856.06	45.61
J1345	4.58	742.6	855.26	48.82
J1347	4.58	741.53	855.3	49.3
J135	4.58	744.98	856.18	48.18
J1351	4.58	741.73	855.36	49.24
J1353	4.58	746.46	855.1	47.07
J1355	4.58	746.24	855.1	47.17
J1357	4.58	746.08	855	47.19
J1359	4.58	741.4	855.48	49.43
J136	4.58	739.83	856.4	50.51
J1361	4.58	742.36	855.41	48.98
J1363	4.58	742.09	855.24	49.03
J1367	4.58	741.71	855.4	49.26
J137	4.58	744.32	856.26	48.5
J1371	4.58	744.19	851.96	46.7
J1373	4.58	759.7	853.26	40.54
J1375	4.58	762.51	853.59	39.46
J1379	4.58	754.86	853.1	42.57
J138	4.58	739.45	857.13	50.99
J1381	4.58	759.63	854.77	41.22
J1385	4.58	767.59	854.15	37.51
J1389	4.58	756.58	855.08	42.68
J139	4.58	740.18	855.52	49.98
J1391	4.58	765.7	854.36	38.42
J1393	4.58	764.85	854.15	38.69
J14	4.58	733.87	856.73	53.23
J140	4.58	740.77	855.52	49.72
J1401	4.58	757.87	853.43	41.41
J1403	4.58	757.54	853.33	41.5
J1405	4.58	742.15	855.48	49.11
J1407	4.58	740.89	856.35	50.03
J1409	4.58	753.94	855.44	43.98
J141	4.58	741.9	854.6	48.84
J1411	4.58	763.72	855.44	39.74
J1417	4.58	754.55	855.4	43.7
J1419	4.58	753.3	849.85	41.84
J142	4.58	741.21	855.87	49.68
J1423	4.58	741.79	856.37	49.65
J1429	4.58	761.27	853.19	39.83
J143	4.58	738.01	854.78	50.6
J1431	4.58	762.04	853.35	39.57
J1433	4.58	760.52	853.57	40.32
J144	4.58	740.71	858.3	50.95

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1445	4.58	758.7	853.72	41.17
J1447	4.58	752.69	826.18	31.84
J1449	4.58	763.05	854.18	39.49
J145	4.58	742.55	855.93	49.13
J1451	4.58	749.98	854.69	45.37
J1453	4.58	750.83	854.69	45.01
J1459	4.58	752.45	854.94	44.41
J146	4.58	740.17	856.41	50.36
J1463	4.58	751.66	854.7	44.65
J1465	4.58	754.17	854.7	43.56
J1467	4.58	753.66	854.94	43.89
J147	4.58	742.06	855.31	49.07
J1471	4.58	752.96	854.53	44.01
J1475	4.58	752	849.03	42.05
J1479	4.58	752.48	849.18	41.9
J148	4.58	740.91	858.47	50.94
J1483	4.58	750.05	855.7	45.78
J149	4.58	739.28	858.54	51.68
J1491	4.58	749.43	851.31	44.14
J1493	4.58	740.49	856.25	50.16
J15	4.58	727.38	858.57	56.85
J150	4.58	740.18	859.87	51.86
J1500	4.58	722.88	848.98	54.64
J1501	4.58	746.03	849.02	44.63
J1502	4.58	739.88	849.02	47.29
J1503	4.58	701.03	852.22	65.51
J1504	4.58	567.12	849.84	122.5
J1505	4.58	600.6	849.51	107.85
J1506	4.58	645.4	851.14	89.15
J1507	4.58	658.85	851.54	83.49
J1508	4.58	704.61	854.24	64.83
J1509	4.58	699.26	854.24	67.15
J151	4.58	740.22	862.1	52.81
J1510	4.58	679.71	854.24	75.63
J1511	4.58	693.44	854.24	69.68
J1512	4.58	746.27	909.37	70.67
J1513	4.58	767.92	904.87	59.34
J1515	0	737.23	863.1	54.54
J1517	4.58	742.24	852.97	47.98
J152	4.58	770.31	873.21	44.58
J1521	4.58	745	849.46	45.26
J1523	4.58	745.77	857.69	48.5
J1525	4.58	691.98	855.23	70.73
J1527	4.58	698.37	856.04	68.32
J153	4.58	750.52	873.32	53.21
J1531	4.58	722.8	852.41	56.16
J1533	4.58	724.44	852.22	55.37
J1535	4.58	723.63	848.96	54.31
J1537	4.58	685.66	848.69	70.64
J1539	4.58	712.41	850.32	59.75
J154	4.58	761.73	873.23	48.32
J1541	4.58	638.17	848.21	91.01
J1543	4.58	634.04	845.64	91.69
J1545	4.58	648.09	846.86	86.13
J1547	4.58	630.17	846.74	93.84
J1549	4.58	656.5	848.24	83.08
J155	0	855.1	886.44	13.58
J1551	4.58	645.64	848.73	88

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1553	4.58	632.57	846.6	92.74
J1557	4.58	659.68	846.53	80.96
J1559	4.58	577.06	848.03	117.41
J156	4.58	746.06	849.81	44.96
J1561	4.58	573.68	847.55	118.67
J1565	4.58	748.49	852.5	45.06
J1567	4.58	738.82	853.88	49.86
J157	4.58	767.25	869.49	44.3
J1571	4.58	737.25	853.87	50.53
J1575	4.58	739.09	853.97	49.78
J1577	4.58	738.3	853.97	50.12
J1579	4.58	737.28	854.15	50.64
J158	4.58	771.36	869.27	42.42
J1581	4.58	737.72	854.15	50.45
J1583	4.58	741.08	854.4	49.1
J1585	4.58	740.39	854.39	49.4
J1587	4.58	741.15	854.52	49.12
J1589	4.58	741.63	854.51	48.91
J159	4.58	772.92	869.24	41.73
J1591	4.58	742.52	854.65	48.59
J1593	4.58	740.99	854.64	49.25
J1595	4.58	741.94	858.42	50.47
J16	4.58	748.08	860.55	48.73
J160	4.58	744.05	864.81	52.33
J1601	4.58	743.23	858.32	49.87
J1605	4.58	742.95	858.29	49.97
J1609	4.58	740.46	858.5	51.15
J161	0	744.35	993.37	107.9
J1613	4.58	742.25	858.27	50.27
J1617	4.58	742.23	858.5	50.38
J1619	4.58	742.84	858.49	50.11
J162	0	736.72	914.37	76.97
J163	0	737.98	914.99	76.7
J1633	4.58	742.51	858.51	50.26
J1637	4.58	742.23	858.55	50.4
J1639	4.58	741.19	858.55	50.85
J164	4.58	777.69	873.1	41.34
J1641	4.58	741.35	859.7	51.28
J1645	4.58	743.56	858.54	49.82
J1649	4.58	742.93	858.54	50.09
J165	3.36	772.37	981.91	90.79
J1651	4.58	742.67	859.41	50.59
J1653	4.58	743.71	859.38	50.12
J1657	4.58	744.9	861.36	50.46
J166	3.36	775.14	981.97	89.62
J1661	4.58	743.02	861.26	51.23
J1665	4.58	744.32	862.03	51
J1667	4.58	746.51	862.12	50.09
J1669	4.58	740.14	861.64	52.65
J167	3.36	859.91	982.1	52.94
J1673	4.58	744.08	860.44	50.42
J1675	4.58	744.11	860.44	50.4
J168	4.58	739.58	856.18	50.52
J1681	4.58	781.08	862.26	35.18
J1687	4.58	760.07	862.26	44.28
J1689	4.58	766.73	862.26	41.39
J169	3.36	777.05	981.88	88.75
J1691	4.58	776.53	862.26	37.15

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1693	4.58	779.6	862.26	35.82
J1695	4.58	760.57	862.26	44.06
J1697	4.58	757.53	862.26	45.38
J17	0	746.62	929.38	79.19
J170	4.58	761.47	860.28	42.82
J1701	4.58	770.55	862.26	39.74
J1703	4.58	766.91	862.26	41.32
J1707	4.58	770.73	862.26	39.66
J1709	4.58	761.97	862.26	43.46
J171	4.58	741.48	855.7	49.49
J1711	4.58	774.28	862.26	38.12
J1713	4.58	769.23	862.26	40.31
J1719	4.58	771.02	873.24	44.29
J172	4.58	742.92	850.42	46.58
J1721	4.58	773.5	873.28	43.24
J1725	4.58	776.37	873.32	42.01
J1729	4.58	785.67	852.96	29.15
J173	4.58	746.41	849.49	44.66
J1731	4.58	788.18	852.89	28.04
J1735	4.58	769.91	855.25	36.98
J1737	4.58	765.23	856.52	39.56
J174	4.58	748.74	849.1	43.48
J1741	4.58	764.49	869.23	45.39
J1743	4.58	773.75	869.27	41.39
J1747	4.58	770.6	869.27	42.75
J175	0	735.33	780	19.35
J1751	4.58	765.07	869.23	45.13
J1753	4.58	734.25	860.21	54.58
J1757	4.58	737.99	861.07	53.33
J176	4.58	736.23	849.77	49.2
J1761	4.58	757.16	860.68	44.86
J1763	4.58	744.39	860.63	50.36
J1765	4.58	752.82	880.11	55.16
J1767	4.58	749.51	880.11	56.59
J1769	4.58	743.83	869.11	54.28
J177	0	734.29	850.91	50.53
J1771	4.58	741.03	868.38	55.18
J1773	4.58	744.07	868.38	53.86
J1775	4.58	743.51	868.38	54.1
J1777	4.58	742.83	866.22	53.47
J1779	0	832.76	908.59	32.86
J178	4.58	735.31	851.06	50.15
J1781	0	817.09	908.91	39.79
J1783	0.25	785.55	1084.32	129.46
J1785	3.18	901.55	1084.22	79.15
J1787	4.58	685.16	851.62	72.12
J1789	4.58	710.37	851.6	61.2
J179	4.58	738.11	850.69	48.78
J1793	4.58	687.35	851.67	71.2
J1795	4.58	743.89	849.48	45.75
J1797	4.58	743.81	849.48	45.79
J18	0	746.28	995.03	107.78
J180	4.58	738.68	850.33	48.38
J1801	4.58	747.02	849.47	44.39
J1803	4.58	746.38	849.47	44.67
J1805	4.58	747.1	849.48	44.36
J1807	4.58	749.92	849.65	43.22
J181	4.58	744.02	850.61	46.18

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1811	4.58	734.43	849.14	49.7
J1815	4.58	731.82	849.31	50.91
J1817	4.58	731.57	848.92	50.85
J182	4.58	730.68	849.48	51.48
J1821	4.58	729.95	848.87	51.53
J1823	4.58	727.31	848.84	52.66
J1825	4.58	729.84	848.8	51.55
J1827	4.58	730.96	849.48	51.35
J183	4.58	731.24	849.26	51.14
J1831	4.58	741.42	856.27	49.77
J1833	4.58	735.42	854.61	51.65
J1835	4.58	740.21	852.11	48.49
J1839	4.58	737.1	851.86	49.72
J184	4.58	731.64	849.22	50.95
J1843	4.58	737.44	851.46	49.41
J1845	4.58	741.21	855.64	49.58
J1847	4.58	740.63	855.39	49.72
J185	4.58	728.5	849.32	52.35
J1851	4.58	742.51	845.42	44.59
J1853	4.58	741.08	855.52	49.59
J1859	4.58	741.91	855.52	49.23
J186	4.58	728.33	849.32	52.42
J1863	4.58	738.11	856.76	51.41
J1867	4.58	739.43	851.67	48.63
J1869	4.58	739.04	856.8	51.03
J187	4.58	729.6	849.32	51.87
J1871	4.58	742.58	856.38	49.31
J1875	4.58	742.5	856.4	49.35
J1879	4.58	746.94	855.07	46.85
J188	4.58	722.47	848.98	54.82
J1883	4.58	727.19	852.41	54.26
J1885	4.58	745.04	853.72	47.09
J1887	4.58	744.92	853.88	47.21
J1889	4.58	746.37	852.21	45.86
J189	4.58	691.68	848.89	68.12
J1891	4.58	746.06	851.92	45.87
J1893	4.58	741.24	851.58	47.81
J1895	4.58	751.72	852.44	43.64
J1897	4.58	739.54	851.58	48.55
J1899	4.58	746.75	851.17	45.24
J19	0	747.17	929.37	78.95
J190	4.58	676.7	848.23	74.32
J1901	4.58	745.64	851.35	45.8
J1903	4.58	752.04	850.83	42.81
J1905	4.58	758.48	850.78	40
J1907	4.58	749.59	850.66	43.79
J1909	4.58	751.9	850.77	42.84
J191	4.58	719.72	848.23	55.68
J1911	4.58	747.26	850.87	44.9
J1913	4.58	740.58	851.73	48.16
J1915	4.58	743.1	852.16	47.25
J1917	4.58	742.18	852.6	47.85
J1919	4.58	741.81	853.2	48.26
J192	4.58	721	848.58	55.28
J1921	4.58	741.73	853.61	48.48
J1923	4.58	750.87	853.9	44.64
J1925	4.58	739.72	854.46	49.72
J1927	4.58	741.08	854.53	49.16

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1929	4.58	743.81	855.34	48.32
J193	4.58	724.78	848.67	53.68
J1931	4.58	742.11	855.55	49.16
J1933	4.58	740.96	855.3	49.54
J1935	4.58	741.02	855.26	49.5
J1937	4.58	741.09	855.59	49.61
J1939	4.58	742.09	855.52	49.15
J194	4.58	729.34	849.14	51.91
J1941	4.58	738.3	856.76	51.33
J1943	4.58	739.72	858.54	51.49
J1945	4.58	746.16	851.35	45.58
J1947	4.58	738.43	852.11	49.26
J1949	4.58	743.92	854.02	47.71
J195	4.58	734.24	849.36	49.88
J1951	4.58	744.57	851.51	46.34
J1953	4.58	752.17	854.69	44.42
J1955	4.58	758.28	854.47	41.68
J1957	4.58	761.2	854.46	40.41
J1959	4.58	757.4	854.19	41.94
J196	4.58	707.45	847.52	60.69
J1961	4.58	764.5	854.46	38.98
J1963	4.58	765.92	855.31	38.73
J1965	4.58	758.36	854.86	41.82
J1967	4.58	768.22	854.46	37.37
J1969	4.58	767.3	854.47	37.77
J197	4.58	678.58	847.27	73.09
J1971	4.58	754.17	855.11	43.73
J1973	4.58	740.42	856.37	50.24
J1975	4.58	744.01	855.44	48.29
J1977	4.58	750.1	855.6	45.71
J1979	4.58	764.58	853.73	38.63
J198	4.58	681.72	847.26	71.73
J1981	4.58	742.11	856.4	49.52
J1983	4.58	747.79	858.11	47.8
J1985	4.58	745.22	854.82	47.49
J1987	4.58	754.99	855.29	43.46
J1989	4.58	747.72	854.51	46.27
J199	4.58	703.69	847.43	62.28
J1991	4.58	752.43	855.83	44.81
J1993	4.58	749.73	855.96	46.03
J1995	4.58	749.21	856.01	46.28
J1997	4.58	730.81	849.52	51.44
J1999	4.58	746.43	849.8	44.79
J2	4.58	570.33	848.06	120.34
J20	4.58	767.9	860.89	40.29
J200	3.36	834.32	982.04	64.01
J2001	4.58	753.19	850.39	42.12
J2003	4.58	753.69	850.34	41.88
J2005	4.58	736.56	851.46	49.79
J2007	4.58	734.36	850.79	50.45
J2009	4.58	737.27	850.57	49.09
J201	4.58	750.28	850.91	43.6
J2011	4.58	742.07	850.48	46.98
J2013	4.58	738.87	850.61	48.42
J2015	4.58	736.3	850.07	49.29
J2017	4.58	737.34	849.95	48.79
J2019	4.58	735.06	850.22	49.9
J202	4.58	752.15	850.73	42.71

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2021	4.58	745.69	849.81	45.12
J2023	4.58	742.26	849.81	46.6
J2025	4.58	735.04	849.67	49.67
J2027	4.58	739.94	849.44	47.44
J2029	4.58	732.18	849.31	50.75
J203	4.58	762.75	870.38	46.64
J2031	4.58	732.25	849.14	50.65
J2033	4.58	743.38	849.47	45.97
J2035	4.58	729.65	848.78	51.62
J2037	4.58	728.91	848.83	51.96
J2039	4.58	728.5	848.83	52.14
J204	4.58	736.81	851.26	49.59
J2041	4.58	729.76	848.87	51.61
J2043	4.58	729.51	848.87	51.72
J2045	4.58	731.27	848.76	50.91
J2047	4.58	729.96	848.8	51.5
J2049	4.58	729	848.8	51.91
J205	4.58	716.96	848.29	56.91
J2051	4.58	729.5	848.76	51.67
J2053	4.58	655.71	846.95	82.86
J2055	4.58	721.09	848.58	55.24
J2057	4.58	687.6	851.69	71.1
J2059	4.58	750.76	854.54	44.97
J206	4.58	716.87	847.78	56.73
J2061	4.58	769.08	870.37	43.89
J2063	4.58	768.08	855.3	37.79
J2065	4.58	768.02	869.88	44.13
J2067	4.58	767.51	869.88	44.35
J2069	4.58	766.04	870.86	45.42
J207	4.58	731.59	849.15	50.94
J2071	4.58	755.25	868.99	49.28
J2073	4.58	755.05	868.99	49.37
J2075	4.58	766.43	870.86	45.25
J2077	4.58	764.3	873.26	47.21
J2079	4.58	773.1	870.37	42.15
J208	4.58	733.15	849.14	50.26
J2081	4.58	744.11	866.17	52.89
J2083	4.58	742.08	865.07	53.29
J2085	4.58	745.97	865.04	51.59
J2087	4.58	771.82	869.27	42.22
J2089	4.58	768.2	869.27	43.79
J209	4.58	734.65	849.14	49.61
J2091	4.58	767.95	869.27	43.9
J2093	4.58	755.64	869.26	49.23
J2095	4.58	766.14	869.26	44.68
J2097	4.58	772.58	869.24	41.88
J2099	4.58	757.51	869.52	48.53
J21	4.58	771.68	861.33	38.84
J210	4.58	634.32	847.78	92.49
J2101	4.58	774.22	873.32	42.94
J2103	4.58	745.21	860.44	49.93
J2105	4.58	741.64	861.27	51.83
J2107	4.58	743.15	861.19	51.15
J2109	4.58	744.66	861.48	50.62
J211	4.58	739.03	850.63	48.35
J2111	4.58	740.01	858.5	51.34
J2113	4.58	742	858.5	50.48
J2115	4.58	743.3	858.51	49.92

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2117	4.58	742.76	858.52	50.16
J2119	4.58	744.54	858.52	49.39
J212	4.58	737.57	850.3	48.85
J2121	4.58	741.3	849.76	46.99
J2123	0	804.66	897.74	40.33
J2125	0	860.5	886.44	11.24
J2127	0	860.5	886.44	11.24
J2129	0	856.5	886.44	12.97
J213	4.58	733.63	850.36	50.58
J2131	0	860.5	886.44	11.24
J2133	4.58	719.5	851.5	57.2
J2135	4.58	650.5	846.93	85.11
J2137	4.58	654.5	846.93	83.38
J2139	4.58	739.41	851.61	48.62
J214	4.58	744.28	849.88	45.76
J2141	4.58	739.41	851.43	48.54
J2143	4.58	750.78	850.84	43.36
J2145	4.58	750.88	855.92	45.51
J2147	4.58	741.58	856.51	49.8
J2149	4.58	741.39	856.48	49.87
J215	4.58	739.7	849.87	47.74
J2151	4.58	740.57	856.54	50.25
J2155	4.58	740.19	856.53	50.41
J2157	4.58	741.3	856.52	49.92
J2159	4.58	746.61	856.11	47.45
J216	4.58	745.45	895.44	64.99
J2161	4.58	757.12	850.41	40.42
J2163	4.58	747.32	851.66	45.21
J2165	4.58	697.36	851.61	66.84
J2167	0	764.82	854.14	38.7
J2169	0	755.95	850.25	40.86
J217	0	852.1	886.95	15.1
J2171	0	782.75	881.18	42.65
J2173	0	750.26	857.71	46.56
J2175	0	741.57	855.21	49.24
J2177	0	739.55	854.7	49.9
J2179	0	638	847.19	90.64
J218	0	850.25	886.14	15.55
J219	4.58	745.41	884.78	60.39
J22	4.58	737.78	861.84	53.76
J220	4.58	746.04	874.33	55.59
J221	4.58	743.78	856.25	48.73
J222	4.58	744.1	861.41	50.83
J223	4.58	746.97	864.1	50.75
J224	4.58	750.01	861.77	48.43
J225	4.58	744.04	858.46	49.58
J226	4.58	747.76	858.26	47.88
J227	4.58	747.93	858.03	47.71
J228	4.58	752.61	857.73	45.55
J229	4.58	745.28	856.22	48.07
J23	4.58	714.66	857.25	61.78
J230	4.58	755.26	857.72	44.4
J231	4.58	750.14	854.94	45.41
J232	4.58	676.34	857.52	78.5
J233	4.58	668.84	856.64	81.37
J234	4.58	669.87	855.88	80.6
J235	4.58	665.41	855.14	82.21
J236	4.58	674.91	854.47	77.8

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J237	4.58	677.27	854	76.58
J238	4.58	663.98	853.2	81.99
J239	4.58	707.04	851.91	62.77
J24	4.58	692.37	856.93	71.3
J240	4.58	698.76	852.22	66.49
J241	4.58	706.7	852.29	63.08
J242	4.58	713.03	852.45	60.41
J243	4.58	676.5	851.02	75.62
J244	4.58	735.38	851.35	50.25
J245	4.58	739.5	851.4	48.48
J246	4.58	733.24	851.23	51.13
J247	4.58	743.14	851.12	46.79
J248	4.58	723.11	850.28	55.1
J249	4.58	747	851.27	45.18
J25	4.58	738.98	859.2	52.09
J250	4.58	749.44	851	44
J251	4.58	747.37	851	44.9
J252	4.58	754.59	850.83	41.7
J253	4.58	747.71	850.85	44.69
J254	4.58	742.3	851.27	47.21
J255	4.58	744.33	851.48	46.43
J256	4.58	748.7	852.69	45.06
J257	4.58	757.4	850.46	40.32
J258	4.58	760.5	850.76	39.11
J259	4.58	744.21	851.12	46.32
J26	4.58	748.16	866.37	51.22
J260	4.58	729.03	849.51	52.2
J261	4.58	745.11	849.7	45.32
J262	4.58	752.69	850.27	42.28
J263	4.58	757.5	850	40.08
J264	4.58	754.21	849.81	41.42
J265	4.58	731.79	849.49	51
J266	4.58	728.28	849.5	52.53
J267	4.58	737.87	849.51	48.37
J268	4.58	736.96	849.44	48.74
J269	4.58	736.98	849.43	48.72
J27	4.58	744.93	857.64	48.84
J270	4.58	731.17	848.8	50.97
J271	4.58	743.33	849.44	45.98
J272	4.58	744.12	849.5	45.66
J273	4.58	742.79	849.66	46.31
J274	4.58	763.81	873.22	47.41
J275	4.58	739.78	849.42	47.5
J276	4.58	740.51	851.81	48.23
J277	4.58	737.13	851.26	49.45
J278	4.58	737.09	850.79	49.27
J279	4.58	734.46	850.79	50.4
J28	4.58	750.72	857.66	46.34
J280	4.58	734.18	850.83	50.55
J281	4.58	733.14	851.56	51.31
J282	0	828.26	898.27	30.33
J283	4.58	734.46	852.51	51.15
J284	4.58	767.9	869.3	43.94
J285	4.58	742.9	864.81	52.82
J286	4.58	735.01	853.03	51.14
J287	4.58	738.52	853.8	49.95
J288	4.58	737.3	853.98	50.56
J289	4.58	740.46	854.09	49.24

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J29	4.58	754.1	857.77	44.92
J290	4.58	739.21	854.29	49.86
J291	4.58	739.16	854.27	49.88
J292	4.58	738.57	854.16	50.08
J293	4.58	740.15	854.4	49.5
J294	4.58	740.53	854.52	49.39
J295	4.58	741.18	854.65	49.17
J296	4.58	742.64	854.81	48.6
J297	4.58	742.59	854.58	48.53
J298	4.58	742.38	854.94	48.77
J299	4.58	740.24	855.17	49.8
J3	4.58	569.67	849.52	121.26
J30	4.58	749.68	850.8	43.81
J300	4.58	741.16	853.04	48.48
J301	4.58	741.83	851.18	47.38
J302	4.58	746.63	849.88	44.74
J303	4.58	755.22	860.31	45.53
J304	4.58	753.99	860.34	46.08
J305	4.58	753.9	860.35	46.13
J306	4.58	752.14	860.36	46.89
J307	4.58	744.65	860.41	50.16
J308	0	736.45	780	18.87
J31	4.58	741.12	851.61	47.88
J310	0	734.49	968.92	101.58
J311	4.58	740.22	861.05	52.35
J312	4.58	740.72	859.35	51.4
J313	4.58	742.31	858.56	50.37
J314	4.58	742.94	859.41	50.47
J315	4.58	726.61	849.52	53.26
J316	4.58	742.91	858.52	50.09
J317	4.58	741.99	858.51	50.49
J318	4.58	741.18	858.5	50.84
J319	4.58	742.29	858.5	50.36
J32	4.58	725.46	858.45	57.63
J320	4.58	741.71	858.5	50.6
J321	4.58	741.82	858.49	50.55
J322	4.58	742.9	855.49	48.79
J323	4.58	740.61	855.56	49.81
J324	4.58	738.56	857.32	51.46
J325	4.58	741.79	855.21	49.14
J326	4.58	742.96	855.33	48.69
J327	4.58	742.61	855.41	48.88
J328	4.58	740.47	855.51	49.85
J329	4.58	739.09	854.4	49.96
J33	4.58	743.9	855.54	48.37
J330	4.58	741.62	856.31	49.7
J331	4.58	737.08	857.9	52.35
J332	4.58	735.92	858.27	53.02
J333	4.58	737.3	861.89	53.98
J334	4.58	744.5	856.42	48.49
J335	4.58	740.83	856.41	50.08
J336	4.58	741.67	856.58	49.79
J337	4.58	742.05	856.85	49.74
J338	4.58	744.35	857.59	49.07
J339	4.58	741.73	856.51	49.73
J34	4.58	736.01	853.48	50.9
J340	4.58	739.71	856.56	50.63
J341	4.58	737.83	856.57	51.45

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J342	4.58	738.31	856.7	51.3
J343	4.58	740.81	858.23	50.88
J344	4.58	735.38	859.37	53.72
J345	4.58	730.14	860.26	56.38
J346	4.58	744.34	858.31	49.38
J347	4.58	748.57	849.66	43.8
J348	4.58	759.08	860.28	43.85
J349	4.58	746.42	849.32	44.59
J35	4.58	719.59	853.67	58.09
J350	4.58	743.58	849.18	45.75
J351	4.58	745.5	849.09	44.89
J352	0	860.5	888.62	12.18
J353	4.58	684.65	858.16	75.18
J354	4.58	694.99	848.9	66.69
J355	4.58	695.72	849.05	66.44
J356	4.58	724.25	849.13	54.11
J357	4.58	730.27	849.23	51.54
J358	4.58	733.89	849.44	50.07
J359	4.58	734.9	849.14	49.5
J36	4.58	713.97	852.38	59.97
J360	4.58	721.99	848.41	54.78
J361	4.58	717.48	848.3	56.68
J362	4.58	675.07	848.25	75.04
J363	4.58	722.29	847.99	54.47
J364	4.58	711.8	847.66	58.87
J365	4.58	703.45	847.4	62.37
J366	4.58	697.5	847.52	65
J367	4.58	701.46	847.92	63.46
J368	4.58	710.5	848.21	59.67
J369	4.58	715.14	848.55	57.81
J37	4.58	677.65	853.45	76.18
J370	4.58	726.55	848.88	53.01
J371	4.58	728.1	849.18	52.47
J372	4.58	654.82	847.73	83.59
J373	4.58	652.94	847.84	84.45
J374	4.58	650.34	848.03	85.66
J375	4.58	655.64	849.49	83.99
J376	4.58	696.57	849.53	66.28
J377	4.58	726.11	849.57	53.49
J378	4.58	650.76	849.49	86.11
J379	4.58	644.76	848.59	88.32
J38	4.58	678.66	852.19	75.19
J380	4.58	641.79	849.14	89.84
J381	4.58	648.7	849.78	87.13
J382	4.58	650.7	850.07	86.39
J383	4.58	646.07	849.47	88.14
J384	4.58	638.72	849.46	91.32
J385	4.58	642.88	849.46	89.51
J386	4.58	738.45	857.16	51.43
J387	4.58	751.37	849.81	42.65
J388	4.58	747.43	849.74	44.33
J389	4.58	746.74	849.81	44.66
J39	4.58	648.95	851.42	87.73
J390	4.58	749.7	849.68	43.32
J391	4.58	751.27	849.7	42.65
J392	4.58	753.64	849.7	41.62
J393	4.58	750.15	849.65	43.11
J394	4.58	748.92	849.63	43.64

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J395	4.58	750.3	849.61	43.03
J396	4.58	749.59	849.64	43.35
J397	4.58	750.19	849.82	43.17
J398	4.58	757.06	860.7	44.91
J399	4.58	767.79	861.07	40.42
J4	4.58	563.76	849.51	123.82
J40	4.58	654.76	849.46	84.36
J400	4.58	752.67	861.57	47.19
J401	4.58	733.52	861.02	55.24
J402	4.58	742.59	862.44	51.93
J403	0	737.47	912.86	76
J404	4.58	736.3	863.61	55.17
J405	4.58	743.52	866.17	53.14
J407	4.58	766.06	880.11	49.42
J408	4.58	745.37	880.11	58.38
J409	4.58	745.93	873.32	55.2
J41	4.58	647.75	849.46	87.4
J410	4.58	772.06	880.11	46.82
J411	4.58	781.77	880.12	42.61
J412	4.58	776.06	880.12	45.09
J413	4.58	738.9	863.28	53.9
J414	4.58	746.29	866.7	52.17
J415	4.58	778.03	873.15	41.22
J416	0	784.18	879.04	41.11
J417	3.36	788.86	981.83	83.62
J418	0	945.64	982.28	15.88
J419	3.36	777.5	981.88	88.56
J42	4.58	641.05	846.8	89.15
J420	4.58	555.78	845.55	125.56
J421	4.58	577.17	845.56	116.29
J422	4.58	621.21	845.64	97.24
J423	4.58	618.82	845.8	98.35
J424	4.58	620.57	845.81	97.6
J425	4.58	617.63	845.85	98.89
J426	4.58	629.03	845.83	93.94
J427	4.58	637.37	845.82	90.32
J428	4.58	638.64	845.83	89.77
J429	4.58	628.62	845.97	94.18
J43	4.58	647.5	846.76	86.34
J430	4.58	545.92	845.57	129.84
J431	4.58	553.27	845.62	126.68
J432	4.58	603.53	845.66	104.92
J433	4.58	603.62	845.7	104.89
J434	4.58	630.32	845.82	93.38
J435	4.58	598.57	845.99	107.21
J436	4.58	626.94	846.15	94.98
J437	4.58	622.69	846.5	96.98
J438	4.58	636.37	846.84	91.2
J439	4.58	638.3	847.05	90.45
J44	4.58	642.94	846.78	88.32
J440	4.58	646.5	847.28	87
J441	4.58	652.5	847.52	84.5
J442	4.58	643.14	847.17	88.41
J443	4.58	570.64	847.73	120.06
J444	4.58	571.17	848.79	120.3
J445	4.58	574.81	848.97	118.79
J446	4.58	584.58	849.17	114.65
J447	4.58	623.13	849.38	98.03

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J448	4.58	584.44	849.51	114.86
J449	4.58	574.21	849.51	119.28
J45	4.58	636.55	846.58	91
J450	4.58	638.3	845.94	89.97
J451	4.58	639.38	846.27	89.64
J452	4.58	636.21	846.06	90.93
J453	4.58	641.25	846.44	88.91
J454	4.58	638.93	846.28	89.84
J455	4.58	640.4	846.6	89.34
J456	4.58	640.34	846.59	89.37
J457	4.58	640.97	846.59	89.1
J458	4.58	635.34	846.67	91.57
J459	4.58	640.66	846.72	89.29
J46	4.58	649.37	846.91	85.59
J460	4.58	646.52	846.65	86.71
J461	4.58	645.71	846.79	87.13
J462	4.58	637.77	846.82	90.58
J463	4.58	643.85	846.71	87.9
J464	4.58	636.19	846.76	91.24
J465	4.58	637.08	846.99	90.95
J466	4.58	635.13	847.32	91.94
J467	4.58	647.69	847	86.36
J468	4.58	674.74	847.26	74.75
J469	4.58	676.34	847.26	74.06
J47	4.58	657.1	846.95	82.26
J470	4.58	634.97	847.7	92.18
J471	4.58	638.98	847.88	90.52
J472	4.58	649.78	847.11	85.5
J473	4.58	689.82	847.31	68.24
J474	4.58	683.94	847.27	70.77
J475	4.58	654.94	847.36	83.38
J476	4.58	694.79	847.31	66.09
J477	4.58	584.5	849.85	114.97
J478	4.58	643.57	850.55	89.68
J479	4.58	655.15	851.23	84.96
J48	4.58	600.43	846.94	106.81
J480	4.58	655.08	851.34	85.04
J481	4.58	680.01	851.89	74.48
J482	4.58	682.82	852.05	73.33
J483	4.58	677.17	852.23	75.85
J484	4.58	701.14	852.66	65.65
J485	4.58	686.94	853.56	72.2
J486	4.58	634.99	848.18	92.38
J487	4.58	612.01	848.8	102.6
J488	4.58	638.07	849.3	91.53
J489	4.58	650.78	850.36	86.48
J49	4.58	599.64	845.68	106.61
J490	4.58	646.1	850.9	88.74
J491	4.58	650.57	851.93	87.25
J492	4.58	669.42	852.43	79.3
J493	4.58	675.83	854.3	77.33
J494	4.58	684.98	855.17	73.75
J495	4.58	685.29	855.82	73.89
J496	4.58	696.81	856.78	69.31
J497	4.58	699.69	856.82	68.08
J498	4.58	703.54	856.91	66.46
J499	4.58	707.08	857.01	64.97
J5	4.58	655.93	851.14	84.58

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J50	4.58	602.7	845.78	105.33
J500	4.58	686.41	857.49	74.13
J501	4.58	695.06	856.12	69.78
J502	4.58	695.71	855.49	69.24
J503	4.58	685.35	854.88	73.46
J504	4.58	686.63	854.57	72.77
J505	4.58	680.5	854.27	75.3
J506	4.58	691.2	854.26	70.65
J507	4.58	697.82	854.25	67.78
J508	4.58	710.92	854.25	62.1
J509	3.18	860.18	1084.36	97.14
J51	4.58	569.42	845.55	119.65
J510	3.18	823.27	1084.39	113.14
J511	0.25	883.93	1084.4	86.86
J512	3.18	904.36	1084.42	78.02
J513	0.25	947.39	1084.42	59.38
J514	0	759.15	987.36	98.88
J515	4.58	654.1	849.46	84.65
J516	4.58	748.89	856.68	46.71
J517	1.96	743.15	856.7	49.2
J518	4.58	742.02	856.79	49.73
J519	4.58	737.82	856.87	51.58
J52	4.58	545.16	845.59	130.18
J520	4.58	723.36	857.05	57.93
J521	4.58	723.42	858.1	58.35
J522	4.58	724.74	859.22	58.27
J523	4.58	728.61	859.78	56.84
J524	4.58	728.83	859.21	56.49
J525	4.58	739.65	855.03	49.99
J526	4.58	730.85	849.39	51.37
J527	4.58	755.82	853.39	42.28
J528	4.58	763.33	855.44	39.91
J529	4.58	744.79	856.18	48.27
J53	4.58	621.31	845.87	97.3
J530	4.58	736.03	852.09	50.29
J531	4.58	745.7	852.54	46.29
J532	4.58	750.07	853.12	44.65
J533	4.58	738.58	853.75	49.91
J534	4.58	747.82	855.89	46.82
J535	4.58	739.09	853.46	49.55
J536	4.58	749.46	850.51	43.79
J537	4.58	750.57	850.47	43.29
J538	4.58	753.32	850.43	42.08
J539	4.58	755.22	850.38	41.24
J54	4.58	622.02	845.86	96.99
J540	4.58	752.92	850.32	42.2
J541	4.58	606.13	845.73	103.82
J542	4.58	731.49	853.69	52.95
J543	4.58	634.66	848.19	92.52
J544	4.58	628.32	848.18	95.26
J545	4.58	627.66	848.18	95.55
J546	4.58	627.81	848.18	95.49
J547	4.58	626.52	848.18	96.04
J548	4.58	631.35	848.18	93.95
J549	4.58	733.55	849.58	50.27
J55	4.58	622.17	845.9	96.94
J550	4.58	733.31	849.28	50.25
J551	4.58	731.64	849.23	50.95

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J552	4.58	728.45	849.12	52.29
J553	4.58	731.87	849.15	50.82
J554	4.58	731.9	849.02	50.75
J555	4.58	732.56	848.92	50.42
J556	4.58	730.08	848.87	51.47
J557	4.58	729.95	848.83	51.51
J558	4.58	729.03	848.81	51.9
J559	4.58	727.5	848.78	52.55
J56	4.58	631.55	845.81	92.84
J560	4.58	730.55	848.75	51.22
J561	4.58	739.27	849.5	47.77
J562	4.58	746.05	849.51	44.83
J563	4.58	761.31	855.78	40.93
J564	4.58	742.16	856.57	49.57
J565	4.58	742.22	849.51	46.49
J566	4.58	739.76	849.51	47.56
J567	4.58	739.34	849.51	47.74
J568	4.58	740.98	856.45	50.03
J569	4.58	740.58	849.52	47.2
J57	4.58	636.31	845.86	90.8
J570	4.58	742.59	856.6	49.4
J571	4.58	745.41	849.53	45.12
J572	4.58	745.52	849.55	45.08
J573	4.58	746.57	849.54	44.62
J574	4.58	743.24	858.88	50.11
J575	4.58	754.85	857.75	44.59
J576	4.58	743.63	849.52	45.88
J577	4.58	741.82	849.52	46.67
J578	4.58	745.8	849.67	45
J579	4.58	753.28	857.76	45.27
J58	4.58	640.44	846.61	89.33
J580	4.58	640.6	823.82	79.39
J581	4.58	738.84	858.98	52.06
J582	4.58	743.94	849.66	45.81
J583	4.58	746.61	849.62	44.63
J584	4.58	745.05	849.57	45.29
J585	4.58	742.38	849.53	46.43
J586	4.58	742.44	856.27	49.33
J587	4.58	744.88	849.52	45.34
J588	4.58	746.89	852.63	45.82
J589	4.58	746.58	851.86	45.62
J59	4.58	640.89	846.59	89.13
J590	4.58	745.36	850.95	45.75
J591	4.58	640.47	846.61	89.32
J592	4.58	613.06	849.01	102.24
J593	4.58	650.36	846.9	85.16
J594	4.58	570.08	849.51	121.07
J595	4.58	658.46	851.56	83.67
J596	4.58	694.06	856.69	70.47
J597	4.58	740.88	860.74	51.93
J598	0	940.61	1084.43	62.32
J599	0	946.59	987	17.51
J6	4.58	658.02	851.55	83.86
J60	4.58	646.39	846.59	86.75
J600	0	953.99	982.3	12.27
J601	4.58	765.91	873.26	46.51
J602	4.58	767.5	877.41	47.62
J603	4.58	773.18	878.82	45.77

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J604	4.58	777.06	880.61	44.87
J605	4.58	774.13	880.62	46.14
J606	0	873.85	907.36	14.52
J607	3.36	789.7	981.88	83.27
J608	4.58	769.15	873.21	45.09
J61	4.58	639.59	846.85	89.81
J610	4.58	638.83	823.07	79.83
J611	4.58	739.92	854.53	49.66
J612	4.58	646.57	845.71	86.29
J614	4.58	779.53	873.21	40.59
J616	4.58	646.1	837.6	82.97
J618	4.58	746.06	849.52	44.83
J619	0	860.5	886.44	11.24
J62	4.58	636.37	847.15	91.33
J620	0	745.32	929.52	79.81
J621	0	739.59	955.33	93.48
J622	4.58	744.6	873.21	55.72
J623	0	851	886.38	15.33
J624	3.7	944.37	1167.84	96.83
J625	3.7	990.71	1167.83	76.74
J626	3.36	887.1	982.1	41.16
J627	3.18	931.28	1084.41	66.35
J628	3.18	907.3	1084.36	76.72
J629	1.96	779.76	899.18	51.75
J63	4.58	647.97	846.89	86.2
J630	1.96	790.7	899.19	47.01
J631	4.58	749.43	850.79	43.92
J632	4.58	750.94	850.77	43.25
J633	4.58	684	854.29	73.79
J634	4.58	754.78	877.44	53.15
J635	4.58	752.6	861.07	47
J636	4.58	753.32	860.89	46.61
J637	4.58	737.88	860.89	53.3
J638	4.58	659.69	847.28	81.29
J639	4.58	638.41	846.14	90.01
J64	4.58	642.28	848.21	89.23
J640	4.58	641.37	846.13	88.73
J641	4.58	752.78	850.77	42.46
J642	4.58	751.23	850.78	43.14
J643	4.58	754.53	850.95	41.78
J645	4.58	726.5	851.19	54.03
J646	4.58	743.85	851.1	46.47
J647	4.58	744.8	851.05	46.04
J648	4.58	649.59	831.06	78.63
J649	4.58	753.44	855.82	44.36
J65	4.58	689.17	847.63	68.66
J650	4.58	736.39	851.21	49.75
J651	4.58	749.28	851.27	44.19
J652	4.58	744.44	851.3	46.3
J653	4.58	727.28	851.36	53.77
J654	4.58	651.82	828.67	76.63
J655	4.58	722.97	851.34	55.62
J656	4.58	728.49	851.34	53.23
J657	4.58	724.48	851.34	54.97
J658	4.58	723.36	851.36	55.47
J659	4.58	745.49	851.36	45.87
J66	4.58	650.32	849.49	86.3
J660	4.58	719.57	851.34	57.1

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J661	4.58	747.82	851.82	45.06
J662	4.58	723.41	852.43	55.9
J663	4.58	718.35	852.43	58.1
J664	4.58	731.62	853.13	52.65
J665	4.58	737.16	853.13	50.25
J666	4.58	747.01	856.21	47.32
J667	4.58	749.78	856.21	46.12
J668	4.58	747.89	856.61	47.11
J669	4.58	749.76	856.61	46.3
J67	4.58	644.65	849.48	88.75
J670	4.58	747.15	857.71	47.91
J671	4.58	749.19	862.49	49.1
J672	4.58	747.46	869.71	52.97
J673	4.58	748.85	855.85	46.36
J674	4.58	740.87	862.81	52.84
J675	4.58	740.67	856.38	50.14
J676	4.58	740.66	861.65	52.43
J677	4.58	743.84	856.24	48.7
J678	4.58	746.67	855.42	47.12
J679	4.58	740.46	861.88	52.61
J68	4.58	669.21	849.51	78.13
J680	4.58	741.3	855.56	49.51
J681	4.58	740.73	855.67	49.8
J682	4.58	741.9	855.62	49.28
J683	4.58	742.08	855.58	49.18
J684	4.58	741.25	854.5	49.07
J685	4.58	743.77	861.87	51.18
J686	4.58	743.32	854.28	48.08
J687	4.58	740.45	853.88	49.15
J688	4.58	740.28	853.41	49.02
J689	4.58	740.16	851.42	48.21
J69	4.58	690.69	850.67	69.32
J690	4.58	744.91	851.68	46.26
J691	4.58	742.33	850.63	46.92
J692	4.58	746.1	850.73	45.34
J693	4.58	743.87	850.76	46.31
J694	4.58	742.9	851.06	46.87
J695	4.58	741.56	850.62	47.26
J696	4.58	738.03	850.62	48.79
J697	4.58	737.53	850.62	49
J698	4.58	657.22	827.66	73.85
J699	4.58	749.25	851.81	44.44
J7	4.58	694.08	852.88	68.81
J70	4.58	713.01	849.6	59.19
J700	4.58	757.12	849.86	40.18
J701	4.58	751.78	850	42.56
J703	4.58	735.5	849.76	49.51
J705	4.58	738.5	849.68	48.17
J706	4.58	741.84	849.63	46.7
J707	4.58	739.19	849.57	47.83
J708	4.58	736.93	849.51	48.78
J709	4.58	735.55	849.46	49.36
J71	4.58	721.78	851.38	56.16
J710	4.58	739.87	849.89	47.67
J711	4.58	733.29	849.45	50.33
J712	4.58	717.81	847.57	56.23
J713	4.58	731.13	849.47	51.27
J715	4.58	735.13	849.37	49.5

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J716	4.58	737.95	849.38	48.28
J717	4.58	740.21	849.38	47.3
J718	4.58	739.84	861.02	52.51
J719	4.58	740.55	860.98	52.18
J72	4.58	746.09	850.96	45.44
J720	4.58	739.17	853.88	49.7
J721	4.58	742.33	862.05	51.88
J722	4.58	744.79	862.3	50.92
J723	4.58	746.34	861.96	50.1
J724	4.58	746.61	862.13	50.06
J725	4.58	763.44	862.27	42.82
J726	4.58	740.07	859.87	51.91
J727	4.58	742.78	859.39	50.53
J728	4.58	742.8	859.38	50.52
J729	4.58	742.31	859.38	50.73
J73	4.58	729.71	851.5	52.77
J730	4.58	772.75	870.37	42.3
J731	4.58	781.32	880.61	43.02
J732	0	800.35	880.61	34.78
J733	0	778.44	880.61	44.27
J734	0	805.46	880.61	32.57
J735	0	807.96	880.61	31.48
J736	0	804.38	880.61	33.03
J737	4.58	757.42	873.22	50.18
J738	4.58	763.18	873.22	47.68
J739	4.58	771.94	873.22	43.89
J74	4.58	741.25	851.55	47.79
J740	4.58	774.36	873.19	42.83
J741	4.58	775.23	873.4	42.54
J742	4.58	776.23	873.49	42.14
J743	4.58	739.62	860.9	52.55
J744	4.58	741.66	860.98	51.7
J745	4.58	778.16	873.81	41.45
J746	4.58	778.53	873.66	41.22
J747	4.58	732.09	859.96	55.41
J748	4.58	740.04	860.46	52.18
J749	4.58	730.5	860.29	56.24
J75	4.58	755.06	850.95	41.55
J750	4.58	731.5	860.19	55.76
J751	0	868.14	886.44	7.93
J752	0	874.74	1196.28	139.32
J753	0.28	818.07	1006.83	81.79
J754	0.28	793.12	1006.84	92.6
J755	0	875.61	1006.85	56.87
J756	0.2	820.41	914.5	40.77
J757	4.58	755.11	862.27	46.43
J758	4.58	718.82	848.02	55.98
J759	0	737.79	971.68	101.35
J76	4.58	755.06	850.57	41.38
J760	4.58	722.87	851.4	55.69
J761	4.58	731.27	849.52	51.24
J762	4.58	747.32	856.09	47.13
J763	4.58	743.88	869.11	54.26
J764	4.58	742.75	868.38	54.44
J766	4.58	658.59	851.54	83.6
J767	4.58	687.5	851.62	71.11
J768	4.58	693.02	851.54	68.69
J769	4.58	682.38	851.52	73.29

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J77	4.58	729.22	851.9	53.15
J770	4.58	676.03	851.51	76.04
J771	4.58	715.05	851.51	59.13
J772	4.58	712.25	851.52	60.35
J773	4.58	731.78	851.51	51.88
J774	4.58	706.34	851.51	62.9
J775	0	945.07	1271.17	141.3
J776	4.58	762.52	851.5	38.55
J777	4.58	692.32	851.51	68.98
J778	4.58	763.22	851.51	38.26
J779	7.92	751.59	973.66	96.22
J78	4.58	736.82	851.6	49.73
J780	4.58	720.79	851.46	56.62
J781	7.92	798.64	973.52	75.78
J782	7.92	841.45	973.47	57.2
J783	4.58	724.99	851.41	54.78
J784	0	723.75	1049.75	141.26
J785	4.58	676.57	851.51	75.8
J786	4.58	740.26	861.43	52.5
J787	4.58	741.85	861.42	51.81
J788	4.58	742.08	861.64	51.81
J789	4.58	744.75	861.83	50.73
J79	4.58	730.11	852.41	52.99
J790	4.58	744.49	861.81	50.83
J791	4.58	752.92	857.86	45.47
J793	4.58	738.36	851.86	49.18
J794	4.58	724.19	844.62	52.18
J795	4.58	741.16	853.88	48.84
J796	4.58	652.69	851.55	86.17
J797	4.58	651.84	851.54	86.53
J798	4.58	696.81	851.81	67.16
J799	4.58	749.41	876.48	55.06
J8	4.58	684.38	854.29	73.62
J80	4.58	734.94	851.62	50.56
J800	0	725.02	973.85	107.82
J801	4.58	653.5	846.95	83.82
J802	4.58	724.24	844.17	51.97
J804	4.58	701.05	847.66	63.53
J806	4.58	690.17	846.84	67.88
J808	4.58	740.46	856.03	50.08
J809	4.58	740.16	856.21	50.28
J81	4.58	741.25	851.37	47.71
J810	4.58	646.57	846.45	86.61
J811	4.58	731.55	860.13	55.71
J812	4.58	725.34	848.2	53.24
J816	4.58	742.5	856.98	49.61
J817	4.58	737.7	858.2	52.22
J819	0	782.75	881.18	42.65
J82	4.58	745.64	851.11	45.7
J820	0	785.26	880.76	41.38
J821	0	785.34	981.81	85.13
J822	0	782.84	981.8	86.21
J823	0	782.68	1224.77	191.56
J824	4.58	781.93	860.27	33.95
J825	3.36	781.61	981.88	86.78
J826	0	781.87	860.27	33.97
J827	4.58	729.42	849.53	52.04
J828	4.58	748.75	852.71	45.04

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J829	3.18	906.5	1084.38	77.07
J83	4.58	729.14	849.49	52.15
J830	0	940.13	987	20.31
J831	3.05	903.75	987.13	36.13
J832	4.58	753.82	852.92	42.94
J833	4.58	738.49	849.54	48.12
J834	4.58	761.36	855.77	40.91
J835	4.58	725.53	849.53	53.73
J836	4.58	761.19	853.48	39.99
J837	4.58	759.45	853.44	40.73
J838	3.36	775.59	981.97	89.43
J839	4.58	779.19	981.79	87.79
J84	4.58	756.26	850.25	40.73
J840	3.36	780.99	981.78	87
J841	1.52	802.45	981.75	77.69
J842	1.52	817.46	981.75	71.19
J843	1.52	817.77	981.74	71.05
J844	1.52	841.74	981.74	60.66
J845	1.52	818.56	981.73	70.7
J846	1.52	817.59	981.73	71.12
J847	1.52	824.15	981.73	68.28
J848	1.52	814.1	981.73	72.64
J849	1.52	837.89	981.74	62.33
J85	4.58	755.58	850.76	41.24
J850	1.52	827.38	981.73	66.88
J851	1.52	815.81	981.74	71.9
J852	1.52	818.55	981.75	70.72
J853	1.52	797.41	981.75	79.87
J854	1.52	830.05	981.75	65.73
J855	1.52	825.43	981.75	67.73
J856	1.52	796.7	981.76	80.18
J857	1.52	788.15	981.76	83.89
J858	1.52	789.12	981.76	83.47
J859	1.52	780.6	981.8	87.18
J86	4.58	736.7	852.55	50.2
J860	0	782.53	981.8	86.34
J861	4.58	731.85	849.49	50.97
J862	0	777.39	981.78	88.56
J863	4.58	742.95	861.07	51.18
J864	4.58	746.1	860.12	49.41
J865	1.52	814.15	981.75	72.62
J866	4.58	745.71	861.96	50.37
J867	0	860.5	888.86	12.29
J868	4.58	747	862.13	49.88
J869	4.58	751.26	862.27	48.1
J87	4.58	743.22	851.51	46.92
J870	0	860.5	886.44	11.24
J871	0	803.5	885.32	35.45
J872	0	836.95	885.25	20.93
J873	0	807.37	885.37	33.8
J874	4.58	752.03	862.27	47.77
J875	4.58	748.29	862.35	49.42
J876	4.58	747.89	862.3	49.58
J877	4.58	731.96	848.82	50.63
J88	4.58	744.7	851.33	46.2
J881	4.58	739.96	849.23	47.35
J885	4.58	741.52	849.47	46.77
J887	4.58	741.27	849.25	46.79

2043 PHD Scenario Modeling Results

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J889	4.58	734.32	849.45	49.89
J89	4.58	744.43	851.02	46.19
J893	4.58	735.02	849.57	49.63
J895	4.58	748.91	849.66	43.66
J897	4.58	747.98	849.65	44.05
J899	4.58	751.32	849.64	42.6
J9	4.58	711.1	854.24	62.02
J90	4.58	743.32	853.45	47.72
J901	4.58	750.36	849.64	43.02
J903	4.58	738.76	849.49	47.98
J907	4.58	744.6	849.5	45.46
J91	4.58	746.64	851.86	45.59
J913	4.58	748.2	849.52	43.9
J915	4.58	738.76	849.53	48
J92	4.58	749.05	851.74	44.49
J921	4.58	745.5	849.75	45.17
J925	4.58	741.11	849.95	47.16
J93	4.58	748.47	851.81	44.78
J931	4.58	741.47	850.07	47.06
J935	4.58	732.92	850.22	50.83
J937	4.58	751.69	849.73	42.48
J939	4.58	752.27	849.72	42.23
J94	4.58	746.47	851.88	45.67
J941	4.58	752.36	849.72	42.18
J943	4.58	738.67	850.62	48.51
J945	4.58	737.34	850.61	49.08
J95	4.58	742.52	851.87	47.38
J955	4.58	735.05	850.78	50.15
J96	4.58	740.95	851.59	47.94
J963	4.58	738.62	850.37	48.42
J965	4.58	740.24	850.49	47.77
J969	4.58	740.83	850.33	47.45
J97	4.58	745.71	854.95	47.33
J973	4.58	742.41	850.22	46.71
J98	4.58	744.92	853.59	47.08
J983	4.58	741.27	849.21	46.77
J987	4.58	731.06	849.52	51.33
J99	4.58	752.09	852.8	43.64
J993	4.58	726.44	849.5	53.32
J997	4.58	746.15	849.79	44.91
J999	4.58	747.74	849.79	44.22

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1	4.58	566.48	860.27	127.3
J10	4.58	741.1	868.63	55.26
J100	4.58	746.17	865.65	51.77
J1000	3.18	916.3	1084.37	72.82
J1001	4.58	749.82	862.61	48.87
J1002	3.18	836.78	1084.36	107.28
J1003	3.18	894.03	1084.36	82.47
J1004	3.18	882.91	1084.37	87.29
J1005	0	794.26	1084.36	125.7
J1006	0	826.5	899.2	31.5
J1007	1.96	785.8	899.2	49.13
J1008	1.96	746.77	899.19	66.04
J101	4.58	741.65	865.45	53.64
J1011	4.58	751.78	863.23	48.29
J1015	4.58	739.77	867.86	55.5
J1016	4.58	714.9	863.34	64.32
J1017	4.58	722.76	863.34	60.91
J1018	4.58	741.36	867.49	54.65
J1019	4.58	752.8	863.3	47.88
J102	4.58	740.23	865.13	54.12
J1020	4.58	531.5	759.08	98.61
J1021	4.58	622.73	759.14	59.11
J1022	4.58	739.58	869.94	56.48
J1023	4.58	754.87	863.3	46.98
J1024	4.58	742.05	862.31	52.11
J1025	4.58	729.63	861.65	57.21
J1026	4.58	738.8	862.2	53.47
J1027	4.58	736.1	862.19	54.63
J1028	4.58	721.15	861.38	60.76
J1029	4.58	720.66	861.13	60.86
J103	4.58	746.38	866.36	51.99
J1030	4.58	717.88	861.09	62.05
J1031	4.58	714.15	861.08	63.67
J1032	4.58	710.41	861.01	65.26
J1033	4.58	712.48	861.01	64.36
J1034	4.58	747.5	871.61	53.77
J1035	4.58	743.72	864.32	52.26
J1037	4.58	744.88	864.47	51.82
J1038	4.58	744.8	864.73	51.96
J1039	4.58	743.6	865.07	52.63
J104	4.58	754.11	867.75	49.24
J1040	4.58	752.33	868.17	50.19
J1041	4.58	699.48	860.02	69.56
J1042	4.58	698.5	860.01	69.98
J1044	4.58	746.87	864.28	50.87
J1045	4.58	711.82	867.69	67.54
J1046	4.58	699.29	867.75	72.99
J1047	4.58	728.73	867.81	60.27
J1048	4.58	730.17	867.86	59.66
J1049	4.58	537.34	759	96.04
J105	4.58	752.36	867.72	49.99
J1051	4.58	650.41	860.28	90.94
J1053	4.58	752.69	863.53	48.03
J1054	4.58	775.92	873.05	42.09

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1055	4.58	778.94	873.05	40.77
J1056	3.36	781.4	981.88	86.87
J1057	3.36	777.6	981.88	88.52
J1058	4.58	634.8	759.14	53.87
J1059	4.58	646.26	759.14	48.91
J106	4.58	754.4	866.89	48.74
J1060	4.58	614.47	759.09	62.66
J1061	4.58	564.87	759.09	84.16
J1062	4.58	577.51	759.08	78.67
J1063	4.58	635.78	861.9	97.98
J1064	4.58	538.42	759	95.57
J1065	4.58	528.73	752.68	97.04
J1066	4.58	522.02	752.3	99.78
J1067	4.58	612.1	759.2	63.74
J1068	4.58	612.88	759.2	63.4
J1069	4.58	596.02	759.22	70.72
J107	4.58	755.1	866.6	48.31
J1070	4.58	595.77	759.5	70.94
J1071	4.58	605.21	760.24	67.18
J1072	4.58	639.18	858.88	95.2
J1073	4.58	645.1	858.96	92.67
J1074	4.58	624.13	860.59	102.46
J1075	4.58	646.73	860.59	92.66
J1076	4.58	710.56	860.03	64.77
J1077	4.58	728.72	862.24	57.86
J1078	4.58	675.75	859.9	79.79
J1079	4.58	672.22	859.41	81.11
J108	4.58	756.54	867.65	48.14
J1080	4.58	730.1	862.17	57.22
J1081	4.58	728.94	862.31	57.79
J1082	4.58	733.95	862.65	55.77
J1083	4.58	735.94	862.89	55.01
J1084	4.58	755.84	866.22	47.83
J1085	4.58	720.65	862.26	61.36
J1086	4.58	684.09	864.65	78.23
J1087	4.58	746.31	864.64	51.27
J109	4.58	760.71	867.65	46.34
J1091	4.58	756.36	863.48	46.42
J1095	4.58	757.17	863.46	46.05
J1097	4.58	752.15	863.6	48.29
J1099	4.58	753.67	862.85	47.31
J11	4.58	742.91	867.99	54.2
J110	4.58	747.22	867.76	52.23
J1101	4.58	748.04	864.03	50.26
J1103	4.58	747.28	863.94	50.55
J1109	4.58	745.47	864.11	51.41
J111	4.58	759.09	867.68	47.05
J1115	4.58	745.58	863.75	51.21
J1119	4.58	745.05	863.76	51.44
J112	4.58	766.64	866.69	43.35
J1121	4.58	742.97	864.35	52.59
J1125	4.58	739.81	863.98	53.8
J1127	4.58	741.68	863.97	52.99
J113	4.58	761.2	866.43	45.6

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1137	4.58	742.89	864.8	52.82
J1139	4.58	745.38	864.8	51.75
J114	4.58	758.13	866.25	46.85
J1141	4.58	746.67	864.81	51.19
J1145	4.58	741.98	865.13	53.36
J115	4.58	764.34	866.8	44.4
J1153	4.58	746.22	865.12	51.52
J1155	4.58	744.18	865.05	52.37
J1157	4.58	743.07	865.24	52.94
J116	4.58	765.33	866.47	43.82
J1163	4.58	743.69	837.75	40.75
J1165	4.58	747.48	863.93	50.46
J1169	4.58	747.67	863.92	50.37
J117	4.58	750.05	866.59	50.5
J1175	4.58	746.61	863.9	50.82
J1177	4.58	747.98	862.24	49.51
J1179	4.58	747.38	862.24	49.77
J118	4.58	745.53	866.41	52.38
J1181	4.58	748.67	863.82	49.89
J1183	4.58	749.7	863.77	49.43
J1187	4.58	746.04	864.25	51.22
J119	4.58	741.48	866.35	54.11
J1195	4.58	747.16	863.96	50.61
J1199	4.58	743.87	857.73	49.33
J12	4.58	632.47	741.73	47.34
J120	4.58	740.23	865.42	54.24
J1205	4.58	750.28	864.56	49.52
J1207	4.58	746.49	864.31	51.05
J121	4.58	740.41	866.28	54.54
J1211	4.58	740.75	864.36	53.56
J122	4.58	741.44	866.69	54.27
J1223	4.58	748.19	858.43	47.77
J1229	4.58	752.25	857.65	45.67
J123	4.58	739.89	866.91	55.04
J1233	4.58	748.58	864.95	50.42
J1235	4.58	750.31	864.42	49.44
J1237	4.58	753.08	864.25	48.17
J124	4.58	746.44	866.94	52.21
J1241	4.58	750.1	862.68	48.78
J1243	4.58	749.92	862.54	48.8
J1245	4.58	750.39	862.65	48.64
J125	4.58	741.36	867.13	54.5
J1251	4.58	746.16	865.02	51.5
J1253	4.58	753.91	864.07	47.73
J1255	4.58	753.86	863.71	47.6
J1259	4.58	754.31	864.07	47.56
J126	4.58	741.06	867.36	54.73
J1263	4.58	749.59	864.93	49.98
J1265	4.58	749.68	864.98	49.96
J1267	4.58	751.61	865.02	49.14
J1269	4.58	752.06	865.04	48.95
J127	4.58	749.17	867.15	51.12
J1271	4.58	748.04	865.09	50.72
J1273	4.58	743.74	864.72	52.42

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1275	4.58	745.02	864.72	51.87
J1277	4.58	743.22	864.72	52.65
J128	4.58	739.86	867.44	55.28
J1281	4.58	741.34	867.34	54.59
J1283	4.58	741.23	867.26	54.61
J129	4.58	741.08	867.63	54.83
J1291	4.58	740.99	867.26	54.71
J1295	4.58	738.46	867.23	55.79
J1299	4.58	741.54	867.99	54.79
J13	0	758.4	866.17	46.7
J130	4.58	751.82	867.35	50.06
J1303	4.58	739.98	865.94	54.58
J1307	4.58	746.37	866.84	52.2
J131	4.58	742.47	867.67	54.25
J1311	4.58	751.74	866.76	49.84
J1319	4.58	741.38	868.41	55.04
J132	4.58	748.62	867.45	51.49
J1321	4.58	743.72	866.8	53.33
J1323	4.58	750.98	866.68	50.13
J1325	4.58	742.2	866.51	53.86
J1327	4.58	756.31	866.33	47.67
J1329	4.58	745.93	867.19	52.54
J133	4.58	739.7	867.77	55.49
J1331	4.58	745.23	867.18	52.84
J1333	4.58	740.49	867.23	54.92
J1335	4.58	739.68	867.37	55.33
J1339	4.58	742.24	867.63	54.33
J134	4.58	750.79	867.76	50.68
J1345	4.58	742.6	867.78	54.24
J1347	4.58	741.53	867.78	54.71
J135	4.58	744.98	867.81	53.22
J1351	4.58	741.73	867.79	54.62
J1353	4.58	746.46	867.4	52.41
J1355	4.58	746.24	867.41	52.5
J1357	4.58	746.08	867.31	52.53
J1359	4.58	741.4	867.67	54.71
J136	4.58	739.83	868.03	55.55
J1361	4.58	742.36	867.61	54.27
J1363	4.58	742.09	867.57	54.37
J1367	4.58	741.71	867.61	54.55
J137	4.58	744.32	867.81	53.51
J1371	4.58	744.19	864.1	51.96
J1373	4.58	759.7	866.21	46.15
J1375	4.58	762.51	866.3	44.97
J1379	4.58	754.86	866.05	48.18
J138	4.58	739.45	868.63	55.97
J1381	4.58	759.63	866.92	46.49
J1385	4.58	767.59	866.48	42.85
J1389	4.58	756.58	867.08	47.88
J139	4.58	740.18	868.18	55.46
J1391	4.58	765.7	866.69	43.76
J1393	4.58	764.85	866.47	44.03
J14	4.58	733.87	866.28	57.37
J140	4.58	740.77	868.19	55.21

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1401	4.58	757.87	866.14	46.91
J1403	4.58	757.54	866.04	47.01
J1405	4.58	742.15	867.67	54.39
J1407	4.58	740.89	867.95	55.05
J1409	4.58	753.94	867.41	49.16
J141	4.58	741.9	867.47	54.41
J1411	4.58	763.72	867.41	44.93
J1417	4.58	754.55	867.31	48.86
J1419	4.58	753.3	862.71	47.41
J142	4.58	741.21	869.16	55.44
J1423	4.58	741.79	868	54.69
J1429	4.58	761.27	865.26	45.06
J143	4.58	738.01	867.72	56.2
J1431	4.58	762.04	865.43	44.8
J1433	4.58	760.52	865.64	45.55
J144	4.58	740.71	871.57	56.7
J1445	4.58	758.7	865.89	46.44
J1447	4.58	752.69	838.35	37.12
J1449	4.58	763.05	866.38	44.77
J145	4.58	742.55	868.85	54.73
J1451	4.58	749.98	866.73	50.59
J1453	4.58	750.83	866.73	50.22
J1459	4.58	752.45	867.37	49.8
J146	4.58	740.17	869.83	56.18
J1463	4.58	751.66	866.74	49.86
J1465	4.58	754.17	866.74	48.77
J1467	4.58	753.66	867.39	49.28
J147	4.58	742.06	868.41	54.75
J1471	4.58	752.96	866.5	49.2
J1475	4.58	752	859.84	46.73
J1479	4.58	752.48	862.68	47.75
J148	4.58	740.91	871.92	56.77
J1483	4.58	750.05	867.51	50.89
J149	4.58	739.28	871.77	57.41
J1491	4.58	749.43	862.22	48.87
J1493	4.58	740.49	867.8	55.16
J15	4.58	727.38	868.3	61.06
J150	4.58	740.18	873.8	57.9
J1500	4.58	722.88	861.82	60.2
J1501	4.58	746.03	861.88	50.2
J1502	4.58	739.88	861.88	52.86
J1503	4.58	701.03	863.08	70.21
J1504	4.58	567.12	861.22	127.43
J1505	4.58	600.6	860.94	112.81
J1506	4.58	645.4	862.29	93.98
J1507	4.58	658.85	862.62	88.29
J1508	4.58	704.61	864.6	69.32
J1509	4.58	699.26	864.6	71.64
J151	4.58	740.22	875.25	58.51
J1510	4.58	679.71	864.6	80.11
J1511	4.58	693.44	864.6	74.16
J1512	4.58	746.27	908.41	70.25
J1513	4.58	767.92	903.74	58.85
J1515	0	737.23	872.65	58.68

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1517	4.58	742.24	864.74	53.08
J152	4.58	770.31	880.31	47.66
J1521	4.58	745	859.49	49.61
J1523	4.58	745.77	867.71	52.84
J1525	4.58	691.98	865.13	75.02
J1527	4.58	698.37	865.92	72.6
J153	4.58	750.52	880.13	56.16
J1531	4.58	722.8	864.77	61.51
J1533	4.58	724.44	864.5	60.69
J1535	4.58	723.63	861.62	59.79
J1537	4.58	685.66	861.28	76.1
J1539	4.58	712.41	862.98	65.24
J154	4.58	761.73	880.25	51.36
J1541	4.58	638.17	860.81	96.47
J1543	4.58	634.04	857.97	97.03
J1545	4.58	648.09	859.19	91.47
J1547	4.58	630.17	859.15	99.21
J1549	4.58	656.5	860.56	88.42
J155	0	855.1	886.5	13.61
J1551	4.58	645.64	861.11	93.36
J1553	4.58	632.57	858.78	98.02
J1557	4.58	659.68	858.89	86.32
J1559	4.58	577.06	859.89	122.55
J156	4.58	746.06	862.66	50.52
J1561	4.58	573.68	859.41	123.81
J1565	4.58	748.49	865.27	50.6
J1567	4.58	738.82	866.79	55.45
J157	4.58	767.25	878.12	48.04
J1571	4.58	737.25	866.78	56.13
J1575	4.58	739.09	866.89	55.38
J1577	4.58	738.3	866.89	55.71
J1579	4.58	737.28	867.09	56.25
J158	4.58	771.36	878.14	46.27
J1581	4.58	737.72	867.08	56.05
J1583	4.58	741.08	867.35	54.71
J1585	4.58	740.39	867.34	55.01
J1587	4.58	741.15	867.48	54.74
J1589	4.58	741.63	867.47	54.53
J159	4.58	772.92	878.11	45.58
J1591	4.58	742.52	867.62	54.21
J1593	4.58	740.99	867.61	54.87
J1595	4.58	741.94	871.58	56.17
J16	4.58	748.08	870.26	52.94
J160	4.58	744.05	874.16	56.38
J1601	4.58	743.23	871.54	55.6
J1605	4.58	742.95	871.43	55.67
J1609	4.58	740.46	871.65	56.85
J161	0	744.35	993.37	107.9
J1613	4.58	742.25	871.48	56
J1617	4.58	742.23	871.67	56.09
J1619	4.58	742.84	871.66	55.81
J162	0	736.72	913.41	76.56
J163	0	737.98	914.03	76.28
J1633	4.58	742.51	871.68	55.97

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1637	4.58	742.23	871.75	56.12
J1639	4.58	741.19	871.75	56.57
J164	4.58	777.69	880.86	44.7
J1641	4.58	741.35	872.88	57
J1645	4.58	743.56	871.76	55.55
J1649	4.58	742.93	871.75	55.82
J165	3.36	772.37	981.91	90.8
J1651	4.58	742.67	872.69	56.34
J1653	4.58	743.71	872.69	55.88
J1657	4.58	744.9	874.08	55.98
J166	3.36	775.14	981.97	89.62
J1661	4.58	743.02	874.02	56.76
J1665	4.58	744.32	874.68	56.48
J1667	4.58	746.51	874.76	55.57
J1669	4.58	740.14	874.34	58.15
J167	3.36	859.91	982.09	52.94
J1673	4.58	744.08	873.22	55.96
J1675	4.58	744.11	873.22	55.94
J168	4.58	739.58	868.05	55.67
J1681	4.58	781.08	874.77	40.6
J1687	4.58	760.07	874.78	49.7
J1689	4.58	766.73	874.77	46.82
J169	3.36	777.05	981.88	88.76
J1691	4.58	776.53	874.77	42.57
J1693	4.58	779.6	874.77	41.24
J1695	4.58	760.57	874.77	49.49
J1697	4.58	757.53	874.78	50.8
J17	0	746.62	929.98	79.45
J170	4.58	761.47	873.05	48.35
J1701	4.58	770.55	874.77	45.16
J1703	4.58	766.91	874.77	46.74
J1707	4.58	770.73	874.77	45.08
J1709	4.58	761.97	874.78	48.88
J171	4.58	741.48	868.71	55.13
J1711	4.58	774.28	874.77	43.54
J1713	4.58	769.23	874.77	45.73
J1719	4.58	771.02	880.61	47.49
J172	4.58	742.92	863.35	52.18
J1721	4.58	773.5	880.69	46.44
J1725	4.58	776.37	880.76	45.23
J1729	4.58	785.67	875.2	38.79
J173	4.58	746.41	862.37	50.25
J1731	4.58	788.18	875.14	37.68
J1735	4.58	769.91	877.39	46.57
J1737	4.58	765.23	878.4	49.04
J174	4.58	748.74	861.96	49.06
J1741	4.58	764.49	877.53	48.98
J1743	4.58	773.75	878.17	45.24
J1747	4.58	770.6	878.15	46.6
J175	0	735.33	780	19.35
J1751	4.58	765.07	878.1	48.98
J1753	4.58	734.25	870.06	58.85
J1757	4.58	737.99	870.77	57.53
J176	4.58	736.23	862.61	54.76

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1761	4.58	757.16	870.39	49.06
J1763	4.58	744.39	870.39	54.6
J1765	4.58	752.82	881.67	55.83
J1767	4.58	749.51	881.66	57.26
J1769	4.58	743.83	878.44	58.33
J177	0	734.29	863.84	56.13
J1771	4.58	741.03	878.09	59.39
J1773	4.58	744.07	878.09	58.07
J1775	4.58	743.51	878.09	58.31
J1777	4.58	742.83	877	58.14
J1779	0	832.76	915.25	35.74
J178	4.58	735.31	863.93	55.73
J1781	0	817.09	915.57	42.67
J1783	0.25	785.55	1084.32	129.46
J1785	3.18	901.55	1084.27	79.17
J1787	4.58	685.16	862.28	76.75
J1789	4.58	710.37	862.27	65.82
J179	4.58	738.11	863.56	54.36
J1793	4.58	687.02	862.34	75.97
J1795	4.58	743.89	862.24	51.28
J1797	4.58	743.81	862.24	51.32
J18	0	746.28	995.03	107.78
J180	4.58	738.68	863.19	53.95
J1801	4.58	747.02	862.24	49.92
J1803	4.58	746.38	862.24	50.2
J1805	4.58	747.1	862.24	49.89
J1807	4.58	749.92	862.48	48.77
J181	4.58	744.02	863.48	51.76
J1811	4.58	734.43	861.96	55.26
J1815	4.58	731.82	862.13	56.47
J1817	4.58	731.57	861.73	56.4
J182	4.58	730.68	862.3	57.03
J1821	4.58	729.95	861.69	57.08
J1823	4.58	727.31	861.65	58.21
J1825	4.58	729.84	861.61	57.1
J1827	4.58	730.96	862.3	56.91
J183	4.58	731.24	862.08	56.7
J1831	4.58	741.42	869.66	55.57
J1833	4.58	735.42	867.48	57.22
J1835	4.58	740.21	865.04	54.09
J1839	4.58	737.1	864.9	55.37
J184	4.58	731.64	862.04	56.5
J1843	4.58	737.44	864.38	55
J1845	4.58	741.21	868.63	55.21
J1847	4.58	740.63	868.38	55.35
J185	4.58	728.5	862.15	57.91
J1851	4.58	742.51	860.16	50.98
J1853	4.58	741.08	868.18	55.07
J1859	4.58	741.91	867.84	54.56
J186	4.58	728.33	862.14	57.98
J1863	4.58	738.11	869.93	57.12
J1867	4.58	739.43	864.84	54.34
J1869	4.58	739.04	870.04	56.76
J187	4.58	729.6	862.14	57.43

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1871	4.58	742.58	867.86	54.29
J1875	4.58	742.5	867.86	54.32
J1879	4.58	746.94	867.38	52.18
J188	4.58	722.47	861.81	60.38
J1883	4.58	727.19	864.77	59.61
J1885	4.58	745.04	865.47	52.18
J1887	4.58	744.92	865.67	52.32
J1889	4.58	746.37	864.93	51.37
J189	4.58	691.68	861.73	73.68
J1891	4.58	746.06	864.87	51.48
J1893	4.58	741.24	864.59	53.45
J1895	4.58	751.72	864.25	48.76
J1897	4.58	739.54	864.37	54.09
J1899	4.58	746.75	864.12	50.85
J19	0	747.17	929.97	79.21
J190	4.58	676.7	861.02	79.87
J1901	4.58	745.64	864.25	51.39
J1903	4.58	752.04	863.76	48.41
J1905	4.58	758.48	863.7	45.59
J1907	4.58	749.59	863.57	49.39
J1909	4.58	751.9	863.67	48.43
J191	4.58	719.72	861	61.22
J1911	4.58	747.26	863.76	50.48
J1913	4.58	740.58	864.6	53.74
J1915	4.58	743.1	865.03	52.83
J1917	4.58	742.18	865.52	53.44
J1919	4.58	741.81	866.12	53.86
J192	4.58	721	861.38	60.83
J1921	4.58	741.73	866.63	54.12
J1923	4.58	750.87	866.85	50.25
J1925	4.58	739.72	867.23	55.25
J1927	4.58	741.08	867.26	54.67
J1929	4.58	743.81	867.99	53.81
J193	4.58	724.78	861.47	59.23
J1931	4.58	742.11	868.41	54.73
J1933	4.58	740.96	867.79	54.95
J1935	4.58	741.02	867.78	54.92
J1937	4.58	741.09	868.3	55.12
J1939	4.58	742.09	867.84	54.49
J194	4.58	729.34	861.95	57.46
J1941	4.58	738.3	869.93	57.03
J1943	4.58	739.72	871.76	57.21
J1945	4.58	746.16	864.25	51.17
J1947	4.58	738.43	865.04	54.86
J1949	4.58	743.92	866.84	53.26
J195	4.58	734.24	862.17	55.44
J1951	4.58	744.57	864.42	51.93
J1953	4.58	752.17	866.6	49.58
J1955	4.58	758.28	866.62	46.94
J1957	4.58	761.2	866.63	45.69
J1959	4.58	757.4	866.21	47.15
J196	4.58	707.45	860.22	66.19
J1961	4.58	764.5	866.66	44.27
J1963	4.58	765.92	867.28	43.92

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1965	4.58	758.36	866.96	47.06
J1967	4.58	768.22	866.71	42.68
J1969	4.58	767.3	866.77	43.1
J197	4.58	678.58	859.91	78.57
J1971	4.58	754.17	867.1	48.93
J1973	4.58	740.42	868	55.28
J1975	4.58	744.01	867.59	53.55
J1977	4.58	750.1	867.54	50.89
J1979	4.58	764.58	866.45	44.14
J198	4.58	681.72	859.9	77.21
J1981	4.58	742.11	867.86	54.48
J1983	4.58	747.79	868.14	52.15
J1985	4.58	745.22	866.69	52.63
J1987	4.58	754.99	867.35	48.68
J1989	4.58	747.72	866.47	51.46
J199	4.58	703.69	860.04	67.74
J1991	4.58	752.43	867.69	49.94
J1993	4.58	749.73	867.73	51.13
J1995	4.58	749.21	867.73	51.36
J1997	4.58	730.81	862.25	56.95
J1999	4.58	746.43	862.62	50.35
J2	4.58	570.33	859.91	125.48
J20	4.58	767.9	870.6	44.5
J200	3.36	834.32	982.05	64.01
J2001	4.58	753.19	863.31	47.72
J2003	4.58	753.69	863.24	47.47
J2005	4.58	736.56	864.38	55.39
J2007	4.58	734.36	863.66	56.03
J2009	4.58	737.27	863.43	54.67
J201	4.58	750.28	863.84	49.21
J2011	4.58	742.07	863.35	52.55
J2013	4.58	738.87	863.49	53.99
J2015	4.58	736.3	862.93	54.87
J2017	4.58	737.34	862.81	54.37
J2019	4.58	735.06	863.09	55.48
J202	4.58	752.15	863.69	48.33
J2021	4.58	745.69	862.66	50.68
J2023	4.58	742.26	862.66	52.17
J2025	4.58	735.04	862.5	55.23
J2027	4.58	739.94	862.25	53
J2029	4.58	732.18	862.13	56.31
J203	4.58	762.75	878.42	50.12
J2031	4.58	732.25	861.96	56.2
J2033	4.58	743.38	862.29	51.52
J2035	4.58	729.65	861.59	57.17
J2037	4.58	728.91	861.64	57.51
J2039	4.58	728.5	861.64	57.69
J204	4.58	736.81	864.16	55.18
J2041	4.58	729.76	861.69	57.16
J2043	4.58	729.51	861.69	57.27
J2045	4.58	731.27	861.57	56.46
J2047	4.58	729.96	861.62	57.05
J2049	4.58	729	861.62	57.47
J205	4.58	716.96	861.08	62.45

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2051	4.58	729.5	861.57	57.23
J2053	4.58	655.71	859.21	88.18
J2055	4.58	721.09	861.38	60.79
J2057	4.58	689.9	862.35	74.72
J2059	4.58	750.76	866.49	50.15
J206	4.58	716.87	860.52	62.24
J2061	4.58	769.08	878.42	47.38
J2063	4.58	768.08	877.45	47.39
J2065	4.58	768.02	878.25	47.76
J2067	4.58	767.51	878.25	47.98
J2069	4.58	766.04	878.65	48.79
J207	4.58	731.59	861.97	56.49
J2071	4.58	755.25	877.05	52.78
J2073	4.58	755.05	877.05	52.87
J2075	4.58	766.43	878.65	48.62
J2077	4.58	764.3	879.48	49.91
J2079	4.58	773.1	878.42	45.63
J208	4.58	733.15	861.96	55.81
J2081	4.58	744.11	875.09	56.76
J2083	4.58	742.08	874.37	57.32
J2085	4.58	745.97	874.33	55.62
J2087	4.58	771.82	878.15	46.07
J2089	4.58	768.2	878.15	47.64
J209	4.58	734.65	861.96	55.16
J2091	4.58	767.95	878.15	47.75
J2093	4.58	755.64	878.13	53.07
J2095	4.58	766.14	878.13	48.52
J2097	4.58	772.58	878.11	45.72
J2099	4.58	757.51	877.8	52.12
J21	4.58	771.68	871.04	43.05
J210	4.58	634.32	860.15	97.85
J2101	4.58	774.22	880.76	46.17
J2103	4.58	745.21	873.22	55.47
J2105	4.58	741.64	874.03	57.36
J2107	4.58	743.15	873.95	56.68
J2109	4.58	744.66	874.17	56.12
J211	4.58	739.03	863.5	53.93
J2111	4.58	740.01	871.65	57.04
J2113	4.58	742	871.66	56.18
J2115	4.58	743.3	871.67	55.62
J2117	4.58	742.76	871.69	55.86
J2119	4.58	744.54	871.7	55.1
J212	4.58	737.57	863.16	54.42
J2121	4.58	741.3	862.6	52.56
J2123	0	804.66	896.5	39.79
J2125	0	860.5	886.5	11.27
J2127	0	860.5	886.5	11.27
J2129	0	856.5	886.5	13
J213	4.58	733.63	863.22	56.15
J2131	0	860.5	886.5	11.27
J2133	4.58	719.5	864.19	62.69
J2135	4.58	650.5	859.21	90.43
J2137	4.58	654.5	859.21	88.7
J2139	4.58	739.41	864.5	54.2

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J214	4.58	744.28	862.73	51.32
J2141	4.58	739.41	864.29	54.11
J2143	4.58	750.78	863.91	49.02
J2145	4.58	750.88	867.7	50.62
J2147	4.58	741.58	867.87	54.72
J2149	4.58	741.39	867.86	54.8
J215	4.58	739.7	862.72	53.3
J2151	4.58	740.57	867.87	55.16
J2155	4.58	740.19	867.87	55.32
J2157	4.58	741.3	867.87	54.84
J2159	4.58	746.61	867.78	52.5
J216	4.58	745.45	895.56	65.04
J2161	4.58	757.12	863.32	46.02
J2163	4.58	747.32	864.56	50.8
J2165	4.58	697.36	862.28	71.46
J2167	0	764.82	866.64	44.12
J2169	0	755.95	863.15	46.45
J217	0	852.1	887	15.12
J2171	0	782.75	888.37	45.76
J2173	0	750.26	867.83	50.94
J2175	0	741.57	868.28	54.9
J2177	0	739.55	867.61	55.49
J2179	0	638	859.52	95.99
J218	0	850.25	886.25	15.6
J219	4.58	745.41	885.35	60.64
J22	4.58	737.78	871.54	57.96
J220	4.58	746.04	878.56	57.42
J221	4.58	743.78	867.8	53.74
J222	4.58	744.1	870.17	54.63
J223	4.58	746.97	871.98	54.17
J224	4.58	750.01	870.57	52.24
J225	4.58	744.04	868.33	53.85
J226	4.58	747.76	868.22	52.2
J227	4.58	747.93	868.09	52.07
J228	4.58	752.61	868.01	50
J229	4.58	745.28	867.18	52.82
J23	4.58	714.66	866.99	66
J230	4.58	755.26	867.84	48.78
J231	4.58	750.14	867.09	50.68
J232	4.58	676.34	867.78	82.95
J233	4.58	668.84	867.26	85.97
J234	4.58	669.87	866.8	85.33
J235	4.58	665.41	866.36	87.07
J236	4.58	674.91	865.95	82.78
J237	4.58	677.27	865.67	81.64
J238	4.58	663.98	865.2	87.19
J239	4.58	707.04	864.43	68.2
J24	4.58	692.37	866.84	75.6
J240	4.58	698.76	864.65	71.88
J241	4.58	706.7	864.74	68.48
J242	4.58	713.03	864.78	65.75
J243	4.58	676.5	863.72	81.12
J244	4.58	735.38	864.11	55.78
J245	4.58	739.5	864.18	54.02

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J246	4.58	733.24	864.08	56.69
J247	4.58	743.14	864.05	52.39
J248	4.58	723.11	863.28	60.74
J249	4.58	747	864.17	50.77
J25	4.58	738.98	868.74	56.23
J250	4.58	749.44	864.14	49.7
J251	4.58	747.37	864.16	50.61
J252	4.58	754.59	863.9	47.36
J253	4.58	747.71	863.93	50.36
J254	4.58	742.3	864.28	52.85
J255	4.58	744.33	864.38	52.02
J256	4.58	748.7	865.46	50.59
J257	4.58	757.4	863.38	45.92
J258	4.58	760.5	863.67	44.7
J259	4.58	744.21	864	51.9
J26	4.58	748.16	873.38	54.25
J260	4.58	729.03	862.25	57.72
J261	4.58	745.11	862.48	50.85
J262	4.58	752.69	863.17	47.87
J263	4.58	757.5	862.86	45.66
J264	4.58	754.21	862.66	46.99
J265	4.58	731.79	862.25	56.53
J266	4.58	728.28	862.29	58.07
J267	4.58	737.87	862.31	53.92
J268	4.58	736.96	862.25	54.29
J269	4.58	736.98	862.24	54.28
J27	4.58	744.93	868.05	53.35
J270	4.58	731.17	861.61	56.52
J271	4.58	743.33	862.26	51.53
J272	4.58	744.12	862.32	51.22
J273	4.58	742.79	862.49	51.87
J274	4.58	763.81	880.26	50.46
J275	4.58	739.78	862.23	53.06
J276	4.58	740.51	864.7	53.81
J277	4.58	737.13	864.15	55.04
J278	4.58	737.09	863.66	54.84
J279	4.58	734.46	863.66	55.98
J28	4.58	750.72	867.98	50.81
J280	4.58	734.18	863.77	56.15
J281	4.58	733.14	864.32	56.84
J282	0	828.26	897.03	29.8
J283	4.58	734.46	865.34	56.71
J284	4.58	767.9	878.06	47.73
J285	4.58	742.9	874.16	56.87
J286	4.58	735.01	865.89	56.71
J287	4.58	738.52	866.71	55.55
J288	4.58	737.3	866.89	56.15
J289	4.58	740.46	867.01	54.84
J29	4.58	754.1	867.97	49.34
J290	4.58	739.21	867.23	55.47
J291	4.58	739.16	867.22	55.49
J292	4.58	738.57	867.09	55.69
J293	4.58	740.15	867.35	55.12
J294	4.58	740.53	867.48	55.01

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J295	4.58	741.18	867.62	54.79
J296	4.58	742.64	867.79	54.23
J297	4.58	742.59	867.55	54.14
J298	4.58	742.38	867.97	54.42
J299	4.58	740.24	868.27	55.48
J3	4.58	569.67	860.95	126.21
J30	4.58	749.68	863.69	49.4
J300	4.58	741.16	866.13	54.15
J301	4.58	741.83	864.16	53.01
J302	4.58	746.63	862.79	50.33
J303	4.58	755.22	873.08	51.07
J304	4.58	753.99	873.11	51.61
J305	4.58	753.9	873.13	51.66
J306	4.58	752.14	873.13	52.43
J307	4.58	744.65	873.18	55.69
J308	0	736.45	780	18.87
J31	4.58	741.12	864.47	53.45
J310	0	734.49	968.92	101.58
J311	4.58	740.22	874.57	58.21
J312	4.58	740.72	872.69	57.18
J313	4.58	742.31	871.77	56.09
J314	4.58	742.94	872.69	56.22
J315	4.58	726.61	862.24	58.77
J316	4.58	742.91	871.7	55.8
J317	4.58	741.99	871.68	56.19
J318	4.58	741.18	871.65	56.54
J319	4.58	742.29	871.66	56.06
J32	4.58	725.46	868.32	61.9
J320	4.58	741.71	871.65	56.3
J321	4.58	741.82	871.61	56.24
J322	4.58	742.9	868.25	54.31
J323	4.58	740.61	867.87	55.14
J324	4.58	738.56	868.75	56.41
J325	4.58	741.79	867.76	54.58
J326	4.58	742.96	867.79	54.09
J327	4.58	742.61	867.8	54.24
J328	4.58	740.47	867.8	55.17
J329	4.58	739.09	867.2	55.51
J33	4.58	743.9	866.91	53.3
J330	4.58	741.62	867.88	54.71
J331	4.58	737.08	869.12	57.21
J332	4.58	735.92	869.39	57.83
J333	4.58	737.3	872.03	58.38
J334	4.58	744.5	867.84	53.44
J335	4.58	740.83	867.86	55.04
J336	4.58	741.67	867.88	54.69
J337	4.58	742.05	867.92	54.54
J338	4.58	744.35	868.05	53.6
J339	4.58	741.73	867.86	54.65
J34	4.58	736.01	865.13	55.95
J340	4.58	739.71	867.87	55.53
J341	4.58	737.83	867.87	56.35
J342	4.58	738.31	867.89	56.15
J343	4.58	740.81	868.54	55.35

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J344	4.58	735.38	869.51	58.12
J345	4.58	730.14	870.24	60.71
J346	4.58	744.34	868.25	53.69
J347	4.58	748.57	862.56	49.39
J348	4.58	759.08	873.06	49.39
J349	4.58	746.42	862.2	50.17
J35	4.58	719.59	865.36	63.16
J350	4.58	743.58	862.04	51.33
J351	4.58	745.5	861.96	50.46
J352	0	860.5	887.31	11.62
J353	4.58	684.65	867.87	79.39
J354	4.58	694.99	861.74	72.25
J355	4.58	695.72	861.87	71.99
J356	4.58	724.25	861.94	59.66
J357	4.58	730.27	862.05	57.1
J358	4.58	733.89	862.26	55.62
J359	4.58	734.9	861.96	55.05
J36	4.58	713.97	864.75	65.33
J360	4.58	721.99	861.2	60.32
J361	4.58	717.48	861.08	62.23
J362	4.58	675.07	861.04	80.58
J363	4.58	722.29	860.75	59.99
J364	4.58	711.8	860.38	64.38
J365	4.58	703.45	860.09	67.87
J366	4.58	697.5	860.12	70.46
J367	4.58	701.46	860.53	68.92
J368	4.58	710.5	860.85	65.14
J369	4.58	715.14	861.21	63.29
J37	4.58	677.65	864.2	80.83
J370	4.58	726.55	861.57	58.5
J371	4.58	728.1	861.89	57.97
J372	4.58	654.82	860.28	89.02
J373	4.58	652.94	860.36	89.88
J374	4.58	650.34	860.51	91.07
J375	4.58	655.64	862.08	89.45
J376	4.58	696.57	862.16	71.75
J377	4.58	726.11	862.23	58.98
J378	4.58	650.76	862.07	91.56
J379	4.58	644.76	861.08	93.73
J38	4.58	678.66	864.61	80.57
J380	4.58	641.79	861.67	95.27
J381	4.58	648.7	862.36	92.58
J382	4.58	650.7	862.67	91.85
J383	4.58	646.07	861.99	93.56
J384	4.58	638.72	861.93	96.72
J385	4.58	642.88	861.87	94.88
J386	4.58	738.45	870.4	57.17
J387	4.58	751.37	862.66	48.22
J388	4.58	747.43	862.57	49.89
J389	4.58	746.74	862.66	50.23
J39	4.58	648.95	862.75	92.64
J390	4.58	749.7	862.51	48.88
J391	4.58	751.27	862.53	48.21
J392	4.58	753.64	862.53	47.18

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J393	4.58	750.15	862.48	48.67
J394	4.58	748.92	862.45	49.19
J395	4.58	750.3	862.43	48.59
J396	4.58	749.59	862.46	48.91
J397	4.58	750.19	862.66	48.73
J398	4.58	757.06	870.41	49.11
J399	4.58	767.79	870.77	44.62
J4	4.58	563.76	860.95	128.77
J40	4.58	654.76	861.78	89.7
J400	4.58	752.67	871.28	51.39
J401	4.58	733.52	870.86	59.51
J402	4.58	742.59	872.07	56.1
J403	0	737.47	911.9	75.58
J404	4.58	736.3	873.29	59.36
J405	4.58	743.52	875.09	57.01
J407	4.58	766.06	878.48	48.71
J408	4.58	745.37	878.6	57.73
J409	4.58	745.93	880.13	58.15
J41	4.58	647.75	861.83	92.76
J410	4.58	772.06	880.13	46.83
J411	4.58	781.77	881.67	43.29
J412	4.58	776.06	882.88	46.29
J413	4.58	738.9	876	59.41
J414	4.58	746.29	877.34	56.78
J415	4.58	778.03	880.64	44.46
J416	0	784.18	885.79	44.03
J417	3.36	788.86	981.84	83.62
J418	0	945.64	982.28	15.88
J419	3.36	777.5	981.89	88.56
J42	4.58	641.05	859.16	94.51
J420	4.58	555.78	758.97	88.05
J421	4.58	577.17	758.98	78.78
J422	4.58	621.21	759.06	59.73
J423	4.58	618.82	759.21	60.83
J424	4.58	620.57	759.21	60.07
J425	4.58	617.63	759.21	61.35
J426	4.58	629.03	759.17	56.39
J427	4.58	637.37	759.15	52.77
J428	4.58	638.64	759.16	52.22
J429	4.58	628.62	759.26	56.61
J43	4.58	647.5	859.09	91.68
J430	4.58	545.92	758.99	92.32
J431	4.58	553.27	759.05	89.16
J432	4.58	603.53	759.09	67.4
J433	4.58	603.62	759.12	67.38
J434	4.58	630.32	759.24	55.86
J435	4.58	598.57	759.39	69.68
J436	4.58	626.94	759.53	57.45
J437	4.58	622.69	759.84	59.43
J438	4.58	636.37	859.16	96.53
J439	4.58	638.3	859.37	95.79
J44	4.58	642.94	859.11	93.67
J440	4.58	646.5	859.62	92.34
J441	4.58	652.5	859.88	89.86

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J442	4.58	643.14	859.34	93.68
J443	4.58	570.64	859.68	125.24
J444	4.58	571.17	860.42	125.33
J445	4.58	574.81	860.54	123.81
J446	4.58	584.58	860.69	119.64
J447	4.58	623.13	860.84	103
J448	4.58	584.44	860.95	119.81
J449	4.58	574.21	860.94	124.24
J45	4.58	636.55	858.84	96.32
J450	4.58	638.3	759.25	52.41
J451	4.58	639.38	759.41	52.01
J452	4.58	636.21	759.36	53.36
J453	4.58	641.25	759.5	51.24
J454	4.58	638.93	759.56	52.27
J455	4.58	640.4	859.04	94.74
J456	4.58	640.34	859.04	94.76
J457	4.58	640.97	859.04	94.49
J458	4.58	635.34	858.98	96.9
J459	4.58	640.66	859.13	94.66
J46	4.58	649.37	859.21	90.92
J460	4.58	646.52	859.09	92.11
J461	4.58	645.71	859.13	92.48
J462	4.58	637.77	859.2	95.94
J463	4.58	643.85	859.19	93.31
J464	4.58	636.19	859.09	96.58
J465	4.58	637.08	859.4	96.33
J466	4.58	635.13	859.74	97.32
J467	4.58	647.69	859.53	91.79
J468	4.58	674.74	859.9	80.23
J469	4.58	676.34	859.91	79.54
J47	4.58	657.1	859.22	87.58
J470	4.58	634.97	860.14	97.57
J471	4.58	638.98	860.33	95.91
J472	4.58	649.78	859.65	90.94
J473	4.58	689.82	859.94	73.71
J474	4.58	683.94	859.92	76.25
J475	4.58	654.94	859.92	88.82
J476	4.58	694.79	859.98	71.58
J477	4.58	584.5	861.22	119.9
J478	4.58	643.57	861.82	94.57
J479	4.58	655.15	862.36	89.79
J48	4.58	600.43	859.21	112.13
J480	4.58	655.08	862.46	89.86
J481	4.58	680.01	862.85	79.23
J482	4.58	682.82	862.96	78.06
J483	4.58	677.17	863.08	80.55
J484	4.58	701.14	863.38	70.3
J485	4.58	686.94	864.07	76.75
J486	4.58	634.99	860.59	97.75
J487	4.58	612.01	861.17	107.96
J488	4.58	638.07	861.64	96.87
J489	4.58	650.78	862.22	91.62
J49	4.58	599.64	759.11	69.1
J490	4.58	646.1	862.49	93.76

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J491	4.58	650.57	863.11	92.09
J492	4.58	669.42	863.47	84.08
J493	4.58	675.83	864.82	81.89
J494	4.58	684.98	865.47	78.21
J495	4.58	685.29	865.94	78.28
J496	4.58	696.81	866.68	73.6
J497	4.58	699.69	866.7	72.37
J498	4.58	703.54	866.76	70.73
J499	4.58	707.08	866.83	69.22
J5	4.58	655.93	862.29	89.41
J50	4.58	602.7	759.21	67.82
J500	4.58	686.41	867.3	78.38
J501	4.58	695.06	866.15	74.13
J502	4.58	695.71	865.64	73.63
J503	4.58	685.35	865.13	77.9
J504	4.58	686.63	864.88	77.23
J505	4.58	680.5	864.63	79.78
J506	4.58	691.2	864.61	75.14
J507	4.58	697.82	864.61	72.27
J508	4.58	710.92	864.6	66.59
J509	3.18	860.18	1084.36	97.14
J51	4.58	569.42	758.97	82.13
J510	3.18	823.27	1084.39	113.14
J511	0.25	883.93	1084.4	86.86
J512	3.18	904.36	1084.42	78.02
J513	0.25	947.39	1084.42	59.38
J514	0	759.15	987.58	98.98
J515	4.58	654.1	861.8	89.99
J516	4.58	748.89	866.22	50.84
J517	1.96	743.15	866.24	53.33
J518	4.58	742.02	866.38	53.88
J519	4.58	737.82	866.49	55.75
J52	4.58	545.16	759.01	92.66
J520	4.58	723.36	866.73	62.12
J521	4.58	723.42	867.82	62.57
J522	4.58	724.74	869.02	62.52
J523	4.58	728.61	869.56	61.08
J524	4.58	728.83	868.74	60.62
J525	4.58	739.65	868.04	55.63
J526	4.58	730.85	862.21	56.92
J527	4.58	755.82	866.49	47.96
J528	4.58	763.33	867.41	45.1
J529	4.58	744.79	867.8	53.3
J53	4.58	621.31	759.21	59.76
J530	4.58	736.03	864.72	55.76
J531	4.58	745.7	864.99	51.69
J532	4.58	750.07	865.54	50.03
J533	4.58	738.58	865.36	54.94
J534	4.58	747.82	867.67	51.93
J535	4.58	739.09	865.1	54.6
J536	4.58	749.46	863.45	49.39
J537	4.58	750.57	863.41	48.89
J538	4.58	753.32	863.35	47.68
J539	4.58	755.22	863.3	46.83

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J54	4.58	622.02	759.2	59.44
J540	4.58	752.92	863.23	47.8
J541	4.58	606.13	759.16	66.31
J542	4.58	731.49	865.36	58.01
J543	4.58	634.66	860.63	97.91
J544	4.58	628.32	860.6	100.65
J545	4.58	627.66	860.6	100.93
J546	4.58	627.81	860.59	100.87
J547	4.58	626.52	860.59	101.42
J548	4.58	631.35	860.59	99.33
J549	4.58	733.55	862.39	55.83
J55	4.58	622.17	759.23	59.39
J550	4.58	733.31	862.1	55.8
J551	4.58	731.64	862.05	56.51
J552	4.58	728.45	861.94	57.84
J553	4.58	731.87	861.97	56.37
J554	4.58	731.9	861.85	56.31
J555	4.58	732.56	861.73	55.97
J556	4.58	730.08	861.69	57.02
J557	4.58	729.95	861.65	57.06
J558	4.58	729.03	861.62	57.45
J559	4.58	727.5	861.59	58.1
J56	4.58	631.55	759.15	55.29
J560	4.58	730.55	861.57	56.77
J561	4.58	739.27	862.3	53.31
J562	4.58	746.05	862.31	50.37
J563	4.58	761.31	867.65	46.07
J564	4.58	742.16	867.87	54.47
J565	4.58	742.22	862.32	52.04
J566	4.58	739.76	862.32	53.1
J567	4.58	739.34	862.32	53.29
J568	4.58	740.98	867.86	54.98
J569	4.58	740.58	862.32	52.75
J57	4.58	636.31	759.18	53.24
J570	4.58	742.59	867.88	54.29
J571	4.58	745.41	862.33	50.67
J572	4.58	745.52	862.36	50.63
J573	4.58	746.57	862.35	50.17
J574	4.58	743.24	871.91	55.75
J575	4.58	754.85	867.94	49
J576	4.58	743.63	862.32	51.43
J577	4.58	741.82	862.32	52.21
J578	4.58	745.8	862.5	50.56
J579	4.58	753.28	867.95	49.68
J58	4.58	640.44	859.04	94.72
J580	4.58	640.6	737.75	42.1
J581	4.58	738.84	868.62	56.23
J582	4.58	743.94	862.49	51.37
J583	4.58	746.61	862.44	50.19
J584	4.58	745.05	862.38	50.84
J585	4.58	742.38	862.34	51.98
J586	4.58	742.44	869.66	55.13
J587	4.58	744.88	862.24	50.85
J588	4.58	746.89	865.46	51.38

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J589	4.58	746.58	864.87	51.25
J59	4.58	640.89	859.04	94.52
J590	4.58	745.36	864	51.41
J591	4.58	640.47	859.04	94.71
J592	4.58	613.06	861.36	107.59
J593	4.58	650.36	859.21	90.5
J594	4.58	570.08	860.94	126.03
J595	4.58	658.46	862.64	88.47
J596	4.58	694.06	866.63	74.78
J597	4.58	740.88	873.65	57.53
J598	0	940.61	1084.43	62.32
J599	0	946.59	987	17.51
J6	4.58	658.02	862.64	88.66
J60	4.58	646.39	859.04	92.14
J600	0	953.99	982.3	12.27
J601	4.58	765.91	879.48	49.21
J602	4.58	767.5	881.39	49.35
J603	4.58	773.18	882.06	47.18
J604	4.58	777.06	882.92	45.87
J605	4.58	774.13	882.92	47.14
J606	0	873.85	914.02	17.4
J607	3.36	789.7	981.88	83.27
J608	4.58	769.15	880.35	48.18
J61	4.58	639.59	859.25	95.18
J610	4.58	638.83	736.55	42.34
J611	4.58	739.92	867.26	55.18
J612	4.58	646.57	858.24	91.71
J614	4.58	779.53	880.32	43.67
J616	4.58	646.1	851.37	88.94
J618	4.58	746.06	862.24	50.34
J619	0	860.5	886.5	11.27
J62	4.58	636.37	859.57	96.71
J620	0	745.32	930.12	80.07
J621	0	739.59	955.33	93.48
J622	4.58	744.6	880.31	58.8
J623	0	851	886.41	15.34
J624	3.7	944.37	1167.84	96.83
J625	3.7	990.71	1167.82	76.74
J626	3.36	887.1	982.09	41.16
J627	3.18	931.28	1084.41	66.35
J628	3.18	907.3	1084.36	76.72
J629	1.96	779.76	899.19	51.75
J63	4.58	647.97	859.42	91.62
J630	1.96	790.7	899.19	47.01
J631	4.58	749.43	863.82	49.57
J632	4.58	750.94	863.77	48.89
J633	4.58	684	864.65	78.27
J634	4.58	754.78	881.6	54.95
J635	4.58	752.6	870.77	51.2
J636	4.58	753.32	870.6	50.82
J637	4.58	737.88	870.59	57.5
J638	4.58	659.69	859.62	86.63
J639	4.58	638.41	759.35	52.4
J64	4.58	642.28	860.67	94.63

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J640	4.58	641.37	759.34	51.12
J641	4.58	752.78	863.78	48.1
J642	4.58	751.23	863.8	48.78
J643	4.58	754.53	864.07	47.47
J645	4.58	726.5	864.07	59.61
J646	4.58	743.85	864.04	52.08
J647	4.58	744.8	864.04	51.67
J648	4.58	649.59	843.76	84.13
J649	4.58	753.44	867.67	49.5
J65	4.58	689.17	860.21	74.11
J650	4.58	736.39	864.07	55.33
J651	4.58	749.28	864.09	49.74
J652	4.58	744.44	864.1	51.85
J653	4.58	727.28	864.11	59.29
J654	4.58	651.82	841.35	82.12
J655	4.58	722.97	864.11	61.16
J656	4.58	728.49	864.11	58.77
J657	4.58	724.48	864.11	60.5
J658	4.58	723.36	864.14	61
J659	4.58	745.49	864.14	51.41
J66	4.58	650.32	862.08	91.76
J660	4.58	719.57	864.11	62.63
J661	4.58	747.82	864.79	50.68
J662	4.58	723.41	864.77	61.25
J663	4.58	718.35	864.77	63.45
J664	4.58	731.62	864.87	57.74
J665	4.58	737.16	864.87	55.34
J666	4.58	747.01	867.18	52.07
J667	4.58	749.78	867.18	50.87
J668	4.58	747.89	867.36	51.77
J669	4.58	749.76	867.36	50.96
J67	4.58	644.65	862.04	94.2
J670	4.58	747.15	867.83	52.29
J671	4.58	749.19	875.1	54.56
J672	4.58	747.46	878.74	56.89
J673	4.58	748.85	867.69	51.49
J674	4.58	740.87	875.47	58.32
J675	4.58	740.67	867.86	55.11
J676	4.58	740.66	874.36	57.93
J677	4.58	743.84	867.84	53.73
J678	4.58	746.67	867.53	52.37
J679	4.58	740.46	874.54	58.1
J68	4.58	669.21	862.11	83.58
J680	4.58	741.3	868.13	54.95
J681	4.58	740.73	868.43	55.33
J682	4.58	741.9	868.31	54.77
J683	4.58	742.08	868.21	54.65
J684	4.58	741.25	867.34	54.64
J685	4.58	743.77	874.53	56.66
J686	4.58	743.32	867.04	53.61
J687	4.58	740.45	866.79	54.75
J688	4.58	740.28	866.33	54.62
J689	4.58	740.16	864.31	53.79
J69	4.58	690.69	863.34	74.81

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J690	4.58	744.91	864.54	51.84
J691	4.58	742.33	863.5	52.5
J692	4.58	746.1	863.62	50.92
J693	4.58	743.87	863.65	51.9
J694	4.58	742.9	863.95	52.45
J695	4.58	741.56	863.5	52.83
J696	4.58	738.03	863.5	54.36
J697	4.58	737.53	863.5	54.58
J698	4.58	657.22	840.41	79.38
J699	4.58	749.25	864.69	50.02
J7	4.58	694.08	863.53	73.42
J70	4.58	713.01	862.29	64.68
J700	4.58	757.12	862.71	45.75
J701	4.58	751.78	862.86	48.13
J703	4.58	735.5	862.59	55.07
J705	4.58	738.5	862.52	53.74
J706	4.58	741.84	862.46	52.27
J707	4.58	739.19	862.4	53.39
J708	4.58	736.93	862.33	54.33
J709	4.58	735.55	862.29	54.91
J71	4.58	721.78	864.11	61.67
J710	4.58	739.87	862.73	53.23
J711	4.58	733.29	862.27	55.89
J712	4.58	717.81	860.5	61.83
J713	4.58	731.13	862.29	56.83
J715	4.58	735.13	862.19	55.05
J716	4.58	737.95	862.19	53.83
J717	4.58	740.21	862.19	52.85
J718	4.58	739.84	873.86	58.07
J719	4.58	740.55	873.82	57.75
J72	4.58	746.09	864.02	51.1
J720	4.58	739.17	866.79	55.3
J721	4.58	742.33	874.7	57.36
J722	4.58	744.79	874.93	56.39
J723	4.58	746.34	874.56	55.56
J724	4.58	746.61	874.68	55.49
J725	4.58	763.44	874.78	48.25
J726	4.58	740.07	873.8	57.94
J727	4.58	742.78	872.69	56.29
J728	4.58	742.8	872.69	56.28
J729	4.58	742.31	872.69	56.49
J73	4.58	729.71	864.25	58.3
J730	4.58	772.75	878.42	45.79
J731	4.58	781.32	882.92	44.02
J732	0	800.35	882.92	35.78
J733	0	778.44	882.92	45.27
J734	0	805.46	882.92	33.57
J735	0	807.96	882.92	32.48
J736	0	804.38	882.92	34.03
J737	4.58	757.42	880.26	53.23
J738	4.58	763.18	880.26	50.73
J739	4.58	771.94	880.26	46.93
J74	4.58	741.25	864.32	53.33
J740	4.58	774.36	880.51	46

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J741	4.58	775.23	880.91	45.79
J742	4.58	776.23	881.07	45.43
J743	4.58	739.62	873.76	58.12
J744	4.58	741.66	873.82	57.26
J745	4.58	778.16	881.54	44.8
J746	4.58	778.53	881.31	44.54
J747	4.58	732.09	869.23	59.42
J748	4.58	740.04	869.55	56.12
J749	4.58	730.5	869.44	60.2
J75	4.58	755.06	864.07	47.23
J750	4.58	731.5	869.38	59.74
J751	0	868.14	886.5	7.96
J752	0	874.74	1196.33	139.34
J753	0.28	818.07	1006.83	81.79
J754	0.28	793.12	1006.84	92.6
J755	0	875.61	1006.85	56.87
J756	0.2	820.41	917.74	42.17
J757	4.58	755.11	874.78	51.85
J758	4.58	718.82	860.82	61.53
J759	0	737.79	971.68	101.35
J76	4.58	755.06	863.51	46.99
J760	4.58	722.87	864.18	61.23
J761	4.58	731.27	862.24	56.75
J762	4.58	747.32	867.77	52.19
J763	4.58	743.88	878.44	58.3
J764	4.58	742.75	878.09	58.64
J766	4.58	658.59	862.62	88.41
J767	4.58	687.5	862.28	75.73
J768	4.58	693.02	862.2	73.31
J769	4.58	682.38	862.19	77.91
J77	4.58	729.22	864.49	58.61
J770	4.58	676.03	862.18	80.66
J771	4.58	715.05	862.18	63.75
J772	4.58	712.25	862.19	64.97
J773	4.58	731.78	862.18	56.5
J774	4.58	706.34	862.17	67.52
J775	0	945.07	1271.17	141.3
J776	4.58	762.52	862.16	43.17
J777	4.58	692.32	862.17	73.6
J778	4.58	763.22	862.18	42.88
J779	7.92	751.59	973.66	96.22
J78	4.58	736.82	864.4	55.28
J780	4.58	720.79	862.13	61.24
J781	7.92	798.64	973.52	75.78
J782	7.92	841.45	973.47	57.2
J783	4.58	724.99	862.08	59.4
J784	0	723.75	1060.42	145.88
J785	4.58	676.57	862.18	80.42
J786	4.58	740.26	874.17	58.02
J787	4.58	741.85	874.16	57.33
J788	4.58	742.08	874.34	57.31
J789	4.58	744.75	874.49	56.22
J79	4.58	730.11	864.77	58.35
J790	4.58	744.49	874.46	56.32

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J791	4.58	752.92	868.05	49.89
J793	4.58	738.36	864.9	54.83
J794	4.58	724.19	856.94	57.52
J795	4.58	741.16	867.02	54.53
J796	4.58	652.69	862.63	90.97
J797	4.58	651.84	862.62	91.33
J798	4.58	696.81	862.47	71.78
J799	4.58	749.41	881.14	57.08
J8	4.58	684.38	864.65	78.11
J80	4.58	734.94	864.44	56.11
J800	0	725.02	973.85	107.82
J801	4.58	653.5	859.25	89.15
J802	4.58	724.24	856.57	57.34
J804	4.58	701.05	861.3	69.43
J806	4.58	690.17	860.33	73.73
J808	4.58	740.46	867.94	55.24
J809	4.58	740.16	867.99	55.39
J81	4.58	741.25	864.43	53.37
J810	4.58	646.57	860.08	92.51
J811	4.58	731.55	869.34	59.7
J812	4.58	725.34	861.04	58.8
J816	4.58	742.5	870.15	55.31
J817	4.58	737.7	869.34	57.04
J819	0	782.75	888.37	45.76
J82	4.58	745.64	864.03	51.3
J820	0	785.26	887.92	44.49
J821	0	785.34	981.81	85.13
J822	0	782.84	981.8	86.21
J823	0	782.68	1224.76	191.55
J824	4.58	781.93	873.05	39.48
J825	3.36	781.61	981.88	86.78
J826	0	781.87	873.05	39.5
J827	4.58	729.42	862.25	57.55
J828	4.58	748.75	865.46	50.57
J829	3.18	906.5	1084.38	77.07
J83	4.58	729.14	862.23	57.67
J830	0	940.13	987	20.31
J831	3.05	903.75	987.22	36.17
J832	4.58	753.82	865.6	48.43
J833	4.58	738.49	862.27	53.63
J834	4.58	761.36	867.65	46.06
J835	4.58	725.53	862.25	59.24
J836	4.58	761.19	866.43	45.6
J837	4.58	759.45	866.31	46.31
J838	3.36	775.59	981.98	89.43
J839	4.58	779.19	981.79	87.78
J84	4.58	756.26	863.15	46.32
J840	3.36	780.99	981.75	86.99
J841	1.52	802.45	981.7	77.67
J842	1.52	817.46	981.7	71.17
J843	1.52	817.77	981.7	71.03
J844	1.52	841.74	981.7	60.64
J845	1.52	818.56	981.69	70.69
J846	1.52	817.59	981.69	71.11

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J847	1.52	824.15	981.69	68.26
J848	1.52	814.1	981.69	72.62
J849	1.52	837.89	981.7	62.31
J85	4.58	755.58	863.67	46.83
J850	1.52	827.38	981.69	66.87
J851	1.52	815.81	981.7	71.88
J852	1.52	818.55	981.71	70.7
J853	1.52	797.41	981.71	79.85
J854	1.52	830.05	981.61	65.67
J855	1.52	825.43	981.61	67.67
J856	1.52	796.7	981.54	80.09
J857	1.52	788.15	981.55	83.8
J858	1.52	789.12	981.55	83.38
J859	1.52	780.6	981.54	87.07
J86	4.58	736.7	864.85	55.53
J860	0	782.53	981.8	86.34
J861	4.58	731.85	862.26	56.51
J862	0	777.39	981.75	88.55
J863	4.58	742.95	873.87	56.73
J864	4.58	746.1	872.95	54.97
J865	1.52	814.15	981.6	72.55
J866	4.58	745.71	874.56	55.83
J867	0	860.5	887.55	11.72
J868	4.58	747	874.67	55.32
J869	4.58	751.26	874.79	53.52
J87	4.58	743.22	864.58	52.59
J870	0	860.5	886.5	11.27
J871	0	803.5	885.09	35.35
J872	0	836.95	885.06	20.85
J873	0	807.37	885.12	33.69
J874	4.58	752.03	874.79	53.19
J875	4.58	748.29	874.81	54.82
J876	4.58	747.89	874.85	55.01
J877	4.58	731.96	861.59	56.17
J88	4.58	744.7	864.22	51.79
J881	4.58	739.96	862.01	52.88
J885	4.58	741.52	862.29	52.33
J887	4.58	741.27	862.08	52.35
J889	4.58	734.32	862.27	55.44
J89	4.58	744.43	863.91	51.77
J893	4.58	735.02	862.43	55.21
J895	4.58	748.91	862.49	49.22
J897	4.58	747.98	862.48	49.61
J899	4.58	751.32	862.46	48.16
J9	4.58	711.1	864.6	66.51
J90	4.58	743.32	865.08	52.76
J901	4.58	750.36	862.46	48.57
J903	4.58	738.76	862.29	53.53
J907	4.58	744.6	862.3	51
J91	4.58	746.64	864.86	51.23
J913	4.58	748.2	862.33	49.45
J915	4.58	738.76	862.33	53.55
J92	4.58	749.05	864.66	50.09
J921	4.58	745.5	862.6	50.74

2043 PHD Scenario Modeling Results
With Improvements

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J925	4.58	741.11	862.81	52.73
J93	4.58	748.47	864.69	50.36
J931	4.58	741.47	862.93	52.63
J935	4.58	732.92	863.09	56.4
J937	4.58	751.69	862.57	48.04
J939	4.58	752.27	862.56	47.79
J94	4.58	746.47	864.71	51.23
J941	4.58	752.36	862.56	47.75
J943	4.58	738.67	863.49	54.09
J945	4.58	737.34	863.48	54.66
J95	4.58	742.52	864.71	52.95
J955	4.58	735.05	863.65	55.72
J96	4.58	740.95	864.47	53.52
J963	4.58	738.62	863.25	54
J965	4.58	740.24	863.36	53.35
J969	4.58	740.83	863.21	53.03
J97	4.58	745.71	866.79	52.46
J973	4.58	742.41	863.09	52.29
J98	4.58	744.92	865.71	52.34
J983	4.58	741.27	862.08	52.35
J987	4.58	731.06	862.25	56.84
J99	4.58	752.09	865.45	49.12
J993	4.58	726.44	862.24	58.84
J997	4.58	746.15	862.61	50.46
J999	4.58	747.74	862.61	49.77

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1	**502.26**	1837.49	J1	20	114.47	20	**1837.49**	20
J100	**1002.26**	4127.89	J116	19.62	36.93	20	**4127.89**	20
J1000	**501.57**	685.62	J1731	30.12	30.12	20	**79.01**	72.66
J1002	**501.57**	837.96	J1731	30.12	30.12	20	**79.38**	106.72
J1003	**501.57**	869.95	J1731	30.12	30.12	20	**79.86**	82.24
J1004	**501.57**	1096.34	J1731	30.12	30.12	20	**79.23**	87.1
J1007	**500.97**	1016.94	J1731	30.12	30.12	20	**79.51**	47.83
J1008	**500.97**	688.52	J1731	30.12	30.12	20	**79.34**	64.18
J101	**1002.26**	3225.66	J101	20	45.05	20	**3225.66**	20
J1015	**2502.26**	5110.25	J1967	13.94	29.74	20	**4231.93**	28
J1016	**1002.26**	2359.18	J1017	16.59	48.05	20	**2248.59**	23.26
J1017	**1002.26**	2023.36	J1017	20	46.39	20	**2023.36**	20
J102	**1002.26**	2902.37	J102	20	44.85	20	**2902.37**	20
J1020	**502.26**	1291.43	J1020	20	117.54	20	**1291.43**	20
J1021	**502.26**	1094.53	J1021	20	80.22	20	**1094.53**	20
J1022	**3002.26**	2035.35	J1867	19.47	-11.24	20	**2003.55**	20.85
J1025	**3002.26**	1789.46	J1025	20	-29.75	20	**1789.46**	20
J1026	**1002.26**	2189.13	J717	19.77	41.55	20	**2189.13**	20
J1027	**1002.26**	2230.82	J717	19.97	41.81	20	**2230.82**	20
J1028	**502.26**	1661.04	J1028	20	53.11	20	**1661.04**	20
J1029	**502.26**	1623.75	J1029	20	52.99	20	**1623.75**	20
J103	**2502.26**	4096.25	J1237	18.54	32.46	20	**3968.24**	21.39
J1030	**502.26**	1298.64	J1030	20	51.84	20	**1298.64**	20
J1031	**502.26**	1095.68	J1031	20	50.69	20	**1095.68**	20
J1032	**502.26**	591.15	J1033	19.1	30.03	20	**581.91**	21.2
J1033	**502.26**	577	J1033	20	29.3	20	**577**	20
J1034	**1002.26**	4374.79	J1681	13.8	31.6	20	**3417.8**	29.17
J1035	**1002.26**	3913.31	J258	18.17	38	20	**3668.73**	22.76
J1038	**2502.26**	2069.43	J1275	19.9	9.01	20	**2069.43**	20
J1039	**1002.26**	3741.53	J1039	20	45.16	20	**3741.53**	20
J1040	**1002.26**	1782.66	J1040	20	36.4	20	**1782.66**	20
J1041	**502.26**	814.45	J1041	20	47.26	20	**814.45**	20
J1042	**502.26**	501.65	J1042	20	19.9	20	**501.65**	20
J1045	**502.26**	4300.54	J1045	20	62.01	20	**4300.54**	20
J1046	**502.26**	5071.37	J1047	13.12	54.93	20	**4595.93**	27.45
J1047	**502.26**	2479.69	J1047	20	53.77	20	**2479.69**	20
J1049	**502.26**	1436.22	J1049	20	118.85	20	**1436.22**	20
J105	**1752.26**	1786.08	J105	20	20.83	20	**1786.08**	20
J1051	**502.26**	1474.37	J1051	20	78.61	20	**1474.37**	20
J1055	**502.26**	1682.92	J1055	20	30.84	20	**1682.92**	20
J1056	**501.66**	1693.8	J607	16.4	130.63	20	**1647.49**	23.55
J1057	**501.66**	1905.77	J607	14.76	132.01	20	**1831.33**	25.39
J1058	**502.26**	1153.79	J1058	20	77.81	20	**1153.79**	20
J1059	**502.26**	1239.9	J1059	20	75.71	20	**1239.9**	20
J106	**2502.26**	3724.44	J106	20	31.3	20	**3724.44**	20
J1060	**502.26**	1547.9	J1060	20	91.84	20	**1547.9**	20
J1061	**502.26**	1559.84	J1062	14.52	105.33	20	**1511.09**	25.75
J1062	**502.26**	1368.37	J1062	20	102.77	20	**1368.37**	20
J1063	**502.26**	4005.08	J1177	18.32	45.34	20	**3879.92**	23.99
J1064	**502.26**	1570.07	J1064	20	120.88	20	**1570.07**	20
J1067	**502.26**	1766.52	J1068	19.66	94.86	20	**1766.52**	20
J1068	**502.26**	1549.54	J1068	20	92.75	20	**1549.54**	20
J1069	**502.26**	2264.27	J422	13.9	93.85	20	**2175.83**	26.1
J107	**1002.26**	2335.8	J107	20	38.18	20	**2335.8**	20
J1070	**502.26**	2013.19	J1070	20	103.42	20	**2013.19**	20

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1071	**502.26**	1821.52	J1071	20	98.54	20	**1821.52**	20
J1072	**502.26**	2426.81	J1072	20	88.04	20	**2426.81**	20
J1073	**502.26**	2545.51	J1073	20	85.93	20	**2545.51**	20
J1074	**502.26**	2151.5	J1074	20	93.79	20	**2151.5**	20
J1075	**502.26**	2518.96	J1075	20	85.82	20	**2518.96**	20
J1076	**502.26**	709.38	J1076	20	39.75	20	**709.38**	20
J1077	**1002.26**	744.72	J1077	20	-5.13	20	**744.72**	20
J1078	**502.26**	871	J1078	20	56.02	20	**871**	20
J108	**2502.26**	3972.05	J108	20	31.99	20	**3972.05**	20
J1081	**502.26**	1026.51	J1081	20	45.06	20	**1026.51**	20
J1082	**502.26**	879.53	J1082	20	40.7	20	**879.53**	20
J1083	**502.26**	872.29	J1083	20	39.98	20	**872.29**	20
J1084	**502.26**	616.68	J1084	20	27.6	20	**616.68**	20
J1085	**1002.26**	3609.95	J1177	10.09	41.47	20	**2933.08**	30.89
J1087	**502.26**	723.52	J1087	20	33.48	20	**723.52**	20
J109	**2502.26**	2534.98	J834	19.72	20.18	20	**2534.98**	20
J110	**2502.26**	4640.33	J1963	16	30.05	20	**4060.29**	25.28
J111	**3002.26**	3543.42	J1963	19.45	23.97	20	**3432.69**	21.1
J112	**1002.26**	2306.05	J112	20	34.15	20	**2306.05**	20
J1125	**1002.26**	2287.04	J1125	20	42.67	20	**2287.04**	20
J113	**1002.26**	1985.63	J113	20	34.61	20	**1985.63**	20
J115	**1002.26**	2165.46	J115	20	34.48	20	**2165.46**	20
J1153	**1002.26**	4000.15	J1153	20	44.21	20	**4000.15**	20
J116	**1002.26**	1878.67	J116	20	32.78	20	**1878.67**	20
J117	**1002.26**	3059.58	J117	20	41.71	20	**3059.58**	20
J1187	**1002.26**	1111.49	J1187	20	24.69	20	**1111.49**	20
J119	**2502.26**	3719.99	J119	20	34.01	20	**3719.99**	20
J120	**2502.26**	3323.91	J120	20	31.2	20	**3323.91**	20
J121	**3002.26**	3788.14	J121	20	29.42	20	**3788.14**	20
J122	**3002.26**	4685.94	J116	16.61	27.62	20	**4246.64**	24.3
J123	**3002.26**	4846.17	J1967	15.86	27.25	20	**4240.4**	25.81
J124	**3002.26**	4159.92	J1311	19.77	29.91	20	**4159.92**	20
J125	**3002.26**	4289.52	J1967	19.51	27.18	20	**4155.47**	21.5
J1259	**3002.26**	1592.66	J1259	20	-28.47	20	**1592.66**	20
J126	**3002.26**	4884.74	J1385	15.48	27.34	20	**4274.15**	25.75
J1263	**3002.26**	1703.32	J1263	20	-24.5	20	**1703.32**	20
J1265	**1002.26**	1661.12	J1265	20	35.3	20	**1661.12**	20
J1267	**1002.26**	1765.11	J1229	18.86	34.65	20	**1709.95**	21.35
J127	**3002.26**	3662.14	J127	20	27.27	20	**3662.14**	20
J1273	**2502.26**	1689.9	J1275	19.45	-8.92	20	**1663.5**	20.77
J1275	**1002.26**	1437.49	J1275	20	33.27	20	**1437.49**	20
J128	**3002.26**	4143.5	J128	20	32.39	20	**4143.5**	20
J1281	**3002.26**	2359.67	J1281	20	4.42	20	**2359.67**	20
J1299	**3002.26**	2539.74	J1299	20	9.94	20	**2539.74**	20
J13	**500**	610.5	J1084	22.71	29.29	20	**610.5**	20
J130	**3002.26**	3429.75	J130	20	24.95	20	**3429.75**	20
J131	**3002.26**	4287.64	J1385	19.32	27.11	20	**4153.65**	21.49
J132	**1002.26**	4143.5	J1969	18.17	36.13	20	**3884.53**	22.66
J1325	**1002.26**	4266.04	J116	18.97	36.95	20	**4132.72**	21.46
J133	**3002.26**	5091.93	J1967	13.84	27.08	20	**4137.19**	28.62
J1339	**3002.26**	3223.45	J1339	20	23.33	20	**3223.45**	20
J134	**3002.26**	4235.56	J1963	18.03	26.67	20	**3970.84**	22.56
J135	**1752.26**	5101.7	J1967	13.55	33.03	20	**4145.13**	27.94
J1351	**3002.26**	4605.75	J1385	17.53	27.31	20	**4173.97**	24.38
J136	**3002.26**	5407.44	J1967	12.14	27.34	20	**4224.56**	29.92

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1363	**3002.26**	2858.7	J1363	20	17.42	20	**2858.7**	20
J137	**2502.26**	5098.72	J1967	13.84	29.65	20	**4142.71**	28.04
J138	**3002.26**	3630.69	J138	20	28.43	20	**3630.69**	20
J139	**3002.26**	3353.88	J1853	19.61	24.8	20	**3353.88**	20
J14	**502.26**	818.49	J1084	10.48	30.38	20	**677.81**	29.78
J140	**3002.26**	4345.2	J1681	19.24	25.56	20	**4209.42**	21.54
J1409	**3002.26**	2040.86	J1411	17.56	-4.04	20	**1913.31**	22.58
J141	**3002.26**	3903.9	J141	20	30.3	20	**3903.9**	20
J142	**3002.26**	4530.64	J1681	16.99	24.97	20	**3964.31**	25.88
J1423	**3002.26**	4175.12	J1423	20	32.37	20	**4175.12**	20
J143	**2502.26**	1528.07	J143	20	-24.65	20	**1528.07**	20
J144	**3002.26**	4941.38	J1681	11.12	23.45	20	**3551.62**	32.66
J145	**3002.26**	3378.13	J145	20	25.32	20	**3378.13**	20
J1451	**2502.26**	586.45	J1451	20	-330.27	20	**586.45**	20
J146	**3002.26**	4709.33	J1681	14.92	24.47	20	**3826.33**	28.75
J1467	**2502.26**	1072.57	J1467	20	-69.38	20	**1072.57**	20
J147	**3002.26**	1955.53	J147	20	-13.72	20	**1955.53**	20
J148	**3002.26**	4669.13	J1681	12.86	23.32	20	**3647.75**	30.16
J149	**3002.26**	4937.07	J1681	10.07	23.1	20	**3548.52**	33.04
J1500	**502.26**	677.07	J1501	17.49	29.67	20	**645.33**	23.05
J1501	**502.26**	541.95	J1501	20	23.46	20	**541.95**	20
J1502	**502.26**	557.11	J1501	18.62	23.46	20	**539.7**	21.65
J1503	**502.26**	952.4	J1503	20	52.38	20	**952.4**	20
J1504	**502.26**	1481.56	J1504	20	109.89	20	**1481.56**	20
J1505	**502.26**	1115.18	J1505	20	89.03	20	**1115.18**	20
J1506	**502.26**	1681.27	J1506	20	82.76	20	**1681.27**	20
J1507	**502.26**	1404.19	J1507	20	74.94	20	**1404.19**	20
J1509	**502.26**	1644.9	J9	18.18	57.33	20	**1606.35**	21.96
J151	**3002.26**	4600.56	J1681	11.12	22.16	20	**3306.65**	33.24
J1510	**502.26**	1618.65	J9	19.42	57.33	20	**1606.01**	20.78
J1511	**502.26**	1544.17	J1511	20	63.67	20	**1544.17**	20
J1515	**1000**	4481.26	J21	8.13	34.77	20	**3220.9**	33.81
J152	**502.26**	1874.17	J614	18.46	34.4	20	**1757.03**	22.2
J153	**3002.26**	5354.6	J614	8.73	25.21	20	**3848.62**	32.03
J156	**2502.26**	2836.97	J156	20	25.01	20	**2836.97**	20
J1567	**1002.26**	2286.39	J1567	20	43.28	20	**2286.39**	20
J1575	**1002.26**	1941.1	J1575	20	40.96	20	**1941.1**	20
J1583	**1002.26**	2377.33	J1583	20	42.99	20	**2377.33**	20
J1587	**1002.26**	2373.85	J1589	19.79	42.76	20	**2373.85**	20
J159	**1002.26**	687.93	J159	20	2.59	20	**687.93**	20
J1591	**1002.26**	2367.09	J1591	20	42.47	20	**2367.09**	20
J16	**502.26**	1901.49	J20	18.19	37.02	20	**1782.65**	22.97
J1639	**2502.26**	2243.35	J1639	20	13.52	20	**2243.35**	20
J164	**502.26**	2031.87	J164	20	35.57	20	**2031.87**	20
J1649	**2502.26**	2339.06	J1649	20	16.27	20	**2339.06**	20
J165	**501.66**	3817.06	J626	6.64	94.87	20	**2982.08**	48.87
J1651	**1752.26**	2139.43	J1651	20	28.86	20	**2139.43**	20
J1667	**1752.26**	2091.85	J1667	20	27.64	20	**2091.85**	20
J1669	**1752.26**	3626.01	J1681	16.21	28.02	20	**3172.76**	26.41
J1673	**1752.26**	2150.43	J1675	19.99	28.88	20	**2150.43**	20
J168	**3002.26**	3687.8	J168	20	28.91	20	**3687.8**	20
J1689	**1752.26**	2556.48	J1681	16.81	24.61	20	**2236.92**	24.03
J169	**501.66**	1812.63	J169	20	136.84	20	**1812.63**	20
J1695	**1752.26**	2937.11	J1681	14.06	25.27	20	**2386.4**	26.69
J1707	**1752.26**	2348.2	J1711	18.46	25.5	20	**2201.43**	21.89

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1709	**1752.26**	2724.11	J1681	17.78	25.88	20	**2468.73**	23.4
J1713	**1752.26**	2338.15	J1681	17.39	23.58	20	**2118.94**	22.9
J1719	**1002.26**	1259.45	J1719	20	26.5	20	**1259.45**	20
J172	**502.26**	938.67	J347	19.71	37.4	20	**938.67**	20
J1721	**1002.26**	1096.61	J1721	20	22.72	20	**1096.61**	20
J1725	**1002.26**	767.22	J1725	20	9.35	20	**767.22**	20
J173	**502.26**	601.62	J173	20	27.49	20	**601.62**	20
J174	**502.26**	535.86	J174	20	22.85	20	**535.86**	20
J1765	**2502.26**	2223.56	J411	18.79	15.01	20	**2154.08**	21.53
J1771	**3002.26**	2348	J1773	18.68	1.27	20	**2274.63**	21.73
J1773	**3002.26**	2102.44	J1773	20	-7.05	20	**2102.44**	20
J1787	**502.26**	1188.25	J778	-7.79	28.82	20	**705.52**	51.35
J179	**1002.26**	2512.81	J965	19.05	43.19	20	**2473.54**	20.81
J1795	**1002.26**	1344.9	J1805	18.61	30.01	20	**1302.87**	21.53
J1797	**1002.26**	1251.19	J1801	19.85	28.61	20	**1251.19**	20
J1805	**1002.26**	1195.7	J1805	20	27.21	20	**1195.7**	20
J1807	**1002.26**	1699.67	J1807	20	35.23	20	**1699.67**	20
J1817	**3002.26**	1353.41	J1817	20	-83.36	20	**1353.41**	20
J182	**3002.26**	3299.33	J174	18.26	22.03	20	**3196.22**	21.69
J1827	**3002.26**	2344.25	J1827	20	2.36	20	**2344.25**	20
J183	**3002.26**	2902.19	J183	20	18.08	20	**2902.19**	20
J1831	**3002.26**	2199.15	J1831	20	-2	20	**2199.15**	20
J1833	**3002.26**	1279.78	J1833	20	-99.55	20	**1279.78**	20
J184	**3002.26**	2856.91	J184	20	17.17	20	**2856.91**	20
J1845	**3002.26**	2357.38	J1845	20	4.17	20	**2357.38**	20
J1853	**3002.26**	1261.5	J1853	20	-94.62	20	**1261.5**	20
J1859	**3002.26**	2394.56	J1859	20	5.62	20	**2394.56**	20
J186	**502.26**	1336.82	J174	17.39	40.71	20	**1253.27**	23.71
J1871	**1752.26**	2896.86	J1871	20	36.9	20	**2896.86**	20
J1875	**3002.26**	2587.17	J1875	20	11.29	20	**2587.17**	20
J188	**502.26**	731.3	J1501	19.27	32.73	20	**719.88**	21.03
J1885	**1002.26**	3621.58	J1237	18.34	41.12	20	**3508.41**	21.41
J1889	**1002.26**	1641.01	J1205	18.26	34.19	20	**1589.73**	21.48
J189	**502.26**	649.84	J804	15.89	34.69	20	**619.38**	24.19
J1891	**2502.26**	2265.52	J1223	18.32	13.23	20	**2194.73**	21.45
J1893	**3002.26**	2638.4	J1199	18.06	10.82	20	**2555.95**	21.54
J1897	**1002.26**	1797.61	J1211	19.48	38.89	20	**1769.52**	20.82
J1899	**1002.26**	1787.55	J1899	20	37.22	20	**1787.55**	20
J190	**502.26**	843.71	J1033	4.5	39.27	20	**711.88**	35.1
J191	**502.26**	1371.43	J191	20	51.78	20	**1371.43**	20
J1913	**1002.26**	2470.74	J1913	20	43.34	20	**2470.74**	20
J1915	**1002.26**	2372.8	J1163	16.55	38.67	20	**2187.42**	23.73
J1917	**1002.26**	2464.61	J1917	20	42.87	20	**2464.61**	20
J1927	**3002.26**	3529.19	J1283	19.93	26.97	20	**3529.19**	20
J1933	**3002.26**	4734.8	J1385	16.68	27.35	20	**4290.91**	24.42
J1939	**3002.26**	4342.59	J1967	19.33	27.21	20	**4206.89**	21.5
J1941	**3002.26**	1427.61	J1867	18.92	-70	20	**1405.3**	20.87
J1943	**3002.26**	3177.18	J1645	18.33	21.22	20	**3077.9**	21.65
J1945	**1002.26**	1835.24	J1945	20	37.8	20	**1835.24**	20
J1947	**2502.26**	2888.97	J1835	19.23	25.83	20	**2843.83**	20.81
J1949	**3002.26**	3841.87	J1307	18.94	28.34	20	**3721.81**	21.43
J195	**1002.26**	2306.81	J195	20	44.22	20	**2306.81**	20
J1951	**2502.26**	1614.38	J1951	20	-12.72	20	**1614.38**	20
J1955	**1002.26**	2153.7	J1955	20	36.37	20	**2153.7**	20
J1957	**1002.26**	2075.32	J1957	20	35.08	20	**2075.32**	20

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1963	1002.26	1738.85	J1963	20	31.9	20	1738.85	20
J197	502.26	862.29	J197	20	54.82	20	862.29	20
J1975	2502.26	3950.43	J1371	19.51	34.51	20	3888.71	20.74
J1977	1002.26	3658.28	J1417	18.04	40.96	20	3486.79	21.96
J198	502.26	897.17	J198	20	55.39	20	897.17	20
J1983	1002.26	4692.74	J1967	19.41	36.36	20	4546.09	21.37
J1987	2502.26	3778.16	J1987	20	31.47	20	3778.16	20
J1989	2502.26	3497.34	J1989	20	31.37	20	3497.34	20
J199	502.26	1097.08	J1076	17.02	51.07	20	1054.22	23.1
J1995	2502.26	1730.37	J1491	19.26	-5.2	20	1703.34	20.72
J1997	1002.26	2107.91	J987	19.89	44.17	20	2107.91	20
J1999	1002.26	2733.83	J1001	18.53	40.23	20	2648.4	21.37
J2	502.26	1759.87	J1559	17.08	109.24	20	1732.37	22.86
J20	502.26	1729.75	J20	20	36.85	20	1729.75	20
J200	501.66	3410.55	J626	5.9	92.48	20	2771.07	37.9
J2001	1002.26	3105.99	J2001	20	40.08	20	3105.99	20
J2005	3002.26	2924.5	J1843	19.62	18.19	20	2924.5	20
J2007	1002.26	2076.94	J955	19.7	42.86	20	2076.94	20
J2009	1002.26	2088.65	J963	19.39	41.67	20	2056.01	20.83
J201	1002.26	3633.24	J258	18.35	37.76	20	3462.93	21.85
J2011	1002.26	1707.1	J973	19.82	37.38	20	1707.1	20
J2013	1002.26	1952	J969	19.12	39.89	20	1921.5	20.82
J2015	2502.26	3780.55	J700	16.26	28.38	20	3426.13	24.52
J202	1002.26	3582.84	J258	19.26	37.83	20	3470.88	21.18
J2021	2502.26	2913.92	J2021	20	25.96	20	2913.92	20
J2023	2502.26	2828.29	J2023	20	25.23	20	2828.29	20
J2025	3002.26	3380.17	J174	19.75	24.1	20	3380.17	20
J2027	1002.26	1727.05	J881	19.96	38.11	20	1727.05	20
J2029	3002.26	2848.6	J2029	20	17.01	20	2848.6	20
J2033	1002.26	2302.41	J2033	20	41.13	20	2302.41	20
J2037	3002.26	2415.89	J2045	19.51	4.72	20	2378.15	20.89
J204	1002.26	3223.26	J204	20	46.65	20	3223.26	20
J2045	3002.26	2267.69	J2045	20	-0.09	20	2267.69	20
J2047	3002.26	2366.3	J2045	19.84	3.47	20	2366.3	20
J205	502.26	1226.45	J205	20	51.43	20	1226.45	20
J2053	502.26	1712.76	J1557	18.25	76.59	20	1686	21.8
J2055	502.26	1818.29	J1028	19.97	53.7	20	1818.29	20
J2057	502.26	1304.81	J778	-11.79	29.52	20	733.95	51.56
J206	502.26	921.23	J206	20	46.18	20	921.23	20
J2065	1002.26	4372.09	J1731	10.97	27.29	20	2869.18	29.83
J2069	1002.26	4681.3	J1731	8.67	27.27	20	2925.81	31.14
J207	3002.26	2671.12	J1811	19.14	12.11	20	2629.38	20.86
J2071	502.26	3385.03	J1731	17.57	28.9	20	2961.9	25.18
J2079	502.26	1516.07	J2079	20	35.37	20	1516.07	20
J208	3002.26	1771.51	J208	20	-29.2	20	1771.51	20
J2093	1002.26	1289.75	J159	17.04	24.48	20	1168.83	24.06
J21	502.26	1954.09	J21	20	35.85	20	1954.09	20
J210	502.26	2878.43	J441	19.24	83.91	20	2855.94	21.02
J2109	1752.26	3646.96	J1681	15.88	27.99	20	3077.12	27.39
J2111	1002.26	3730.29	J1681	18.46	31.62	20	3497.15	23.21
J2113	1002.26	3288.48	J2113	20	45.75	20	3288.48	20
J2115	1002.26	3254.71	J2115	20	45.2	20	3254.71	20
J2117	1002.26	3656.05	J1681	18.97	31.63	20	3427.55	23.08
J2119	1002.26	4491.32	J1681	13.13	31.63	20	3508.84	29.64
J212	2502.26	3250.77	J212	20	30.67	20	3250.77	20

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J2121	**2502.26**	3069.22	J921	18.18	26.37	20	**2973.31**	21.46
J213	**2502.26**	3960.13	J700	14.99	28.68	20	**3465.11**	26.19
J2133	**1002.26**	4653.18	J651	10.61	42.55	20	**3853.42**	30.21
J2135	**502.26**	1639.11	J2135	20	79.82	20	**1639.11**	20
J2139	**2502.26**	2045.87	J2139	20	7.25	20	**2045.87**	20
J214	**2502.26**	3259.47	J700	19.85	27.32	20	**3259.47**	20
J2141	**2502.26**	1917.7	J2141	20	2.03	20	**1917.7**	20
J2143	**2502.26**	1898.66	J2143	20	4.53	20	**1898.66**	20
J2145	**2502.26**	2168.18	J2145	20	12.67	20	**2168.18**	20
J2147	**2502.26**	4193.26	J2147	20	36.95	20	**4193.26**	20
J2149	**2502.26**	4254.04	J2149	20	37.27	20	**4254.04**	20
J2151	**2502.26**	3840.64	J2151	20	35.36	20	**3840.64**	20
J2155	**2502.26**	3656.11	J2155	20	34.26	20	**3656.11**	20
J2157	**2502.26**	3905.74	J2157	20	35.56	20	**3905.74**	20
J2159	**2502.26**	4225.49	J1963	19.36	30.15	20	**4093.45**	21.4
J2161	**2502.26**	2638.05	J2161	20	21.85	20	**2638.05**	20
J2165	**502.26**	1157.61	J778	-5.81	28.82	20	**705.42**	47.27
J2173	**1000**	762.08	J2173	20	2.87	20	**762.08**	20
J2175	**3000**	3176.65	J2175	20	22.75	20	**3176.65**	20
J2177	**3000**	1736.26	J2177	20	-30.72	20	**1736.26**	20
J22	**502.26**	4137.71	J21	5.9	36.67	20	**2909.33**	34.32
J220	**1002.26**	7307.95	J778	17.46	39.73	20	**6851.2**	23.1
J221	**2502.26**	3105.78	J221	20	28.85	20	**3105.78**	20
J222	**1002.26**	5785.92	J778	13.12	38.41	20	**4791.47**	27.65
J224	**1002.26**	1349.55	J224	20	31.41	20	**1349.55**	20
J225	**1002.26**	5198.98	J1967	16.8	36.43	20	**4711.57**	24.25
J226	**1002.26**	4812.72	J1967	18.84	36.39	20	**4662.32**	21.37
J227	**1002.26**	4656.04	J1967	19.56	36.34	20	**4510.54**	21.37
J229	**1002.26**	1866.02	J667	18.05	37.01	20	**1807.7**	21.54
J23	**502.26**	1761.72	J1084	2.15	38.98	20	**1293.76**	37.71
J231	**2502.26**	1318.98	J231	20	-36.3	20	**1318.98**	20
J232	**502.26**	7129.94	J1967	3	37.93	20	**4679.03**	49.22
J233	**502.26**	6320.21	J1967	8.23	37.91	20	**4542.65**	46.15
J234	**502.26**	5855.86	J1967	11.17	37.89	20	**4574.89**	40.77
J235	**502.26**	5729.22	J1967	11.77	37.87	20	**4475.95**	41.44
J236	**502.26**	5400.24	J1967	13.81	37.86	20	**4387.7**	37.33
J237	**502.26**	5325.36	J651	10.83	45.25	20	**4410.07**	35.66
J238	**502.26**	5702.01	J651	4.3	45.18	20	**4187.41**	45.53
J239	**1002.26**	4927.66	J651	8.86	42.64	20	**3926.73**	33.74
J24	**502.26**	4944.25	J778	-9	39.1	20	**2858.4**	50.59
J241	**1002.26**	1884.97	J241	20	50.1	20	**1884.97**	20
J242	**1002.26**	2933	J242	20	55.19	20	**2933**	20
J243	**1002.26**	5030.6	J651	6.98	42.65	20	**3930.16**	39.34
J244	**1002.26**	3644.36	J659	17.93	43.72	20	**3473.53**	22.38
J245	**1002.26**	3144.92	J245	20	45.52	20	**3144.92**	20
J246	**1002.26**	4004.24	J651	15.81	42.37	20	**3628.84**	24.84
J247	**2502.26**	3526.45	J247	20	31.99	20	**3526.45**	20.01
J248	**3002.26**	3332.95	J248	20	25.93	20	**3332.95**	20
J249	**1002.26**	1895.97	J249	20	38.05	20	**1895.97**	20
J25	**1002.26**	5937.64	J778	10.45	38.22	20	**4638.78**	30.17
J250	**3002.26**	3106.47	J250	20	21.39	20	**3106.47**	20
J252	**2502.26**	2116.53	J252	20	12.24	20	**2116.53**	20
J253	**1752.26**	3076.66	J253	20	35.8	20	**3076.66**	20
J254	**1752.26**	1857.05	J254	20	22.79	20	**1857.05**	20
J256	**1002.26**	2031.75	J256	20	38.62	20	**2031.75**	20

2022 MDD Fire Flow Scenario Modeling Results

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J257	**1002.26**	2623.13	J257	20	37.62	20	**2623.13**	20
J258	**1002.26**	1583.16	J258	20	31.53	20	**1583.16**	20
J259	**1002.26**	1757.69	J259	20	37.61	20	**1757.69**	20
J26	**1002.26**	6038.06	J778	16.02	38.9	20	**5377.65**	24.84
J260	**3002.26**	3368.37	J1177	18.21	22.86	20	**3263.1**	21.74
J261	**1002.26**	2794.25	J261	20	42.3	20	**2794.25**	20
J262	**1002.26**	3159.88	J262	20	40.32	20	**3159.88**	20
J263	**1002.26**	2665.78	J263	20	37.54	20	**2665.78**	20
J264	**1002.26**	2864.24	J264	20	39.07	20	**2864.24**	20
J265	**1002.26**	2144.46	J1805	13.36	37.56	20	**1876.4**	26.8
J267	**1002.26**	2676.77	J267	20	44.5	20	**2676.77**	20
J269	**1002.26**	2188.07	J269	20	42.7	20	**2188.07**	20
J270	**3002.26**	1847.85	J270	20	-23.92	20	**1847.85**	20
J271	**1002.26**	2284.34	J271	20	41.06	20	**2284.34**	20
J272	**1002.26**	2322.71	J272	20	40.98	20	**2322.71**	20
J273	**2502.26**	3068.55	J273	20	27.96	20	**3068.55**	20
J274	**3002.26**	2510.64	J614	15.7	7.91	20	**2196.81**	24.84
J275	**1002.26**	2240.43	J275	20	42.03	20	**2240.43**	20
J276	**1002.26**	2723.36	J276	20	44.23	20	**2723.36**	20
J278	**1002.26**	2490.62	J278	20	44.43	20	**2490.62**	20
J28	**1002.26**	1748.44	J28	20	36.48	20	**1748.44**	20
J281	**2502.26**	3706.08	J700	19.93	29.84	20	**3706.08**	20
J283	**2502.26**	3470.06	J283	20	33.51	20	**3470.06**	20
J286	**2502.26**	3447.07	J286	20	33.24	20	**3447.07**	20
J287	**1002.26**	3440.9	J287	20	46.66	20	**3440.9**	20
J288	**1002.26**	2771.54	J1575	19.22	44.93	20	**2728.24**	20.83
J289	**1002.26**	3374.38	J289	20	45.84	20	**3374.38**	20
J290	**1002.26**	3426.85	J290	20	46.43	20	**3426.85**	20
J291	**1002.26**	3027.17	J291	20	45.7	20	**3027.17**	20
J292	**1002.26**	2809.53	J292	20	45.36	20	**2809.53**	20
J294	**1002.26**	3359.65	J1589	19.52	45.37	20	**3307.15**	20.78
J296	**1002.26**	3512.44	J296	20	45.3	20	**3512.44**	20
J297	**1002.26**	2643.15	J297	20	43.47	20	**2643.15**	20
J298	**1002.26**	3602.26	J298	20	45.55	20	**3602.26**	20
J299	**2502.26**	1736.82	J299	20	-7.89	20	**1736.83**	20
J3	**502.26**	2097.43	J447	-1	92.25	20	**1835.25**	41.81
J30	**1002.26**	2173.14	J30	20	38.76	20	**2173.14**	20
J300	**502.26**	1170.88	J300	20	43.22	20	**1170.88**	20
J301	**502.26**	965.43	J301	20	40.2	20	**965.43**	20
J302	**502.26**	681.02	J302	20	31.37	20	**681.02**	20
J303	**502.26**	1728.08	J303	20	40.75	20	**1728.08**	20
J305	**502.26**	2112.69	J305	20	42.25	20	**2112.69**	20
J307	**1752.26**	4092.38	J1681	13.48	28.42	20	**3197.17**	29.93
J311	**3002.26**	4457.44	J1681	12.47	22.34	20	**3343.08**	31.89
J312	**3002.26**	4213.19	J1681	15.07	22.84	20	**3423.22**	29.01
J313	**2502.26**	4759.36	J1681	11.19	25.66	20	**3569.52**	31.25
J314	**2502.26**	4169.5	J1681	14.63	25.22	20	**3387.72**	28.75
J315	**1002.26**	3423.27	J1177	14.48	41.66	20	**3048.85**	26.11
J317	**1002.26**	4529.12	J1681	12.81	31.62	20	**3538.37**	30.04
J319	**1002.26**	3188.15	J1613	19.99	45.46	20	**3188.15**	20
J32	**502.26**	5885.22	J778	11.47	39.8	20	**4689.78**	31.43
J321	**1002.26**	4609.52	J1681	12.03	31.6	20	**3457.14**	31.32
J322	**3002.26**	4491.36	J1681	18.35	25.54	20	**4210.65**	22.92
J323	**3002.26**	4214.33	J323	20	32.79	20	**4214.33**	20
J324	**3002.26**	5030.42	J1731	17.23	23.91	20	**4244.42**	27.58

2022 MDD Fire Flow Scenario Modeling Results

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J325	**3002.26**	4793.32	J1681	17.21	25.78	20	**4194.15**	25.73
J327	**3002.26**	4470.49	J1385	18.42	27.29	20	**4191.09**	22.93
J328	**3002.26**	4775.7	J1967	16.33	27.17	20	**4178.73**	25.87
J329	**3002.26**	4818.25	J1967	16.16	27.3	20	**4215.97**	25.92
J33	**1002.26**	3230.79	J33	20	44.76	20	**3230.79**	20
J330	**2502.26**	5376.24	J1967	11.9	29.73	20	**4200.18**	29.62
J331	**3002.26**	4937.98	J1731	17.2	23.72	20	**4166.42**	27.8
J332	**3002.26**	4897.28	J1731	17.09	23.6	20	**4132.08**	27.97
J334	**1752.26**	3609.68	J334	20	39.82	20	**3609.68**	20
J336	**1752.26**	5296.74	J1967	13.14	33.15	20	**4303.6**	28.39
J337	**1002.26**	5269.2	J1967	13.76	36.12	20	**4281.23**	28.38
J338	**1002.26**	5220.54	J1967	15.17	36.23	20	**4404.83**	26.86
J339	**2502.26**	4126.53	J339	20	36.6	20	**4126.53**	20
J34	**1002.26**	2082.12	J34	20	43.13	20	**2082.12**	20
J340	**2502.26**	4284.07	J340	20	37.86	20	**4284.07**	20
J341	**2502.26**	3944.63	J341	20	36.64	20	**3944.63**	20
J342	**1002.26**	3351.06	J342	20	47.25	20	**3351.06**	20
J343	**1002.26**	4150.34	J343	20	47.53	20	**4150.34**	20
J344	**1002.26**	3686.56	J344	20	49.31	20	**3686.56**	20
J345	**502.26**	3770.4	J21	16.66	36.91	20	**3416.92**	25.51
J346	**1002.26**	5047.04	J1967	17.49	36.4	20	**4573.88**	24.24
J347	**502.26**	620.44	J347	20	28.25	20	**620.44**	20
J348	**502.26**	1714.74	J348	20	38.98	20	**1714.74**	20
J349	**502.26**	576.32	J349	20	25.91	20	**576.32**	20
J35	**1002.26**	306.24	J35	20	-294.32	20	**306.24**	20
J350	**502.26**	571.38	J174	19.31	24.8	20	**562.45**	20.79
J351	**502.26**	461.08	J351	20	15.41	20	**461.08**	20
J354	**502.26**	670.46	J804	17.32	37.26	20	**649.51**	22.73
J355	**502.26**	918.18	J1501	11.4	34.69	20	**789.06**	31.58
J356	**502.26**	854.78	J356	20	42.42	20	**854.78**	20
J357	**3002.26**	2999.9	J1811	19.77	19.73	20	**2999.9**	20
J358	**3002.26**	2960.05	J358	20	19.24	20	**2960.05**	20
J359	**3002.26**	1859.79	J359	20	-21.19	20	**1859.79**	20
J36	**1002.26**	1980.87	J36	20	49.03	20	**1980.87**	20
J361	**502.26**	1176.78	J361	20	50.69	20	**1176.78**	20
J362	**502.26**	1018.8	J1033	3.79	45.4	20	**843.7**	36.61
J363	**502.26**	1034.91	J363	20	46.94	20	**1034.91**	20
J364	**502.26**	881.33	J364	20	46.48	20	**881.33**	20
J366	**502.26**	1401.54	J1076	16.36	54.76	20	**1335.84**	23.9
J368	**502.26**	2077.09	J368	20	58.79	20	**2077.09**	20
J369	**502.26**	2114.92	J369	20	57.1	20	**2114.92**	20
J37	**502.26**	2302.88	J37	20	73.56	20	**2302.88**	20
J372	**502.26**	1750.52	J372	20	79.32	20	**1750.52**	20
J373	**502.26**	1716.82	J373	20	79.85	20	**1716.82**	20
J376	**502.26**	4309.74	J1177	10	45.21	20	**3501.66**	34.01
J378	**502.26**	5358.89	J1177	-2.01	45.26	20	**3642.37**	52.16
J379	**502.26**	4394.44	J1177	12.34	45.3	20	**3707.81**	37.56
J380	**502.26**	4939	J1177	5.44	45.3	20	**3704.25**	47.47
J381	**502.26**	5164.7	J1177	4.07	45.32	20	**3792.83**	47.87
J383	**502.26**	4587.44	J1177	10.45	45.31	20	**3727.29**	40.78
J384	**502.26**	4148.31	J1177	16.35	45.33	20	**3824.22**	29.58
J385	**502.26**	3779.85	J385	20	89.6	20	**3779.85**	20
J386	**3002.26**	2062.78	J1869	19.7	-10.06	20	**2062.78**	20
J387	**2502.26**	2884.04	J387	20	25.04	20	**2884.04**	20
J388	**1002.26**	2883.2	J941	17.86	39.46	20	**2748.05**	21.98

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J389	**2502.26**	3183.93	J941	19.01	26.98	20	**3084.43**	21.32
J39	**502.26**	2921.82	J39	20	86.4	20	**2921.82**	20
J391	**1002.26**	2909.5	J392	19.02	39.19	20	**2818.58**	21.23
J392	**1002.26**	2726.99	J392	20	38.96	20	**2726.99**	20
J394	**1002.26**	2511.89	J394	20	40.06	20	**2511.89**	20
J395	**1002.26**	2701.2	J395	20	40.08	20	**2701.2**	20
J397	**1002.26**	2363.61	J397	20	39.19	20	**2363.61**	20
J398	**502.26**	1830.17	J20	18.88	36.95	20	**1772.98**	21.29
J399	**502.26**	1843.46	J399	20	37.15	20	**1843.46**	20
J4	**502.26**	1616.37	J4	20	113.13	20	**1616.37**	20
J40	**3002.26**	3614.6	J778	19.8	24.71	20	**3558.13**	21.78
J400	**502.26**	2829.65	J21	12.03	36.22	20	**2299.09**	27.64
J401	**502.26**	3821.35	J21	13.52	36.81	20	**3104.85**	30.11
J405	**502.26**	3883.4	J1731	15.97	29	20	**3155.26**	29.03
J408	**2502.26**	1723.69	J407	11.03	-19.01	20	**1427.43**	29.04
J41	**502.26**	3643.65	J41	20	87.43	20	**3643.65**	20
J410	**2502.26**	1665.54	J410	20	-1.04	20	**1665.54**	20
J411	**2502.26**	2128.33	J411	20	15.01	20	**2128.33**	20
J412	**2502.26**	5381.33	J411	17.52	30.02	20	**4876.83**	22.71
J414	**3002.26**	4859.54	J1681	11.4	23.22	20	**3644.65**	31.22
J415	**502.26**	1847.8	J415	20	35.18	20	**1847.8**	20
J417	**501.66**	3478.01	J745	19.11	35.46	20	**3314.98**	27.75
J419	**501.66**	2193.68	J607	14.71	133.54	20	**2107.99**	25.64
J42	**502.26**	2561.16	J42	20	87.73	20	**2561.16**	20
J420	**502.26**	1086.97	J51	17.09	96.55	20	**1069.99**	23.05
J421	**502.26**	821.18	J421	20	78.89	20	**821.18**	20
J422	**502.26**	778.11	J422	20	64.24	20	**778.11**	20
J423	**502.26**	2149.17	J423	20	94.79	20	**2149.17**	20
J424	**502.26**	2170.99	J424	20	94.21	20	**2170.99**	20
J425	**502.26**	2294.59	J1059	19.53	84.23	20	**2285.63**	20.55
J426	**502.26**	1750.69	J1059	16.47	81.29	20	**1695.98**	24.16
J427	**502.26**	1385.72	J427	20	81.34	20	**1385.72**	20
J430	**502.26**	1358.82	J51	18.06	105.03	20	**1342.9**	22.36
J431	**502.26**	1882.47	J432	15.32	98.75	20	**1823.65**	25.98
J432	**502.26**	1811.15	J432	20	98.62	20	**1811.15**	20
J433	**502.26**	1946.69	J1060	17.02	95.04	20	**1908.67**	22.98
J434	**502.26**	1536.46	J434	20	85.91	20	**1536.46**	20
J435	**502.26**	1624.79	J435	20	99.12	20	**1624.79**	20
J436	**502.26**	1510.81	J436	20	87.09	20	**1510.81**	20
J437	**502.26**	1728.49	J437	20	91.08	20	**1728.49**	20
J438	**502.26**	2757.36	J438	20	90.1	20	**2757.36**	20
J439	**3002.26**	2769.43	J439	20	9.01	20	**2769.43**	20
J44	**502.26**	2734.85	J43	18.02	85.32	20	**2692.12**	21.9
J440	**502.26**	2626.09	J638	14.29	80.15	20	**2502.99**	25.56
J441	**502.26**	2597.5	J441	20	83.41	20	**2597.5**	20
J442	**502.26**	1652.28	J442	20	82.82	20	**1652.28**	20
J445	**502.26**	1889.9	J447	18.7	92.51	20	**1875.14**	21.4
J447	**502.26**	1769.11	J447	20	91.72	20	**1769.11**	20
J448	**502.26**	1741.88	J1505	13	99.59	20	**1673.83**	26.64
J449	**502.26**	1898.33	J447	14.77	92.19	20	**1831.59**	26.27
J45	**502.26**	2458.16	J45	20	89.2	20	**2458.16**	20
J450	**502.26**	1256.16	J450	20	78.93	20	**1256.16**	20
J453	**502.26**	2661.36	J453	20	87.66	20	**2661.36**	20
J455	**502.26**	2699.23	J455	20	88.21	20	**2699.23**	20
J456	**502.26**	2407.26	J456	20	87.53	20	**2407.26**	20

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J457	**502.26**	2350.48	J457	20	87.11	20	**2350.48**	20
J458	**502.26**	2344.44	J458	20	89.43	20	**2344.44**	20
J459	**502.26**	3199.88	J459	20	88.95	20	**3199.88**	20
J46	**502.26**	2791.48	J801	19.95	83.12	20	**2791.48**	20
J460	**502.26**	2270.25	J460	20	84.62	20	**2270.25**	20
J463	**502.26**	2253.85	J698	12.01	77.71	20	**2104.18**	27.98
J464	**502.26**	1428.57	J43	15.1	77.99	20	**1372.77**	25.11
J465	**502.26**	3375.24	J465	20	90.78	20	**3375.24**	20.01
J466	**502.26**	3505.28	J466	20	91.86	20	**3505.28**	20
J467	**502.26**	2271.38	J467	20	84.34	20	**2271.38**	20
J468	**502.26**	892.45	J468	20	57.16	20	**892.45**	20
J47	**502.26**	1852.09	J1557	18.85	77.52	20	**1837.62**	20.89
J470	**502.26**	3735.29	J470	20	92.28	20	**3735.29**	20
J471	**502.26**	3851.29	J1177	18.81	45.31	20	**3730.93**	23.83
J472	**502.26**	2298.51	J472	20	83.62	20	**2298.52**	20
J473	**502.26**	918.2	J473	20	53.88	20	**918.2**	20
J474	**502.26**	842.71	J474	20	52.52	20	**842.71**	20
J475	**502.26**	2414.96	J1076	18.45	59.15	20	**2377.23**	21.79
J476	**502.26**	814.96	J476	20	48.48	20	**814.96**	20
J477	**502.26**	2120.4	J778	15.55	37.95	20	**1855.35**	40.43
J478	**502.26**	2026.48	J778	15.44	37.77	20	**1773.17**	34.93
J479	**502.26**	2318.63	J778	6.73	37.57	20	**1702.75**	47.55
J48	**502.26**	1739.33	J1553	6.02	86.09	20	**1576.26**	34.4
J480	**502.26**	2399.83	J778	4.29	37.54	20	**1687.38**	50.35
J481	**502.26**	2411.81	J778	1.18	37.34	20	**1620.44**	47.54
J482	**502.26**	2424.93	J778	-0.08	37.27	20	**1591.36**	48
J483	**502.26**	2540.54	J778	-4.49	37.2	20	**1587.84**	51.48
J484	**502.26**	2398.18	J778	-2.79	37.02	20	**1536.34**	44.72
J485	**502.26**	2849.93	J778	-12.18	37.29	20	**1603.09**	52.9
J486	**502.26**	3311.07	J486	20	92.08	20	**3311.07**	20
J487	**502.26**	3562.27	J487	20	102.23	20	**3562.27**	20
J488	**502.26**	3632.27	J778	19.78	39.35	20	**3632.27**	20
J489	**502.26**	3013.7	J489	20	85.65	20	**3013.7**	20
J49	**502.26**	1935.23	J1060	13.57	94.67	20	**1859.64**	26.03
J490	**502.26**	2957.12	J490	20	87.59	20	**2957.12**	20
J491	**502.26**	2709.24	J492	18.08	77.62	20	**2666.91**	21.88
J492	**502.26**	2428.3	J492	20	77.12	20	**2428.3**	20
J494	**502.26**	2490.81	J494	20	71.16	20	**2490.81**	20
J495	**502.26**	2767.89	J495	20	71.57	20	**2767.89**	20
J496	**502.26**	2554.71	J1084	8.44	41.27	20	**2035.78**	36.22
J497	**502.26**	2328.73	J1084	8.28	40.92	20	**1855.71**	35.84
J498	**502.26**	2100.9	J1084	7.5	40.43	20	**1641.33**	36.44
J499	**502.26**	1950.31	J1084	6.21	39.95	20	**1493.21**	37
J5	**502.26**	2249.17	J778	8.72	37.6	20	**1722.02**	44.55
J50	**502.26**	2232.39	J422	13.8	93.69	20	**2136.46**	26.49
J501	**502.26**	3935.28	J778	-7.65	38.67	20	**2336.57**	49.08
J503	**502.26**	3363.63	J778	-11.76	38.02	20	**1892.04**	53.37
J504	**502.26**	3219.78	J778	-11.37	37.86	20	**1811.13**	52.98
J505	**502.26**	2611.24	J778	1.87	37.72	20	**1754.43**	47.61
J506	**502.26**	2082.58	J778	13.81	37.72	20	**1757.17**	33.09
J507	**502.26**	1863.54	J9	14.24	57.97	20	**1732.51**	25.77
J508	**502.26**	1651.78	J9	19.92	57.57	20	**1651.78**	20
J509	**501.57**	1183.78	J1731	30.12	30.12	20	**79.77**	96.9
J51	**502.26**	995.79	J51	20	93.03	20	**995.79**	20
J511	**500.11**	2073.25	J1731	30.12	30.12	20	**76.94**	86.81

2022 MDD Fire Flow Scenario Modeling Results

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J516	**502.26**	690.32	J1084	16.99	29.01	20	**647.18**	23.02
J517	**500.97**	689.99	J1084	18.67	29.97	20	**668.43**	21.67
J518	**502.26**	821.86	J1084	14.01	31.91	20	**731.97**	25.72
J519	**502.26**	919.3	J1084	12.19	33.17	20	**790.02**	27.67
J52	**502.26**	1743.54	J51	18.23	110.99	20	**1729.92**	21.56
J520	**502.26**	1230.54	J1084	5.92	35.87	20	**961.36**	33.68
J521	**502.26**	1671.84	J1084	13.07	39.71	20	**1436.74**	29.04
J523	**502.26**	1886.6	J523	20	52.4	20	**1886.6**	20
J525	**2502.26**	1417.16	J525	20	-34.67	20	**1417.16**	20
J526	**3002.26**	3108.06	J174	18.83	20.25	20	**3010.94**	21.7
J529	**1752.26**	4727.04	J1967	16.31	33.01	20	**4136.16**	25.5
J53	**502.26**	2333.62	J1059	14.83	84.07	20	**2242.46**	25.34
J530	**1002.26**	1921.51	J530	20	41.7	20	**1921.51**	20
J531	**1002.26**	1662.18	J531	20	36.38	20	**1662.18**	20
J532	**1002.26**	1381.72	J532	20	31.38	20	**1381.72**	20
J533	**1002.26**	1890.39	J533	20	40.85	20	**1890.39**	20
J534	**2502.26**	3824.56	J534	20	33.45	20	**3824.56**	20
J535	**1002.26**	1724.17	J1517	18.6	37.59	20	**1670.29**	21.67
J537	**1002.26**	1776.56	J537	20	35.94	20	**1776.56**	20
J538	**1002.26**	3138.16	J539	19.62	39.3	20	**3138.16**	20
J539	**1002.26**	1926.03	J539	20	35.64	20	**1926.03**	20
J54	**502.26**	2225.99	J1059	15.18	83.7	20	**2139.04**	25.33
J540	**1002.26**	3132.8	J2003	19.8	39.89	20	**3132.8**	20
J541	**502.26**	2004.37	J541	20	99.02	20	**2004.37**	20
J542	**1002.26**	419.48	J542	20	-116.54	20	**419.48**	20
J543	**502.26**	3080.58	J543	20	91.88	20	**3080.58**	20.01
J544	**502.26**	2826.7	J544	20	94.09	20	**2826.7**	20
J545	**502.26**	2780.87	J545	20	94.27	20	**2780.87**	20
J546	**502.26**	2775.63	J546	20	94.2	20	**2775.63**	20
J547	**502.26**	2891.4	J547	20	94.97	20	**2891.4**	20
J548	**502.26**	2975.39	J1075	13.34	86.45	20	**2824.29**	26.63
J554	**3002.26**	2652.33	J555	19.99	12.54	20	**2652.33**	20
J556	**3002.26**	2457.29	J556	20	6.55	20	**2457.29**	20
J559	**3002.26**	2374.88	J2045	18.62	1.9	20	**2300.66**	21.8
J56	**502.26**	1512.12	J1059	13.62	78.75	20	**1441.24**	26.17
J561	**1002.26**	2310.15	J561	20	42.61	20	**2310.15**	20
J562	**1002.26**	2326.83	J562	20	40.36	20	**2326.83**	20
J566	**1002.26**	2535.02	J566	20	43.35	20	**2535.02**	20
J567	**1002.26**	2694.88	J562	19.86	41.55	20	**2694.88**	20
J57	**502.26**	1246.61	J580	15.63	75.02	20	**1207.66**	24.07
J571	**1002.26**	2423.65	J571	20	40.97	20	**2423.65**	20
J572	**1002.26**	2657.09	J913	19.28	40.58	20	**2615.57**	20.7
J573	**1002.26**	2524.12	J913	19.29	40.19	20	**2484.68**	20.69
J574	**1752.26**	4452.97	J1681	12.63	28.89	20	**3478.88**	29.88
J575	**2502.26**	3428.8	J230	19.87	29.68	20	**3428.8**	20
J577	**1002.26**	2591.86	J577	20	42.81	20	**2591.86**	20
J58	**502.26**	3115.62	J58	20	88.88	20	**3115.62**	20
J581	**1002.26**	5910.46	J778	10.95	38.24	20	**4617.55**	30.17
J583	**1002.26**	2430.84	J583	20	40.6	20	**2430.84**	20
J584	**1002.26**	2235.4	J584	20	40.32	20	**2235.4**	20
J585	**1002.26**	2318.01	J585	20	41.59	20	**2318.01**	20
J587	**1002.26**	1375.02	J1179	18.92	30.76	20	**1332.05**	21.51
J59	**502.26**	2515.13	J59	20	87.59	20	**2515.13**	20
J590	**3002.26**	3435.84	J590	20	25.34	20	**3435.84**	20.01
J591	**502.26**	3153	J1073	19.62	86.96	20	**3153**	20

2022 MDD Fire Flow Scenario Modeling Results

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J592	**502.26**	3658.79	J778	19.77	39.37	20	**3658.79**	20
J593	**502.26**	2725.4	J593	20	84.28	20	**2725.4**	20
J594	**502.26**	2089.02	J447	-1.05	92.19	20	**1827.89**	41.78
J595	**502.26**	2554.33	J778	-0.77	37.46	20	**1676.28**	53.54
J596	**502.26**	4586.1	J778	-8.42	38.98	20	**2722.99**	49.27
J597	**1752.26**	4132.7	J1681	13.35	28.32	20	**3228.67**	30.5
J6	**502.26**	2557.12	J778	-0.8	37.46	20	**1678.11**	53.64
J60	**502.26**	2314.84	J612	19.83	84.61	20	**2314.84**	20
J601	**1002.26**	4891.78	J1731	9.28	27.53	20	**3057.36**	31.31
J602	**1002.26**	5528.81	J1731	11.11	28.21	20	**3628.28**	30.47
J604	**1002.26**	4203.37	J731	18.15	33.77	20	**3940.66**	21.79
J605	**1002.26**	6211.76	J1731	14.11	28.86	20	**4658.82**	27.04
J607	**501.66**	1327.29	J607	20	127.42	20	**1327.29**	19.82
J608	**502.26**	2287.81	J614	16.22	34.73	20	**2037.58**	23.92
J61	**502.26**	3320.74	J61	20	89.61	20	**3320.74**	20
J614	**502.26**	1725.26	J614	20	34.31	20	**1725.26**	20
J618	**1002.26**	1345.75	J1177	19.17	30.19	20	**1324.72**	20.74
J62	**502.26**	3427.21	J62	20	91.19	20	**3427.21**	20
J622	**502.26**	2187.47	J614	12.15	34.36	20	**1777.32**	29.8
J626	**501.66**	1797.21	J626	20	90.48	20	**1797.21**	20
J627	**501.57**	586.19	J1731	30.12	30.12	20	**79**	66.31
J628	**501.57**	583.59	J1731	30.12	30.12	20	**80.07**	76.41
J629	**500.97**	680.83	J1731	30.12	30.12	20	**78.45**	50.17
J63	**502.26**	2237.66	J63	20	84.07	20	**2237.66**	20
J631	**1002.26**	2933.18	J631	20	41.27	20	**2933.18**	20
J632	**1002.26**	2964.85	J641	19.75	40.04	20	**2964.85**	20
J633	**502.26**	2753.2	J778	-1.69	37.72	20	**1763.77**	48.93
J635	**502.26**	1568.26	J635	20	42.38	20	**1568.26**	20
J636	**502.26**	1601.82	J1761	18.31	40.46	20	**1551.76**	21.36
J637	**502.26**	1619.47	J1763	17.16	45.28	20	**1543.56**	22.6
J638	**502.26**	2057.01	J638	20	78.8	20	**2057.02**	20
J639	**502.26**	2336.07	J640	18.95	86.54	20	**2317.82**	20.98
J64	**502.26**	4273.48	J1177	13.84	45.3	20	**3739.3**	34.42
J640	**502.26**	2305.67	J640	20	86.5	20	**2305.67**	20
J641	**1002.26**	1901.7	J641	20	36.29	20	**1901.7**	20
J642	**1002.26**	1922.87	J642	20	36.9	20	**1922.87**	20
J645	**1002.26**	3636.57	J645	20	51.3	20	**3636.57**	20
J647	**2502.26**	3166.39	J647	20	28.81	20	**3166.39**	20
J65	**502.26**	2367.78	J1076	14.3	58.79	20	**2201.3**	26.04
J651	**1002.26**	2844.65	J651	20	41.17	20	**2844.65**	20
J652	**1002.26**	3007.31	J652	20	43.33	20	**3007.31**	20
J653	**1002.26**	3889.33	J651	17.19	42.39	20	**3646.24**	23.57
J656	**1002.26**	2763.94	J656	20	48.63	20	**2763.94**	20
J657	**1002.26**	2407.63	J657	20	48.58	20	**2407.63**	20
J658	**1002.26**	2252.4	J658	20	48.1	20	**2252.4**	20
J659	**1002.26**	3065.26	J659	20	43.08	20	**3065.26**	20
J661	**2502.26**	2165.71	J661	20	12.49	20	**2165.71**	20
J662	**1002.26**	2900.16	J662	20	51.2	20	**2900.16**	20
J663	**1002.26**	2204.35	J663	20	49.64	20	**2204.35**	20
J664	**1002.26**	1902.01	J665	17.6	40.58	20	**1812.86**	22.75
J665	**1002.26**	1463.42	J665	20	35.58	20	**1463.42**	20
J666	**1002.26**	1521.58	J667	18.8	33.41	20	**1474.03**	21.53
J667	**1002.26**	1319.38	J667	20	30.38	20	**1319.38**	20
J669	**1002.26**	1597.33	J669	20	35.02	20	**1597.33**	20
J67	**502.26**	5582.21	J1177	-3.67	45.29	20	**3750.55**	54.04

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J671	**1752.26**	4589.38	J1681	8.19	28.01	20	**3155.2**	32.66
J672	**3002.26**	4946.52	J1681	12.56	24.1	20	**3709.89**	31.18
J673	**2502.26**	4423.76	J1963	16.54	29.65	20	**4009.04**	23.9
J674	**3002.26**	4983.11	J1681	5.76	21.39	20	**3270.17**	35.63
J675	**2502.26**	5123.78	J1967	13.89	29.75	20	**4243.13**	27.88
J679	**1752.26**	4123.33	J1681	12.03	27.99	20	**3092.5**	32.01
J68	**502.26**	4926.43	J1177	2.84	45.24	20	**3617.85**	44.06
J681	**3002.26**	3795.64	J681	20	29.73	20	**3795.64**	20
J682	**3002.26**	2439.91	J682	20	7.03	20	**2439.91**	20
J683	**3002.26**	2400.67	J683	20	5.84	20	**2400.67**	20
J684	**3002.26**	4176.65	J1281	19.96	32.27	20	**4176.65**	20
J692	**1002.26**	2066.26	J692	20	39.34	20	**2066.26**	20
J693	**2502.26**	1413.93	J693	20	-29.61	20	**1413.93**	20
J695	**1002.26**	1658.33	J695	20	37.14	20	**1658.33**	20
J696	**1002.26**	1613.1	J696	20	37.46	20	**1613.1**	20
J70	**3002.26**	4057.1	J1177	10.86	24.16	20	**3359.78**	30.91
J700	**1002.26**	2753.06	J700	20	37.81	20	**2753.06**	20
J701	**1002.26**	1813.05	J701	20	35.79	20	**1813.05**	20
J703	**3002.26**	3369.48	J706	18.19	23.36	20	**3264.18**	21.58
J705	**3002.26**	2760.64	J706	19.93	15.63	20	**2760.64**	20
J706	**3002.26**	2527.37	J706	20	10.37	20	**2527.37**	20
J707	**3002.26**	2503.04	J707	20	9.28	20	**2503.04**	20
J708	**3002.26**	2582.08	J708	20	11.1	20	**2582.08**	20
J709	**3002.26**	2736	J709	20	14.74	20	**2736**	20
J71	**1002.26**	4620.24	J651	10.53	42.53	20	**3826.14**	29.92
J711	**3002.26**	2943.92	J889	19.55	18.49	20	**2897.92**	20.83
J713	**3002.26**	3112.1	J713	20	21.91	20	**3112.1**	20
J715	**1002.26**	2051.89	J715	20	42.41	20	**2051.89**	20
J716	**1002.26**	1980.28	J716	20	41	20	**1980.28**	20
J717	**1002.26**	2001.34	J717	20	40.45	20	**2001.34**	20
J718	**1752.26**	4255.54	J1681	11.87	28.22	20	**3191.66**	32.03
J719	**1752.26**	4064.76	J1681	13.52	28.24	20	**3175.59**	30.59
J721	**1752.26**	3996.27	J1681	13.07	27.97	20	**3122.09**	30.38
J725	**1752.26**	3345.24	J1681	13.42	26.55	20	**2613.47**	27.19
J726	**3002.26**	2825.53	J726	20	16.52	20	**2825.53**	20
J727	**2502.26**	3962.51	J1681	16.41	25.32	20	**3467.19**	26.01
J728	**2502.26**	2272.92	J1653	19.6	14.1	20	**2272.92**	20
J729	**2502.26**	1898.41	J729	20	0.9	20	**1898.41**	20
J73	**1002.26**	3191.14	J73	20	49.38	20	**3191.14**	20
J732	**1000**	1613.02	J1731	27.79	28.86	20	**1613.02**	20
J733	**1000**	2064.02	J1731	26.9	28.86	20	**2064.02**	20
J734	**1000**	1125.82	J1731	28.66	28.86	20	**1125.82**	20
J735	**1000**	743.94	J1731	29.25	28.86	20	**743.94**	20
J736	**1000**	931.06	J1731	28.97	28.86	20	**931.06**	20
J738	**1002.26**	1550.64	J738	20	32.36	20	**1550.64**	20
J739	**1002.26**	1210.45	J739	20	25.53	20	**1210.45**	20
J74	**1002.26**	1583.97	J1207	17.73	34.15	20	**1509.72**	22.36
J740	**502.26**	2058.83	J740	20	36.9	20	**2058.83**	20
J741	**1002.26**	1031.87	J741	20	20.89	20	**1031.87**	20
J742	**1002.26**	1066.78	J742	20	21.82	20	**1066.78**	20
J743	**1752.26**	4019.96	J1681	13.95	28.25	20	**3266.22**	29.33
J744	**1752.26**	4021.21	J1681	13.77	28.22	20	**3141.57**	30.43
J746	**1002.26**	1239.12	J746	20	25.2	20	**1239.12**	20
J747	**3002.26**	5628.68	J778	12.02	29.55	20	**4573.3**	29.89
J748	**3002.26**	5304.46	J778	15.23	29.82	20	**4641.4**	26.06

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J749	**3002.26**	4888.41	J778	18.03	29.72	20	**4582.89**	23.6
J75	**3002.26**	2817.8	J75	20	17.46	20	**2817.8**	20
J750	**3002.26**	4785	J778	18.75	29.71	20	**4635.47**	21.8
J757	**1752.26**	3679.12	J1681	9.8	26.52	20	**2644.37**	30.58
J76	**1002.26**	3182.73	J76	20	39.5	20	**3182.73**	20
J760	**1002.26**	2322.5	J760	20	48.71	20	**2322.5**	20
J761	**1002.26**	1803.85	J1177	15.01	34.96	20	**1634.74**	25.25
J762	**3002.26**	4366.69	J1963	18	27.18	20	**4093.77**	22.72
J763	**3002.26**	3004.47	J763	20	20.04	20	**3004.47**	20
J764	**3002.26**	2607.19	J1773	19.42	10.64	20	**2566.46**	20.85
J766	**502.26**	1304.92	J766	20	73.66	20	**1304.92**	20
J768	**502.26**	1156.66	J778	-10.42	27.75	20	**668.69**	50.26
J769	**502.26**	1085.02	J778	-6.84	27.38	20	**661.18**	51.41
J77	**1002.26**	2829.52	J77	20	48.72	20	**2829.52**	20
J770	**502.26**	1092.15	J778	-9.88	26.76	20	**631.4**	55.21
J772	**502.26**	991.08	J778	-1.94	26.92	20	**634.91**	42.36
J774	**502.26**	934.72	J776	-4.34	25.11	20	**598.81**	44.02
J778	**502.26**	536.77	J778	20	22.11	20	**536.77**	20
J78	**1002.26**	2009.64	J78	20	42.07	20	**2009.64**	20
J780	**502.26**	782.06	J778	13.63	27.75	20	**659.87**	29.87
J783	**502.26**	659.94	J783	20	34.03	20	**659.94**	20
J786	**1752.26**	4472.68	J1681	9.28	28.08	20	**3074.97**	34.53
J787	**1752.26**	4277.68	J1681	10.95	28.07	20	**3074.58**	32.99
J789	**1752.26**	4337.58	J1681	9.99	27.97	20	**3117.64**	32.43
J790	**1752.26**	4170.11	J1681	11.47	27.98	20	**3127.59**	31.28
J791	**1002.26**	1767.98	J791	20	36.1	20	**1767.98**	20
J793	**3002.26**	2818.78	J793	20	16.53	20	**2818.78**	20
J795	**502.26**	1468.75	J795	20	45.39	20	**1468.75**	20
J796	**502.26**	1865.99	J778	15.78	37.46	20	**1661.89**	32.51
J797	**502.26**	1671.28	J1507	16.96	77.21	20	**1632.11**	22.82
J8	**502.26**	3152.46	J778	-12.47	37.72	20	**1773.26**	53.58
J80	**1002.26**	2430.89	J80	20	45.17	20	**2430.89**	20
J801	**3002.26**	2699.14	J801	20	6.62	20	**2699.14**	20
J808	**3002.26**	4872.62	J1967	15.82	27.24	20	**4263.55**	25.88
J81	**2502.26**	3259.09	J81	20	30.33	20	**3259.09**	20
J811	**3002.26**	5514.68	J778	13.24	29.66	20	**4653.01**	28.44
J816	**1002.26**	3964.11	J1681	18.01	31.81	20	**3592.48**	24.43
J817	**3002.26**	3813.85	J817	20	30.5	20	**3813.85**	20
J82	**1002.26**	3834.1	J258	17.58	37.86	20	**3594.47**	22.65
J827	**1002.26**	2027.12	J1177	12.58	36.2	20	**1742.06**	27.87
J833	**1002.26**	2144.54	J833	20	42.02	20	**2144.54**	20
J835	**1002.26**	2142.03	J1177	13.26	37.2	20	**1874.28**	27.38
J836	**1002.26**	2006.31	J836	20	34.68	20	**2006.31**	20
J837	**1002.26**	1830.46	J837	20	34.18	20	**1830.46**	20
J84	**1002.26**	2948.33	J84	20	38.63	20	**2948.33**	20
J85	**1002.26**	1663.25	J85	20	33.55	20	**1663.25**	20
J86	**1002.26**	3810.69	J86	20	47.87	20	**3810.69**	20
J864	**1752.26**	4354.35	J1681	11.92	28.55	20	**3265.76**	30.82
J866	**1752.26**	4223.49	J1681	10.08	27.83	20	**3035.64**	32.3
J868	**1752.26**	4121.44	J1681	10.48	27.72	20	**2962.29**	32.09
J87	**2502.26**	2819.81	J1199	19.3	24.4	20	**2775.75**	20.75
J874	**1752.26**	4341.87	J1681	7.73	27.59	20	**2985.04**	32.12
J875	**1752.26**	4308.19	J1681	8.69	27.73	20	**2961.88**	33.08
J876	**1752.26**	4547.22	J1681	6.99	27.79	20	**2984.11**	34.04
J88	**1002.26**	3904.87	J258	17.84	37.96	20	**3660.82**	22.71

2022 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J885	**1002.26**	1903.07	J885	20	39.34	20	**1903.07**	20
J89	**1002.26**	2328.15	J89	20	41.26	20	**2328.15**	20
J895	**1002.26**	1684.83	J895	20	35.34	20	**1684.83**	20
J899	**1002.26**	1855.45	J899	20	36.13	20	**1855.45**	20
J9	**502.26**	1606.38	J9	20	57.33	20	**1606.38**	20
J90	**1002.26**	3692.51	J90	20	45.28	20	**3692.51**	20
J915	**1002.26**	1797.28	J915	20	39.26	20	**1797.28**	20
J92	**2502.26**	2033.52	J92	20	8.76	20	**2033.52**	20
J925	**2502.26**	1812.37	J925	20	-2.1	20	**1812.37**	20
J931	**2502.26**	2350.85	J931	20	16.75	20	**2350.85**	20
J935	**2502.26**	1518.13	J935	20	-27.09	20	**1518.13**	20
J937	**1002.26**	1817.07	J941	19.71	35.46	20	**1817.07**	20
J94	**1002.26**	3954.64	J258	19.22	38.15	20	**3831.06**	21.35
J943	**1002.26**	1328.88	J943	20	32.1	20	**1328.88**	20
J95	**1002.26**	2569.05	J95	20	43.03	20	**2569.05**	20
J96	**1002.26**	2771.5	J96	20	44.16	20	**2771.5**	20
J97	**2502.26**	3019.03	J1467	18.8	25.7	20	**2924.69**	21.46
J98	**1002.26**	2289.05	J98	20	41.41	20	**2289.05**	20
J99	**1002.26**	2295.93	J99	20	38.84	20	**2295.93**	20

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1	502.58	1817.99	J1	20	113.28	20	1817.99	20
J100	1002.58	3918.75	J116	19.07	35.86	20	3796.29	21.29
J1000	501.79	665.55	J1731	29.29	29.29	20	76.69	72.66
J1002	501.79	833.3	J1731	29.29	29.29	20	76.49	106.75
J1003	501.79	858.11	J1731	29.29	29.29	20	77.2	82.25
J1004	501.79	1084.47	J1731	29.29	29.29	20	76.78	87.1
J1007	501.11	1012.67	J1731	29.29	29.29	20	76.15	47.91
J1008	501.11	688.31	J1731	29.29	29.29	20	75.96	64.31
J101	1002.58	3097.88	J101	20	43.88	20	3097.88	20
J1015	2502.58	4885.44	J1967	13.3	28.27	20	3969.42	28.33
J1016	1002.58	2301.22	J1017	16.59	46.79	20	2193.35	23.16
J1017	1002.58	1973.88	J1017	20	45.13	20	1973.88	20
J102	1002.58	2794.91	J102	20	43.64	20	2794.91	20
J1020	502.58	1278.54	J1020	20	116.06	20	1278.54	20
J1021	502.58	1079.64	J1021	20	78.77	20	1079.64	20
J1022	3002.58	1985.87	J1867	19.3	-13.09	20	1954.84	20.82
J1025	3002.58	1734.4	J1025	20	-32.25	20	1734.4	20
J1026	1002.58	2108.23	J717	19.75	40.15	20	2108.23	20
J1027	1002.58	2150.55	J717	19.85	40.42	20	2150.55	20
J1028	502.58	1614.53	J1028	20	51.88	20	1614.53	20
J1029	502.58	1577.12	J1029	20	51.73	20	1577.12	20
J103	2502.58	3911.84	J1967	18.47	27.5	20	3667.35	22.62
J1030	502.58	1266.37	J1030	20	50.56	20	1266.37	20
J1031	502.58	1070.26	J1031	20	49.4	20	1070.26	20
J1032	502.58	580.45	J1033	19.1	28.66	20	571.38	21.17
J1033	502.58	566.42	J1033	20	27.94	20	566.42	20
J1034	1002.58	4181.57	J1681	13.39	30.8	20	3266.85	28.76
J1035	1002.58	3719.29	J258	17.6	36.76	20	3486.84	22.64
J1038	2502.58	2004.24	J1275	19.9	7.29	20	2004.24	20
J1039	1002.58	3582.34	J1039	20	44.04	20	3582.34	20
J1040	1002.58	1744.02	J1040	20	35.54	20	1744.02	20
J1041	502.58	798.37	J1041	20	45.85	20	798.37	20
J1042	502.58	493.6	J1042	20	18.45	20	493.6	20
J1045	502.58	4191.67	J1967	19.96	37.04	20	4191.67	20
J1046	502.58	4944.81	J1967	15.42	37.07	20	4172.19	31.8
J1047	502.58	2428.75	J1047	20	53.04	20	2428.75	20
J1049	502.58	1420.52	J1049	20	117.34	20	1420.52	20
J105	1752.58	1738.37	J105	20	19.65	20	1738.37	20
J1051	502.58	1454.78	J1051	20	77.4	20	1454.78	20
J1055	502.58	1656.29	J1055	20	30.71	20	1656.29	20
J1056	501.89	1683.95	J607	16.4	129.74	20	1631.32	24.01
J1057	501.89	1894.81	J607	14.76	131.12	20	1820.79	25.34
J1058	502.58	1136.49	J1058	20	76.36	20	1136.49	20
J1059	502.58	1219.26	J1059	20	74.27	20	1219.26	20
J106	2502.58	3547.18	J106	20	29.83	20	3547.18	20
J1060	502.58	1524.09	J1060	20	90.38	20	1524.09	20
J1061	502.58	1540.67	J1062	14.52	103.86	20	1492.53	25.66
J1062	502.58	1351.55	J1062	20	101.29	20	1351.55	20
J1063	502.58	3922.71	J1177	16.68	44.27	20	3616.25	29.57
J1064	502.58	1551.99	J1064	20	119.38	20	1551.99	20
J1067	502.58	1738.97	J1068	19.66	93.46	20	1738.97	20
J1068	502.58	1527.65	J1068	20	91.35	20	1527.65	20
J1069	502.58	2224.49	J422	13.73	92.42	20	2128.9	26.57
J107	1002.58	2253.09	J107	20	37.1	20	2253.09	20
J1070	502.58	1981.62	J1070	20	102.02	20	1981.62	20

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1071	502.58	1795	J1071	20	97.18	20	1795	20
J1072	502.58	2378.24	J1072	20	86.74	20	2378.24	20
J1073	502.58	2490.75	J1073	20	84.63	20	2490.75	20
J1074	502.58	2121.08	J1074	20	92.62	20	2121.08	20
J1075	502.58	2474.08	J1075	20	84.64	20	2474.08	20
J1076	502.58	696.16	J1076	20	38.44	20	696.16	20
J1077	1002.58	730.12	J1077	20	-6.55	20	730.12	20
J1078	502.58	856.68	J1078	20	54.61	20	856.68	20
J108	2502.58	3770.71	J1967	19.71	27.59	20	3770.71	20
J1081	502.58	1000.89	J1081	20	43.85	20	1000.89	20
J1082	502.58	857.63	J1082	20	39.48	20	857.63	20
J1083	502.58	850.05	J1083	20	38.77	20	850.05	20
J1084	502.58	601.2	J1084	20	26.58	20	601.2	20
J1085	1002.58	3472.36	J1177	9.93	40.15	20	2821.29	30.49
J1087	502.58	708.78	J1087	20	32.54	20	708.78	20
J109	2502.58	2434.8	J834	19.72	18.74	20	2434.8	20
J110	2502.58	4423.25	J1963	15.58	28.6	20	3870.34	25.04
J111	3002.58	3372.18	J1963	19.2	22.35	20	3266.8	21.05
J112	1002.58	2199.81	J112	20	33.09	20	2199.81	20
J1125	1002.58	2211.23	J1125	20	41.42	20	2211.23	20
J113	1002.58	1910.71	J113	20	33.52	20	1910.71	20
J115	1002.58	2075.57	J115	20	33.41	20	2075.57	20
J1153	1002.58	3799.72	J258	19.32	37.06	20	3680.98	21.29
J116	1002.58	1803.47	J116	20	31.69	20	1803.47	20
J117	1002.58	2931.72	J117	20	40.57	20	2931.72	20
J1187	1002.58	1082.98	J1187	20	23.45	20	1082.98	20
J119	2502.58	3564.21	J119	20	32.37	20	3564.21	20
J120	2502.58	3190.67	J120	20	29.5	20	3190.67	20.01
J121	3002.58	3628.03	J121	20	27.58	20	3628.03	20
J122	3002.58	4453.81	J1967	16.33	25.56	20	3897.09	25.41
J123	3002.58	4609.23	J1967	15.35	25.63	20	3889.04	26.86
J124	3002.58	3962.19	J1967	19.54	25.47	20	3838.37	21.31
J125	3002.58	4098.54	J1967	18.77	25.56	20	3970.46	21.43
J1259	3002.58	1540.83	J1259	20	-30.45	20	1540.83	20
J126	3002.58	4648.69	J1967	15.03	25.61	20	3922.33	26.78
J1263	3002.58	1653.11	J1263	20	-26.39	20	1653.11	20
J1265	1002.58	1613.18	J1265	20	34.14	20	1613.18	20
J1267	1002.58	1710.43	J1229	18.62	33.25	20	1656.98	21.3
J127	3002.58	3500.77	J127	20	25.56	20	3500.77	20.01
J1273	2502.58	1643.89	J1275	19.45	-10.65	20	1618.2	20.75
J1275	1002.58	1401.64	J1275	20	32.07	20	1401.64	20
J128	3002.58	3973.94	J1385	19.47	25.54	20	3849.75	21.49
J1281	3002.58	2291.41	J1281	20	2.68	20	2291.41	20
J1299	3002.58	2464.91	J1299	20	8.25	20	2464.91	20
J13	504.48	598.35	J1084	22.65	28.26	20	598.35	20
J130	3002.58	3282.04	J130	20	23.27	20	3282.04	20
J131	3002.58	4103.63	J1385	18.49	25.44	20	3847.16	22.82
J132	1002.58	3952.83	J1969	17.59	35.07	20	3582.25	23.76
J1325	1002.58	4063.85	J116	18.33	35.87	20	3809.86	22.76
J133	3002.58	4855.52	J1967	13.26	25.43	20	3945.11	28.26
J1339	3002.58	3111.16	J1339	20	21.65	20	3111.16	20
J134	3002.58	4038.46	J1963	17.58	25.05	20	3722.96	23.04
J135	1752.58	4853.61	J1967	13.11	31.84	20	3943.56	27.59
J1351	3002.58	4399.13	J1385	16.78	25.65	20	3986.72	24.19
J136	3002.58	5158	J1967	11.62	25.72	20	3949.1	30.14

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1363	3002.58	2767.47	J1363	20	15.74	20	2767.47	20
J137	2502.58	4857.05	J1967	13.31	28.18	20	3946.35	27.7
J138	3002.58	3513.94	J138	20	26.92	20	3513.95	20
J139	3002.58	3238.84	J1853	19.61	23.12	20	3238.84	20
J14	502.58	801.53	J1084	10.48	29.38	20	663.77	29.55
J140	3002.58	4161.94	J1681	18.44	24.17	20	3901.82	22.91
J1409	3002.58	1977.92	J1411	17.46	-5.69	20	1854.3	22.49
J141	3002.58	3744.09	J141	20	28.57	20	3744.09	20
J142	3002.58	4334.47	J1681	16.32	23.56	20	3657.21	26.96
J1423	3002.58	4013.74	J1967	19.58	25.68	20	4013.74	20
J143	2502.58	1496.3	J143	20	-26.23	20	1496.3	20
J144	3002.58	4726.7	J1681	10.7	21.95	20	3397.31	32.14
J145	3002.58	3258.62	J145	20	23.65	20	3258.62	20
J1451	2502.58	575.12	J1451	20	-331.97	20	575.12	20
J146	3002.58	4505.25	J1681	14.29	23.05	20	3519.73	29.69
J1467	2502.58	1046.45	J1467	20	-70.88	20	1046.45	20
J147	3002.58	1904.91	J147	20	-15.46	20	1904.91	20
J148	3002.58	4476.24	J1681	12.31	21.82	20	3357.18	30.99
J149	3002.58	4731.2	J1681	9.7	21.61	20	3252.7	33.72
J1500	502.58	661.14	J1501	17.16	28.25	20	619.82	23.92
J1501	502.58	525.94	J1501	20	22.04	20	525.94	20
J1502	502.58	541.98	J1501	18.56	22.04	20	525.05	21.59
J1503	502.58	938.56	J1503	20	51.36	20	938.56	20
J1504	502.58	1468.3	J1504	20	108.75	20	1468.3	20
J1505	502.58	1104.52	J1505	20	87.87	20	1104.52	20
J1506	502.58	1659.86	J778	19.52	36.62	20	1633.92	21.93
J1507	502.58	1385.79	J1507	20	73.89	20	1385.79	20
J1509	502.58	1617.2	J9	18.08	56.38	20	1579.3	21.91
J151	3002.58	4433.21	J1681	10.49	20.63	20	3047.83	33.96
J1510	502.58	1595.77	J9	19.09	56.38	20	1570.84	21.52
J1511	502.58	1519.97	J1511	20	62.71	20	1519.97	20
J1515	1000	4351.65	J21	7.87	34	20	3127.75	33.41
J152	502.58	1812.3	J614	18.3	33.87	20	1699.04	22.11
J153	3002.58	5181.31	J614	8.45	23.92	20	3724.07	31.59
J156	2502.58	2702.85	J156	20	23.04	20	2702.85	20
J1567	1002.58	2215.99	J1567	20	42.07	20	2215.99	20
J1575	1002.58	1887	J1575	20	39.76	20	1887	20
J1583	1002.58	2301.59	J1583	20	41.81	20	2301.59	20
J1587	1002.58	2298.61	J1589	19.79	41.59	20	2298.61	20
J159	1002.58	675.53	J159	20	1.85	20	675.53	20
J1591	1002.58	2290.89	J1591	20	41.31	20	2290.89	20
J16	502.58	1859.55	J20	17.96	36.32	20	1743.32	22.88
J1639	2502.58	2185.68	J1639	20	12.06	20	2185.68	20
J164	502.58	1930.11	J164	20	34.95	20	1930.11	20
J1649	2502.58	2275.68	J1649	20	14.79	20	2275.68	20
J165	501.89	3794.28	J626	6.3	94	20	2875.35	50.09
J1651	1752.58	2085.81	J1651	20	27.68	20	2085.81	20
J1667	1752.58	2038.6	J1667	20	26.48	20	2038.6	20
J1669	1752.58	3510.2	J1681	15.41	26.88	20	2852.04	29.04
J1673	1752.58	2096.75	J1675	19.99	27.69	20	2096.75	20
J168	3002.58	3561.58	J168	20	27.33	20	3561.58	20
J1689	1752.58	2448.69	J1681	16.58	23.44	20	2142.61	23.83
J169	501.89	1802.33	J169	20	135.95	20	1802.33	20
J1695	1752.58	2819.28	J1681	13.85	24.1	20	2202.56	27.35
J1707	1752.58	2244.07	J1711	18.46	24.33	20	2103.81	21.78

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1709	1752.58	2617.02	J1681	17.34	24.71	20	2289.89	24.26
J1713	1752.58	2238.6	J1681	17.19	22.41	20	1958.78	23.61
J1719	1002.58	1218.06	J1719	20	25.65	20	1218.06	20
J172	502.58	911.22	J347	19.51	36.16	20	896.99	20.76
J1721	1002.58	1067.11	J1721	20	21.85	20	1067.11	20
J1725	1002.58	748.83	J1725	20	8.47	20	748.83	20
J173	502.58	583.92	J173	20	26.13	20	583.92	20
J174	502.58	519.47	J174	20	21.43	20	519.47	20
J1765	2502.58	2195.26	J411	18.53	14.31	20	2058.05	23.02
J1771	3002.58	2299.02	J1773	18.68	-0.06	20	2227.17	21.69
J1773	3002.58	2059.69	J1773	20	-8.39	20	2059.69	20
J1787	502.58	1165.73	J778	-8	27.64	20	673.94	51.75
J179	1002.58	2422.28	J965	19.05	41.89	20	2384.43	20.77
J1795	1002.58	1306.36	J1805	18.61	28.64	20	1265.53	21.46
J1797	1002.58	1215.55	J1801	19.78	27.23	20	1215.55	20
J1805	1002.58	1159.51	J1805	20	25.83	20	1159.51	20
J1807	1002.58	1638.42	J1807	20	33.87	20	1638.42	20
J1817	3002.58	1318.26	J1817	20	-85.88	20	1318.26	20
J182	3002.58	3152.81	J174	17.7	19.65	20	2955.76	23.19
J1827	3002.58	2262.91	J1827	20	0.03	20	2262.91	20
J183	3002.58	2781.07	J183	20	15.71	20	2781.07	20
J1831	3002.58	2141.42	J1831	20	-3.68	20	2141.42	20
J1833	3002.58	1256.3	J1833	20	-101.3	20	1256.3	20
J184	3002.58	2737.49	J184	20	14.78	20	2737.49	20
J1845	3002.58	2291.77	J1845	20	2.48	20	2291.77	20
J1853	3002.58	1237.56	J1853	20	-96.31	20	1237.56	20
J1859	3002.58	2327.89	J1859	20	3.97	20	2327.89	20
J186	502.58	1302.17	J174	16.99	39.46	20	1220.79	23.57
J1871	1752.58	2810.72	J1871	20	35.77	20	2810.72	20
J1875	3002.58	2516.25	J1875	20	9.75	20	2516.25	20
J188	502.58	713.73	J1501	18.84	31.32	20	691.43	21.99
J1885	1002.58	3474.13	J1237	18.16	40	20	3311.28	22.01
J1889	1002.58	1596.65	J1205	18.25	33	20	1546.76	21.43
J189	502.58	638.49	J804	15.87	33.2	20	608.56	24.09
J1891	2502.58	2188.74	J1223	18.11	11.31	20	2086.14	22.08
J1893	3002.58	2546.6	J1199	17.83	8.7	20	2427.22	22.21
J1897	1002.58	1749.68	J1211	19.48	37.69	20	1722.34	20.8
J1899	1002.58	1733.07	J1899	20	35.99	20	1733.07	20
J190	502.58	830.78	J1033	4.5	37.93	20	694.48	35.47
J191	502.58	1336.27	J191	20	50.51	20	1336.27	20
J1913	1002.58	2386.72	J1913	20	42.12	20	2386.72	20
J1915	1002.58	2293.32	J1163	15.66	36.59	20	2078.32	24.28
J1917	1002.58	2383.23	J1917	20	41.69	20	2383.23	20
J1927	3002.58	3395.57	J1283	19.93	25.23	20	3395.57	20
J1933	3002.58	4518.74	J1385	15.99	25.69	20	3953.9	25.57
J1939	3002.58	4158.21	J1967	18.47	25.56	20	3898.32	22.84
J1941	3002.58	1400.11	J1867	18.75	-71.89	20	1378.23	20.86
J1943	3002.58	3078.68	J1645	18.33	19.6	20	2982.47	21.59
J1945	1002.58	1778.46	J1945	20	36.57	20	1778.46	20
J1947	2502.58	2784.53	J1835	19.23	24.09	20	2741.02	20.77
J1949	3002.58	3675.89	J1307	18.94	26.57	20	3561.02	21.37
J195	1002.58	2224.13	J195	20	42.83	20	2224.13	20
J1951	2502.58	1569.88	J1951	20	-14.5	20	1569.88	20
J1955	1002.58	2075.88	J1955	20	35.3	20	2075.88	20
J1957	1002.58	1996.87	J1447	19.45	33.46	20	1965.67	20.54

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1963	1002.58	1676.74	J1963	20	30.87	20	1676.74	20
J197	502.58	847.58	J197	20	53.4	20	847.58	20
J1975	2502.58	3789.4	J1371	19.4	32.92	20	3730.2	20.71
J1977	1002.58	3504.37	J1417	18.04	39.94	20	3340.1	21.88
J198	502.58	881.52	J198	20	53.99	20	881.52	20
J1983	1002.58	4495.53	J1967	18.59	35.39	20	4214.56	22.62
J1987	2502.58	3597.39	J1987	20	30.02	20	3597.39	20
J1989	2502.58	3357.63	J1989	20	29.89	20	3357.63	20
J199	502.58	1073.99	J1076	17.02	49.77	20	1032.04	23.01
J1995	2502.58	1687.68	J1491	19.08	-6.83	20	1661.31	20.7
J1997	1002.58	2044.7	J987	19.89	42.84	20	2044.7	20
J1999	1002.58	2613.81	J1001	18.53	38.93	20	2532.13	21.31
J2	502.58	1741.25	J1559	17.08	108.03	20	1714.04	22.83
J20	502.58	1677.04	J20	20	36.15	20	1677.04	20
J200	501.89	3336.27	J626	5.76	91.6	20	2658.59	38.44
J2001	1002.58	2942.62	J2001	20	38.81	20	2942.62	20
J2005	3002.58	2816.16	J1843	19.62	16.18	20	2816.16	20
J2007	1002.58	2014.83	J955	19.7	41.56	20	2014.83	20
J2009	1002.58	2022.65	J963	19.39	40.37	20	1991.05	20.8
J201	1002.58	3437.32	J258	18.04	36.51	20	3222.49	22.32
J2011	1002.58	1655.86	J973	19.81	36.07	20	1655.86	20
J2013	1002.58	1891.33	J969	19.11	38.58	20	1861.78	20.79
J2015	2502.58	3592.08	J700	15.84	26.45	20	3199.19	24.97
J202	1002.58	3380.11	J258	18.97	36.59	20	3274.48	21.13
J2021	2502.58	2774.1	J2021	20	23.99	20	2774.1	20
J2023	2502.58	2703.25	J2023	20	23.26	20	2703.25	20
J2025	3002.58	3221.21	J174	19.18	21.76	20	3120.55	21.51
J2027	1002.58	1671.84	J881	19.96	36.71	20	1671.84	20
J2029	3002.58	2730.67	J2029	20	14.65	20	2730.67	20
J2033	1002.58	2208.6	J2033	20	39.75	20	2208.6	20
J2037	3002.58	2323.74	J2045	19.46	2.18	20	2287.43	20.85
J204	1002.58	3091.84	J204	20	45.37	20	3091.84	20
J2045	3002.58	2181.21	J2045	20	-2.65	20	2181.21	20
J2047	3002.58	2275.74	J2045	19.81	0.92	20	2275.74	20
J205	502.58	1196.5	J205	20	50.15	20	1196.5	20
J2053	502.58	1683.69	J1557	18.23	75.31	20	1657.38	21.76
J2055	502.58	1764.12	J1028	19.97	52.47	20	1764.12	20
J2057	502.58	1277.74	J778	-11.79	28.37	20	698.76	51.87
J206	502.58	899.64	J206	20	44.83	20	899.64	20
J2065	1002.58	4226.57	J1731	10.39	26.15	20	2641.61	30.19
J2069	1002.58	4535.84	J1731	8.1	26.14	20	2551.41	32.2
J207	3002.58	2563.96	J1811	19.11	9.7	20	2523.9	20.82
J2071	502.58	3307.48	J1731	16.52	27.93	20	2687.33	27.37
J2079	502.58	1476.92	J2079	20	34.92	20	1476.92	20
J208	3002.58	1716.71	J208	20	-31.62	20	1716.71	20
J2093	1002.58	1267.54	J159	16.9	23.77	20	1148.71	23.97
J21	502.58	1888.61	J21	20	35.17	20	1888.61	20
J210	502.58	2824.4	J441	18.94	82.7	20	2802.34	20.99
J2109	1752.58	3521.74	J1681	15.17	26.84	20	2861.42	28.41
J2111	1002.58	3600.39	J1681	17.66	30.81	20	3262.85	24.57
J2113	1002.58	3179.56	J2113	20	44.85	20	3179.56	20
J2115	1002.58	3145.45	J2115	20	44.29	20	3145.45	20
J2117	1002.58	3525.17	J1681	18.18	30.82	20	3304.84	22.96
J2119	1002.58	4300.42	J1681	12.7	30.82	20	3225.31	30.43
J212	2502.58	3106.76	J212	20	28.73	20	3106.76	20

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J2121	2502.58	2925.07	J921	18.18	24.37	20	2833.67	21.39
J213	2502.58	3765.06	J700	14.55	26.75	20	3235.6	26.6
J2133	1002.58	4468.57	J651	10.3	41.34	20	3630.71	30.67
J2135	502.58	1613.29	J2135	20	78.55	20	1613.29	20
J2139	2502.58	1985.05	J2139	20	5.48	20	1985.05	20
J214	2502.58	3093.72	J700	19.37	25.37	20	2997.04	21.31
J2141	2502.58	1862.28	J2141	20	0.23	20	1862.28	20
J2143	2502.58	1832.98	J2143	20	2.76	20	1832.98	20
J2145	2502.58	2105.51	J2145	20	11.25	20	2105.51	20
J2147	2502.58	4034.56	J1967	19.53	28.37	20	3908.48	21.47
J2149	2502.58	4091.54	J1967	19.18	28.38	20	3963.68	21.48
J2151	2502.58	3707.04	J2151	20	33.99	20	3707.04	20
J2155	2502.58	3535.49	J2155	20	32.89	20	3535.49	20
J2157	2502.58	3766.44	J2157	20	34.19	20	3766.44	20
J2159	2502.58	4044.56	J1963	18.7	28.7	20	3918.17	21.34
J2161	2502.58	2504.78	J2161	20	20.03	20	2504.78	20
J2165	502.58	1133.41	J778	-5.92	27.64	20	672.96	47.62
J2173	1000	749.08	J2173	20	1.94	20	749.08	20
J2175	3000	3067.37	J2175	20	21.06	20	3067.37	20
J2177	3000	1695.59	J2177	20	-32.46	20	1695.59	20
J22	502.58	4015.81	J21	5.84	36.02	20	2760.87	34.52
J220	1002.58	7175.88	J778	16.02	38.86	20	6278.89	25.94
J221	2502.58	3006.41	J221	20	27.45	20	3006.41	20
J222	1002.58	5560.29	J778	12.55	37.38	20	4517.73	28
J224	1002.58	1331.4	J224	20	30.83	20	1331.4	20
J225	1002.58	4979.61	J1967	16	35.46	20	4357.16	25.39
J226	1002.58	4605.9	J1967	18.08	35.42	20	4318.03	22.6
J227	1002.58	4461.75	J1967	18.7	35.37	20	4182.89	22.61
J229	1002.58	1824.05	J667	18.05	36.06	20	1738.55	22.24
J23	502.58	1730.31	J1084	2.14	38.17	20	1243.66	38.14
J231	2502.58	1287.87	J231	20	-37.79	20	1287.87	20
J232	502.58	6940.08	J1967	1.58	37.12	20	4337.55	50.75
J233	502.58	6168.03	J1967	6.73	37.09	20	4240.52	48.05
J234	502.58	5716.95	J1967	9.68	37.07	20	4109.06	45.44
J235	502.58	5595.62	J1967	10.27	37.04	20	4196.72	43.65
J236	502.58	5266.75	J1967	12.4	37.02	20	4114.65	39.48
J237	502.58	5189.74	J1967	12.81	37.01	20	4054.48	39.08
J238	502.58	5558.35	J651	3.05	44.21	20	3995.07	46.23
J239	1002.58	4754.68	J651	8.28	41.43	20	3714.59	34.23
J24	502.58	4814.98	J778	-9.35	38.15	20	2708.43	50.8
J241	1002.58	1851.57	J241	20	48.93	20	1851.57	20
J242	1002.58	2861.32	J242	20	54.05	20	2861.32	20
J243	1002.58	4886.23	J651	6.06	41.45	20	3664.67	41.24
J244	1002.58	3494.63	J659	17.77	42.51	20	3330.82	22.3
J245	1002.58	3022.91	J245	20	44.33	20	3022.91	20
J246	1002.58	3830.6	J651	15.6	41.16	20	3471.48	24.63
J247	2502.58	3365.4	J247	20	30.24	20	3365.4	20
J248	3002.58	3219.37	J248	20	23.92	20	3219.37	20.01
J249	1002.58	1836.39	J249	20	36.84	20	1836.39	20
J25	1002.58	5693.76	J778	10.08	37.17	20	4359.28	30.43
J250	3002.58	2961.19	J250	20	19.44	20	2961.19	20
J252	2502.58	2031.93	J252	20	10.46	20	2031.93	20
J253	1752.58	2936.42	J253	20	34.35	20	2936.42	20
J254	1752.58	1803.62	J254	20	21.37	20	1803.62	20
J256	1002.58	1967.07	J256	20	37.46	20	1967.07	20

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J257	1002.58	2490.78	J257	20	36.36	20	2490.78	20
J258	1002.58	1522.52	J258	20	30.27	20	1522.52	20
J259	1002.58	1705.44	J259	20	36.36	20	1705.44	20
J26	1002.58	5842.34	J778	15.08	37.93	20	5112.05	25.32
J260	3002.58	3233.26	J1177	17.75	20.73	20	3031.18	23.28
J261	1002.58	2671.21	J261	20	40.99	20	2671.21	20
J262	1002.58	2992.06	J262	20	39.05	20	2992.06	20
J263	1002.58	2521.63	J263	20	36.24	20	2521.63	20
J264	1002.58	2705.33	J264	20	37.73	20	2705.33	20
J265	1002.58	2077.43	J1805	13.36	36.21	20	1817.75	26.56
J267	1002.58	2568.2	J267	20	43.14	20	2568.2	20
J269	1002.58	2110.36	J269	20	41.32	20	2110.36	20
J270	3002.58	1787.96	J270	20	-26.44	20	1787.96	20
J271	1002.58	2191.53	J271	20	39.67	20	2191.53	20
J272	1002.58	2226.71	J272	20	39.6	20	2226.71	20
J273	2502.58	2919.85	J273	20	25.96	20	2919.85	20
J274	3002.58	2423.82	J614	15.51	6.27	20	2120.84	24.67
J275	1002.58	2155.34	J275	20	40.64	20	2155.34	20
J276	1002.58	2624.72	J276	20	43.01	20	2624.72	20
J278	1002.58	2403.38	J278	20	43.14	20	2403.38	20
J28	1002.58	1710.29	J28	20	35.57	20	1710.29	20
J281	2502.58	3545.01	J700	19.02	27.92	20	3434.22	21.58
J283	2502.58	3330.4	J283	20	31.7	20	3330.4	20
J286	2502.58	3309.34	J286	20	31.45	20	3309.34	20
J287	1002.58	3301.21	J287	20	45.44	20	3301.21	20
J288	1002.58	2677.37	J1575	19.22	43.73	20	2635.54	20.8
J289	1002.58	3237.21	J289	20	44.64	20	3237.21	20
J290	1002.58	3290.06	J290	20	45.25	20	3290.06	20
J291	1002.58	2916.23	J291	20	44.52	20	2916.23	20
J292	1002.58	2711.94	J292	20	44.17	20	2711.94	20
J294	1002.58	3226.23	J1589	19.52	44.2	20	3175.82	20.75
J296	1002.58	3365.37	J296	20	44.14	20	3365.37	20
J297	1002.58	2551.51	J297	20	42.3	20	2551.51	20
J298	1002.58	3450.39	J298	20	44.4	20	3450.39	20
J299	2502.58	1695.56	J299	20	-9.48	20	1695.56	20
J3	502.58	2073.36	J447	-1.06	91.09	20	1814.19	41.54
J30	1002.58	2089.41	J1095	19.79	34.98	20	2089.41	20
J300	502.58	1141.1	J300	20	42.14	20	1141.1	20
J301	502.58	938.44	J301	20	39.03	20	938.44	20
J302	502.58	660.97	J302	20	30.08	20	660.97	20
J303	502.58	1700.36	J303	20	40.43	20	1700.36	20
J305	502.58	2065.17	J305	20	41.89	20	2065.17	20
J307	1752.58	3946.57	J1681	12.84	27.26	20	2959.93	30.77
J311	3002.58	4295.78	J1681	11.83	20.83	20	3087.59	32.69
J312	3002.58	4056.87	J1681	14.39	21.34	20	3169.43	29.96
J313	2502.58	4557.05	J1681	10.82	24.32	20	3275.38	31.97
J314	2502.58	4011.53	J1681	14	23.86	20	3134	29.67
J315	1002.58	3289.19	J1177	14.22	40.34	20	2878.04	26.65
J317	1002.58	4342.83	J1681	12.34	30.82	20	3257.12	30.87
J319	1002.58	3084.1	J1613	19.99	44.55	20	3084.1	20
J32	502.58	5675.93	J1967	11.7	37.18	20	4345.63	32.64
J321	1002.58	4416.28	J1681	11.61	30.8	20	3174.2	32.06
J322	3002.58	4289.07	J1681	17.66	24.15	20	3886.97	24.13
J323	3002.58	4044.14	J1967	19.27	25.59	20	3917.76	21.48
J324	3002.58	4830.31	J1731	16.38	22.62	20	3924.63	28.65

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J325	3002.58	4567.74	J1681	16.58	24.39	20	3996.77	25.47
J327	3002.58	4272.69	J1385	17.63	25.63	20	3872.12	24.15
J328	3002.58	4561.66	J1967	15.62	25.52	20	3920.17	26.29
J329	3002.58	4590.97	J1681	16.58	24.45	20	3873.63	27
J33	1002.58	3124.31	J33	20	43.78	20	3124.31	20
J330	2502.58	5119.92	J1967	11.47	28.27	20	3919.94	29.83
J331	3002.58	4753.65	J1731	16.32	22.43	20	3862.34	28.92
J332	3002.58	4722.09	J1731	16.19	22.3	20	3689.14	30.51
J334	1752.58	3482.19	J334	20	38.7	20	3482.19	20
J336	1752.58	5054.74	J1967	12.56	31.97	20	3949.01	29.3
J337	1002.58	5032.42	J1967	13.12	35.12	20	4010.21	28.66
J338	1002.58	4990.23	J1731	17.21	27.59	20	4054.56	27.82
J339	2502.58	3971.81	J1967	19.98	28.39	20	3971.81	20
J34	1002.58	2030.46	J34	20	42.02	20	2030.46	20
J340	2502.58	4124.07	J1967	19	28.39	20	3995.2	21.52
J341	2502.58	3810.71	J341	20	35.28	20	3810.71	20
J342	1002.58	3250.95	J342	20	46.29	20	3250.95	20
J343	1002.58	4014.09	J1731	19.65	27.51	20	4014.09	20
J344	1002.58	3588.62	J21	19.47	34.49	20	3476.47	21.7
J345	502.58	3676.31	J21	16.03	36.29	20	3216.77	27.07
J346	1002.58	4835.95	J1967	16.69	35.43	20	4307.02	24.72
J347	502.58	601.71	J347	20	26.92	20	601.71	20
J348	502.58	1690.79	J348	20	38.73	20	1690.79	20
J349	502.58	559.31	J349	20	24.53	20	559.31	20
J35	1002.58	302.72	J35	20	-295.71	20	302.72	20
J350	502.58	555.03	J174	19.22	23.39	20	546.36	20.75
J351	502.58	448.53	J351	20	13.98	20	448.53	20
J354	502.58	658.32	J804	17.31	35.78	20	637.75	22.66
J355	502.58	900.21	J1501	10.87	33.3	20	759.55	32.46
J356	502.58	833.8	J1501	19.73	35.13	20	833.8	20
J357	3002.58	2872.28	J1811	19.64	17.33	20	2872.28	20
J358	3002.58	2832.71	J358	20	16.91	20	2832.71	20
J359	3002.58	1798.95	J359	20	-23.61	20	1798.95	20
J36	1002.58	1942.02	J36	20	47.87	20	1942.02	20
J361	502.58	1148.11	J361	20	49.4	20	1148.11	20
J362	502.58	1002.27	J1033	3.79	44.07	20	830	36.25
J363	502.58	1008.45	J363	20	45.63	20	1008.45	20
J364	502.58	861.83	J364	20	45.12	20	861.83	20
J366	502.58	1373.19	J1076	16.25	53.49	20	1308.82	23.77
J368	502.58	2022.11	J368	20	57.61	20	2022.11	20
J369	502.58	2057.13	J369	20	55.94	20	2057.13	20
J37	502.58	2267.68	J37	20	72.65	20	2267.68	20
J372	502.58	1723.61	J372	20	78.11	20	1723.61	20
J373	502.58	1691.31	J373	20	78.65	20	1691.31	20
J376	502.58	4164.12	J1177	9.26	44.14	20	3318.28	34.61
J378	502.58	5208.46	J1177	-2.96	44.19	20	3418.05	53.33
J379	502.58	4282.2	J1177	11	44.23	20	3479.29	40.29
J380	502.58	4810.48	J1177	4.19	44.22	20	3532.69	48.31
J381	502.58	5029.38	J1177	2.8	44.25	20	3614.87	48.61
J383	502.58	4475.13	J1177	9.04	44.24	20	3566.12	41.84
J384	502.58	4058.82	J1177	14.76	44.26	20	3551.47	34.71
J385	502.58	3702.14	J778	19.01	38.54	20	3586.45	23.75
J386	3002.58	2013.34	J1869	19.69	-11.75	20	2013.34	20
J387	2502.58	2731.62	J387	20	23.07	20	2731.62	20
J388	1002.58	2740.65	J941	17.86	38.11	20	2569.36	22.49

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J389	2502.58	3017.24	J700	18.95	24.49	20	2922.95	21.25
J39	502.58	2874.87	J39	20	85.41	20	2874.87	20
J391	1002.58	2753.49	J392	19.02	37.84	20	2667.45	21.16
J392	1002.58	2581.17	J392	20	37.62	20	2581.17	20
J394	1002.58	2395.36	J394	20	38.71	20	2395.36	20
J395	1002.58	2565.24	J395	20	38.72	20	2565.24	20
J397	1002.58	2258.49	J397	20	37.85	20	2258.49	20
J398	502.58	1784.47	J20	18.75	36.24	20	1728.7	21.24
J399	502.58	1787.68	J399	20	36.45	20	1787.68	20
J4	502.58	1601.24	J4	20	111.98	20	1601.24	20
J40	3002.58	3536.79	J778	18.42	22.96	20	3315.74	26.85
J400	502.58	2745.45	J21	12.01	35.55	20	2187.78	28
J401	502.58	3719.35	J21	13.01	36.18	20	3021.97	29.85
J405	502.58	3797.32	J1731	14.97	28.05	20	2847.99	31.44
J408	2502.58	1709.01	J407	11.03	-19.74	20	1415.27	28.97
J41	502.58	3568.44	J778	19.51	38.51	20	3456.93	23.64
J410	2502.58	1643.67	J410	20	-1.76	20	1643.67	20
J411	2502.58	2081.46	J411	20	14.31	20	2081.46	20
J412	2502.58	5217.74	J411	17.52	29.34	20	4728.58	22.6
J414	3002.58	4689.64	J1681	10.68	21.7	20	3370.68	31.97
J415	502.58	1763.61	J415	20	34.58	20	1763.61	20
J417	501.89	3429.5	J745	18.32	34.82	20	3215.15	30.04
J419	501.89	2181.02	J607	14.71	132.65	20	2095.82	25.58
J42	502.58	2508.73	J42	20	86.45	20	2508.73	20
J420	502.58	1075.39	J51	17.02	95.01	20	1058.58	23.01
J421	502.58	812.99	J421	20	77.35	20	812.99	20
J422	502.58	769	J422	20	62.75	20	769	20
J423	502.58	2108.56	J423	20	93.38	20	2108.56	20
J424	502.58	2129.55	J424	20	92.8	20	2129.55	20
J425	502.58	2250.34	J1059	19.09	82.83	20	2232.76	21.08
J426	502.58	1720.39	J1059	16.31	79.87	20	1666.63	24.08
J427	502.58	1363.46	J427	20	79.91	20	1363.46	20
J430	502.58	1343.72	J51	17.87	103.51	20	1327.97	22.32
J431	502.58	1856.86	J432	14.94	97.3	20	1798.83	25.89
J432	502.58	1781.44	J432	20	97.16	20	1781.44	20
J433	502.58	1913.6	J1060	16.95	93.59	20	1868.75	23.5
J434	502.58	1512.09	J434	20	84.49	20	1512.09	20
J435	502.58	1602.8	J435	20	97.73	20	1602.8	20
J436	502.58	1488.79	J436	20	85.72	20	1488.79	20
J437	502.58	1702.8	J437	20	89.75	20	1702.8	20
J438	502.58	2699.97	J438	20	88.82	20	2699.97	20
J439	3002.58	2713.09	J439	20	6.31	20	2713.09	19.97
J44	502.58	2675.12	J43	18.02	84.04	20	2633.32	21.85
J440	502.58	2573.45	J638	14.29	78.91	20	2452.82	25.44
J441	502.58	2545.14	J441	20	82.19	20	2545.14	20
J442	502.58	1627.74	J442	20	81.58	20	1627.74	20
J445	502.58	1868.88	J447	18.34	91.37	20	1846.98	22.08
J447	502.58	1745.62	J447	20	90.57	20	1745.62	20
J448	502.58	1723.07	J1505	13	98.43	20	1655.76	26.58
J449	502.58	1877.61	J447	14.44	91.04	20	1804.27	26.87
J45	502.58	2409.24	J45	20	87.9	20	2409.24	20
J450	502.58	1236.8	J450	20	77.51	20	1236.8	20
J453	502.58	2602	J453	20	86.34	20	2602	20
J455	502.58	2640.66	J455	20	86.91	20	2640.66	20
J456	502.58	2359.19	J456	20	86.23	20	2359.19	20

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J457	502.58	2304.16	J457	20	85.81	20	2304.16	20
J458	502.58	2300.45	J458	20	88.14	20	2300.45	20
J459	502.58	3121.7	J459	20	87.66	20	3121.7	20.04
J46	502.58	2728.58	J801	19.89	81.86	20	2728.58	19.99
J460	502.58	2225.29	J698	19.56	76.38	20	2207.9	20.92
J463	502.58	2210.81	J698	11.4	75.81	20	2055.36	28.26
J464	502.58	1408.7	J43	15.1	76.68	20	1353.67	25
J465	502.58	3294.9	J465	20	89.51	20	3294.9	20
J466	502.58	3423.15	J466	20	90.61	20	3423.15	20
J467	502.58	2228.39	J467	20	83.08	20	2228.39	20
J468	502.58	877.57	J468	20	55.75	20	877.57	20
J47	502.58	1818.69	J1557	18.84	76.25	20	1804.48	20.87
J470	502.58	3647.54	J1177	18.67	44.25	20	3533.56	23.83
J471	502.58	3758.47	J1177	17.37	44.24	20	3523.57	27.39
J472	502.58	2254.6	J472	20	82.36	20	2254.6	20
J473	502.58	901.39	J473	20	52.51	20	901.39	20
J474	502.58	827.85	J474	20	51.1	20	827.85	20
J475	502.58	2366.92	J1076	17.67	57.93	20	2292.95	23.47
J476	502.58	799.48	J476	20	47.05	20	799.48	20
J477	502.58	2094.78	J778	14.36	36.99	20	1767.47	44.87
J478	502.58	1995.61	J778	14.41	36.8	20	1683.8	38.12
J479	502.58	2279.31	J778	5.86	36.58	20	1638.25	48.49
J48	502.58	1717.63	J1553	6.01	84.8	20	1556.6	34.22
J480	502.58	2359.04	J778	3.49	36.55	20	1621.84	51.18
J481	502.58	2363.46	J778	0.62	36.33	20	1551.02	48.09
J482	502.58	2374.89	J778	-0.59	36.26	20	1521.42	48.49
J483	502.58	2488.92	J778	-4.94	36.18	20	1516.69	51.93
J484	502.58	2341.57	J778	-3.01	35.99	20	1463.48	45.03
J485	502.58	2786.07	J778	-12.32	36.27	20	1523.63	53.16
J486	502.58	3244.8	J486	20	90.91	20	3244.8	20
J487	502.58	3500.17	J778	19.22	38.47	20	3390.79	24.49
J488	502.58	3560.89	J778	18.34	38.45	20	3338.34	27.64
J489	502.58	2961.65	J489	20	84.61	20	2961.65	20
J49	502.58	1902.92	J1060	13.57	93.22	20	1821.15	26.5
J490	502.58	2909.31	J490	20	86.58	20	2909.31	20
J491	502.58	2669.52	J492	17.95	76.69	20	2627.8	21.85
J492	502.58	2390.95	J492	20	76.17	20	2390.95	20
J494	502.58	2451.6	J494	20	70.31	20	2451.6	20
J495	502.58	2721.05	J495	20	70.74	20	2721.05	20
J496	502.58	2508.38	J1084	7.9	40.46	20	1959.68	37.04
J497	502.58	2287.33	J1084	7.81	40.11	20	1786.98	36.66
J498	502.58	2064.38	J1084	7.12	39.62	20	1612.79	36.13
J499	502.58	1916.79	J1084	5.93	39.14	20	1467.54	36.59
J5	502.58	2211.19	J778	7.82	36.62	20	1623.84	46.99
J50	502.58	2192.3	J422	13.69	92.27	20	2098.1	26.36
J501	502.58	3837.43	J778	-7.98	37.69	20	2218.52	49.34
J503	502.58	3286.73	J778	-12.03	37.03	20	1797.43	53.64
J504	502.58	3145.95	J778	-11.61	36.87	20	1720.44	53.26
J505	502.58	2560.81	J778	1.15	36.72	20	1680.53	48.23
J506	502.58	2045.12	J778	12.91	36.72	20	1661.66	35.22
J507	502.58	1830.32	J778	17.23	36.72	20	1687.33	26.28
J508	502.58	1620.6	J9	19.92	56.62	20	1620.6	20
J509	501.79	1174.58	J1731	29.29	29.29	20	75.71	96.91
J51	502.58	985.06	J51	20	91.49	20	985.06	20
J511	500.14	2050.98	J1731	29.29	29.29	20	74.11	86.81

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J516	**502.58**	673.9	J1084	16.99	27.98	20	**631.78**	22.93
J517	**501.11**	674.91	J1084	18.5	28.96	20	**653.82**	21.62
J518	**502.58**	803.44	J1084	14.01	30.94	20	**703.01**	26.32
J519	**502.58**	899.36	J1084	12.19	32.4	20	**772.88**	27.47
J52	**502.58**	1721.42	J51	17.99	109.49	20	**1701.25**	22.31
J520	**502.58**	1206.49	J1084	5.92	35.04	20	**923.72**	34.23
J521	**502.58**	1641.17	J1084	12.74	38.9	20	**1410.38**	28.78
J523	**502.58**	1853.14	J523	20	51.68	20	**1853.14**	20
J525	**2502.58**	1388.52	J525	20	-36.26	20	**1388.52**	20
J526	**3002.58**	2974.2	J174	18.25	17.86	20	**2834.79**	22.42
J529	**1752.58**	4512.83	J1967	15.65	31.82	20	**3948.73**	25.26
J53	**502.58**	2287.35	J1059	14.59	82.67	20	**2180.13**	26.24
J530	**1002.58**	1872.7	J530	20	40.53	20	**1872.7**	20
J531	**1002.58**	1618.21	J531	20	35.22	20	**1618.21**	20
J532	**1002.58**	1347.47	J532	20	30.26	20	**1347.47**	20
J533	**1002.58**	1845.41	J533	20	39.77	20	**1845.42**	20
J534	**2502.58**	3666.26	J534	20	32.01	20	**3666.26**	20
J535	**1002.58**	1684.56	J1517	18.58	36.48	20	**1631.92**	21.63
J537	**1002.58**	1716.32	J537	20	34.68	20	**1716.32**	20
J538	**1002.58**	2971.67	J539	19.57	38.04	20	**2971.67**	20
J539	**1002.58**	1850.35	J539	20	34.37	20	**1850.35**	20
J54	**502.58**	2182.94	J1059	14.94	82.3	20	**2097.67**	25.22
J540	**1002.58**	2967.25	J2003	19.79	38.63	20	**2967.25**	20
J541	**502.58**	1969.56	J541	20	97.59	20	**1969.56**	20
J542	**1002.58**	413.52	J542	20	-117.82	20	**413.52**	20
J543	**502.58**	3022.07	J543	20	90.71	20	**3022.07**	20
J544	**502.58**	2777.37	J544	20	92.91	20	**2777.37**	19.99
J545	**502.58**	2733.17	J545	20	93.09	20	**2733.17**	20
J546	**502.58**	2728.13	J546	20	93.02	20	**2728.13**	20
J547	**502.58**	2841.11	J547	20	93.8	20	**2841.11**	20
J548	**502.58**	2921.46	J1075	13.34	85.28	20	**2761.69**	26.97
J554	**3002.58**	2543.31	J555	19.95	10.07	20	**2543.31**	20
J556	**3002.58**	2361.59	J556	20	4.03	20	**2361.59**	20
J559	**3002.58**	2286.43	J2045	18.6	-0.65	20	**2214.97**	21.73
J56	**502.58**	1487.85	J1059	13.62	77.32	20	**1418.1**	26.03
J561	**1002.58**	2223.97	J561	20	41.25	20	**2223.97**	20
J562	**1002.58**	2228.94	J562	20	39	20	**2228.94**	20
J566	**1002.58**	2433.03	J566	20	41.99	20	**2433.03**	20
J567	**1002.58**	2582.38	J562	19.65	40.19	20	**2582.38**	20
J57	**502.58**	1227.35	J580	14.93	72.89	20	**1179.4**	24.96
J571	**1002.58**	2319.98	J571	20	39.61	20	**2319.98**	20
J572	**1002.58**	2535.51	J913	19.24	39.22	20	**2495.89**	20.66
J573	**1002.58**	2410.65	J913	19.29	38.83	20	**2372.99**	20.65
J574	**1752.58**	4270.81	J1681	12.16	27.79	20	**3203.11**	30.7
J575	**2502.58**	3300.79	J230	19.87	28.42	20	**3300.79**	20.01
J577	**1002.58**	2482.31	J577	20	41.44	20	**2482.31**	20
J58	**502.58**	3040.47	J58	20	87.58	20	**3040.47**	20
J581	**1002.58**	5665.33	J778	10.55	37.19	20	**4426.04**	29.79
J583	**1002.58**	2324.59	J583	20	39.23	20	**2324.59**	20
J584	**1002.58**	2145.51	J584	20	38.96	20	**2145.51**	20
J585	**1002.58**	2226.25	J585	20	40.22	20	**2226.25**	20
J587	**1002.58**	1334.92	J1179	18.92	29.41	20	**1293.2**	21.43
J59	**502.58**	2463.07	J59	20	86.3	20	**2463.07**	20
J590	**3002.58**	3272.38	J590	20	23.37	20	**3272.38**	20.01
J591	**502.58**	3076.54	J1073	19.51	85.66	20	**3052.51**	20.93

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J592	502.58	3594.56	J778	18.27	38.47	20	3369.9	28.83
J593	502.58	2664.46	J593	20	83.01	20	2664.46	20
J594	502.58	2065.05	J447	-1.1	91.04	20	1806.92	41.51
J595	502.58	2507.63	J778	-1.48	36.46	20	1567.27	55.46
J596	502.58	4467.35	J778	-8.75	38.02	20	2582.69	49.51
J597	1752.58	3985.17	J1681	12.71	27.19	20	2988.88	31.39
J6	502.58	2510.47	J778	-1.52	36.47	20	1569.04	55.57
J60	502.58	2268.04	J612	19.8	83.29	20	2268.04	20
J601	1002.58	4752.07	J1731	8.6	26.43	20	2673.04	32.4
J602	1002.58	5398.46	J1731	10.24	27.2	20	3374.04	30.95
J604	1002.58	4124.71	J731	18.15	33.55	20	3866.91	21.74
J605	1002.58	6084.42	J1731	13.16	27.92	20	4183.04	28.32
J607	501.89	1263.84	J607	20	126.53	20	1263.84	20
J608	502.58	2201.71	J614	16.18	34.19	20	1926.5	24.27
J61	502.58	3240.29	J61	20	88.33	20	3240.29	20
J614	502.58	1656.84	J614	20	33.77	20	1656.84	20
J618	1002.58	1305.83	J1177	19.17	28.84	20	1285.43	20.71
J62	502.58	3346.11	J62	20	89.94	20	3346.11	20
J622	502.58	2136.16	J614	11.83	33.82	20	1668.87	30.97
J626	501.89	1744.48	J626	20	89.6	20	1744.48	20
J627	501.79	496.16	J1731	29.29	29.29	20	75.59	66.31
J628	501.79	572.25	J1731	29.29	29.29	20	77.12	76.42
J629	501.11	680.51	J1731	29.29	29.29	20	75.76	50.25
J63	502.58	2195.11	J63	20	82.8	20	2195.11	20
J631	1002.58	2799.06	J631	20	40.04	20	2799.06	20
J632	1002.58	2824.2	J641	19.71	38.8	20	2824.2	20
J633	502.58	2697.12	J778	-2.3	36.72	20	1685.7	49.43
J635	502.58	1534.64	J635	20	41.68	20	1534.64	20
J636	502.58	1566.55	J1761	18.31	39.75	20	1517.59	21.3
J637	502.58	1591.72	J1761	17.63	39.75	20	1492.23	23.32
J638	502.58	2018.73	J638	20	77.56	20	2018.73	20
J639	502.58	2287.14	J640	18.94	85.18	20	2269.27	20.96
J64	502.58	4164.6	J1177	12.49	44.23	20	3513.88	37.36
J640	502.58	2256.84	J640	20	85.15	20	2256.84	20
J641	1002.58	1832.92	J641	20	35.05	20	1832.92	20
J642	1002.58	1854.85	J642	20	35.66	20	1854.85	20
J645	1002.58	3503.01	J651	19.61	41.17	20	3503.01	20
J647	2502.58	3027.1	J647	20	27.05	20	3027.1	20
J65	502.58	2308.82	J1076	14.08	57.56	20	2128.44	26.51
J651	1002.58	2721.73	J651	20	39.96	20	2721.73	20
J652	1002.58	2883.54	J652	20	42.12	20	2883.54	20
J653	1002.58	3739.71	J651	16.71	41.18	20	3447.54	24.27
J656	1002.58	2679.4	J656	20	47.41	20	2679.4	20
J657	1002.58	2343.77	J657	20	47.36	20	2343.77	20
J658	1002.58	2196.55	J658	20	46.89	20	2196.55	20
J659	1002.58	2935.87	J659	20	41.87	20	2935.87	20
J661	2502.58	2091.76	J661	20	10.77	20	2091.76	20
J662	1002.58	2820.54	J662	20	50.06	20	2820.54	20
J663	1002.58	2156.64	J663	20	48.49	20	2156.64	20
J664	1002.58	1859.33	J665	17.6	39.48	20	1772.18	22.68
J665	1002.58	1433.37	J665	20	34.47	20	1433.37	20
J666	1002.58	1490.41	J667	18.8	32.46	20	1443.84	21.47
J667	1002.58	1290.65	J667	20	29.43	20	1290.65	20
J669	1002.58	1563.49	J669	20	34.08	20	1563.49	20
J67	502.58	5425.51	J1177	-4.63	44.21	20	3475.72	55.9

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J671	1752.58	4397.52	J1681	7.99	26.86	20	2885.88	33.13
J672	3002.58	4780.52	J1681	11.87	22.65	20	3436	31.96
J673	2502.58	4215.6	J1963	16.16	28.2	20	3688.65	24.92
J674	3002.58	4791.43	J1681	5.45	19.83	20	2994.64	36.17
J675	2502.58	4895.13	J1967	13.27	28.28	20	3977.29	28.2
J679	1752.58	3979.87	J1681	11.43	26.84	20	2860.53	32.83
J68	502.58	4779.44	J1177	1.97	44.17	20	3360.54	45.83
J681	3002.58	3653.43	J681	20	28.06	20	3653.43	20
J682	3002.58	2370.39	J682	20	5.36	20	2370.39	20
J683	3002.58	2332.75	J683	20	4.17	20	2332.75	20
J684	3002.58	3996.61	J1681	19.53	24.3	20	3871.72	21.45
J692	1002.58	1993.4	J692	20	38.06	20	1993.4	20
J693	2502.58	1377.28	J693	20	-31.47	20	1377.28	20
J695	1002.58	1610.12	J695	20	35.84	20	1610.12	20
J696	1002.58	1569.31	J696	20	36.15	20	1569.31	20
J70	3002.58	3903.6	J1177	10.39	22	20	3171.67	31.41
J700	1002.58	2597.77	J700	20	36.48	20	2597.77	20
J701	1002.58	1745.98	J701	20	34.48	20	1745.98	20
J703	3002.58	3212.25	J706	18.1	21.11	20	3061.68	22.24
J705	3002.58	2643.75	J706	19.81	13.36	20	2643.75	20
J706	3002.58	2420.95	J706	20	8.09	20	2420.95	20
J707	3002.58	2402.1	J707	20	6.99	20	2402.1	20
J708	3002.58	2478.44	J708	20	8.79	20	2478.44	20
J709	3002.58	2623.01	J709	20	12.42	20	2623.01	20
J71	1002.58	4431.15	J651	10.32	41.31	20	3600.31	30.35
J711	3002.58	2818.92	J889	19.55	16.16	20	2774.87	20.79
J713	3002.58	2978.57	J174	19.89	19.58	20	2978.57	20
J715	1002.58	1983.11	J715	20	41.01	20	1983.11	20
J716	1002.58	1912.64	J716	20	39.6	20	1912.64	20
J717	1002.58	1930.07	J717	20	39.05	20	1930.07	20
J718	1752.58	4104.14	J1681	11.29	27.08	20	2949.85	32.86
J719	1752.58	3922.76	J1681	12.86	27.1	20	2942.07	31.5
J721	1752.58	3856.62	J1681	12.45	26.82	20	2892.47	31.26
J725	1752.58	3191.12	J1681	13.33	25.38	20	2493.06	26.83
J726	3002.58	2746.85	J726	20	14.95	20	2746.85	20
J727	2502.58	3816.92	J1681	15.68	23.96	20	3220.52	27.12
J728	2502.58	2213.14	J1653	19.6	12.63	20	2213.14	20
J729	2502.58	1854.49	J729	20	-0.57	20	1854.49	20
J73	1002.58	3083.47	J73	20	48.19	20	3083.47	20
J732	1000	1572.82	J1731	26.86	27.92	20	1572.82	20
J733	1000	2036.01	J1731	25.89	27.92	20	2036.01	20
J734	1000	1096.51	J1731	27.75	27.92	20	1096.51	20
J735	1000	725.64	J1731	28.36	27.92	20	725.64	20
J736	1000	911.91	J1731	28.07	27.92	20	911.91	20
J738	1002.58	1512.28	J738	20	31.64	20	1512.28	20
J739	1002.58	1182.63	J739	20	24.8	20	1182.63	20
J74	1002.58	1544.2	J1207	17.73	32.95	20	1471.82	22.31
J740	502.58	1972.42	J740	20	36.33	20	1972.42	20
J741	1002.58	1003	J741	20	20.01	20	1003	20
J742	1002.58	1036.09	J742	20	20.94	20	1036.09	20
J743	1752.58	3882.31	J1681	13.26	27.12	20	2911.73	31.67
J744	1752.58	3879.59	J1681	13.12	27.08	20	2909.69	31.32
J746	1002.58	1185.87	J746	20	24.33	20	1185.87	20
J747	3002.58	5437.22	J778	11.35	28.06	20	4247.83	31.05
J748	3002.58	5113.91	J778	14.56	28.33	20	4314.86	27.24

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J749	3002.58	4744.53	J778	17.05	28.23	20	4299.73	25.18
J75	3002.58	2679.78	J75	20	15.49	20	2679.78	20
J750	3002.58	4644.56	J778	17.76	28.22	20	4354.27	23.45
J757	1752.58	3526.57	J1681	9.71	25.35	20	2424.52	31.09
J76	1002.58	3006.88	J76	20	38.25	20	3006.88	20
J760	1002.58	2264.34	J760	20	47.51	20	2264.34	20
J761	1002.58	1753.98	J1177	14.89	33.61	20	1589.55	25.09
J762	3002.58	4171.85	J1963	17.45	25.57	20	3780.74	23.86
J763	3002.58	2930.48	J763	20	18.71	20	2930.48	20
J764	3002.58	2547.84	J1773	19.42	9.3	20	2508.03	20.82
J766	502.58	1288.26	J766	20	72.61	20	1288.26	20
J768	502.58	1132.89	J778	-10.42	26.56	20	637.25	50.57
J769	502.58	1065.56	J778	-7.11	26.18	20	632.68	51.85
J77	1002.58	2744.54	J77	20	47.54	20	2744.54	20
J770	502.58	1073.35	J778	-10.13	25.56	20	620.53	54.57
J772	502.58	968.55	J778	-1.95	25.72	20	620.48	41.83
J774	502.58	915.41	J776	-4.34	23.91	20	572.13	44.36
J778	502.58	517.36	J778	20	20.9	20	517.36	20
J78	1002.58	1954.45	J1211	19.95	39.65	20	1954.45	20
J780	502.58	764.66	J778	13.2	26.56	20	645.18	29.61
J783	502.58	645.52	J778	19.72	26.56	20	645.52	20
J786	1752.58	4307.7	J1681	8.84	26.93	20	2961.54	33.99
J787	1752.58	4121.19	J1681	10.44	26.92	20	2962.1	32.5
J789	1752.58	4170.43	J1681	9.6	26.82	20	2867.17	33.08
J790	1752.58	4013.95	J1681	10.98	26.83	20	2885.03	32.03
J791	1002.58	1729.3	J791	20	35.23	20	1729.3	20
J793	3002.58	2717.93	J793	20	14.57	20	2717.93	20
J795	502.58	1429.77	J795	20	44.34	20	1429.77	20
J796	502.58	1839.5	J778	14.75	36.46	20	1580.82	35.64
J797	502.58	1649.45	J778	18.72	36.46	20	1597.91	23.68
J8	502.58	3081.15	J778	-12.69	36.72	20	1685.01	53.88
J80	1002.58	2358.23	J80	20	43.98	20	2358.23	20
J801	3002.58	2638.53	J801	20	3.86	20	2638.53	20
J808	3002.58	4658.5	J1967	15.08	25.6	20	3930.61	26.96
J81	2502.58	3126.08	J81	20	28.61	20	3126.08	20
J811	3002.58	5332.83	J778	12.49	28.17	20	4332.92	29.69
J816	1002.58	3800.33	J1681	17.33	30.99	20	3325.29	25.58
J817	3002.58	3696.99	J817	20	29.07	20	3696.99	20
J82	1002.58	3637.05	J258	17.15	36.62	20	3296.07	23.75
J827	1002.58	1968.24	J1177	12.54	34.86	20	1691.46	27.61
J833	1002.58	2071.85	J833	20	40.69	20	2071.85	20
J835	1002.58	2081.03	J1177	13.09	35.85	20	1820.9	27.14
J836	1002.58	1929.21	J836	20	33.58	20	1929.21	20
J837	1002.58	1766.45	J837	20	33.07	20	1766.45	20
J84	1002.58	2787.11	J84	20	37.36	20	2787.11	20
J85	1002.58	1603.2	J85	20	32.27	20	1603.2	20
J86	1002.58	3659.21	J86	20	46.74	20	3659.21	20
J864	1752.58	4181.63	J1681	11.46	27.42	20	3005.55	31.52
J866	1752.58	4061	J1681	9.71	26.68	20	2791.94	32.94
J868	1752.58	3962.43	J1681	10.11	26.56	20	2724.17	32.72
J87	2502.58	2713.47	J1199	19.05	22.47	20	2671.07	20.71
J874	1752.58	4153.77	J1681	7.7	26.43	20	2725.91	32.57
J875	1752.58	4134.68	J1681	8.46	26.57	20	2777.99	33.08
J876	1752.58	4359.98	J1681	6.88	26.63	20	2861.24	33.45
J88	1002.58	3707.05	J258	17.34	36.72	20	3359.51	23.82

2033 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J885	**1002.58**	1836.88	J885	20	37.96	20	**1836.88**	20
J89	**1002.58**	2243.39	J89	20	40.01	20	**2243.39**	20
J895	**1002.58**	1625.21	J895	20	33.98	20	**1625.21**	20
J899	**1002.58**	1782.33	J899	20	34.77	20	**1782.33**	20
J9	**502.58**	1576.18	J9	20	56.38	20	**1576.18**	20
J90	**1002.58**	3540.76	J1237	19.82	40.27	20	**3540.76**	20
J915	**1002.58**	1740.63	J915	20	37.89	20	**1740.63**	20
J92	**2502.58**	1964.37	J92	20	7.02	20	**1964.37**	20
J925	**2502.58**	1754.02	J925	20	-4.1	20	**1754.02**	20
J931	**2502.58**	2260.99	J931	20	14.77	20	**2260.99**	20
J935	**2502.58**	1480.08	J935	20	-29.07	20	**1480.08**	20
J937	**1002.58**	1746.43	J941	19.71	34.1	20	**1746.43**	20
J94	**1002.58**	3752.29	J258	18.61	36.92	20	**3635.03**	21.28
J943	**1002.58**	1296.24	J943	20	30.78	20	**1296.24**	20
J95	**1002.58**	2478.18	J95	20	41.82	20	**2478.18**	20
J96	**1002.58**	2668.62	J96	20	42.94	20	**2668.62**	20
J97	**2502.58**	2917.28	J1467	18.64	24.25	20	**2826.12**	21.4
J98	**1002.58**	2221.09	J98	20	40.32	20	**2221.09**	20
J99	**1002.58**	2212.63	J99	20	37.7	20	**2212.63**	20

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1	502.69	1810.28	J1	20	112.75	20	1810.28	20
J100	1002.69	3844.16	J258	18.78	36.64	20	3724.03	21.27
J1000	501.87	658.74	J1731	28.92	28.92	20	75.91	72.66
J1002	501.87	831.73	J1731	28.92	28.92	20	75.54	106.76
J1003	501.87	854.12	J1731	28.92	28.92	20	75.07	82.25
J1004	501.87	1080.49	J1731	28.92	28.92	20	76.24	87.1
J1007	501.15	1011.3	J1731	28.92	28.92	20	75.55	47.93
J1008	501.15	688.25	J1731	28.92	28.92	20	75.45	64.33
J101	1002.69	3051.06	J1163	19.68	38.65	20	3051.06	20
J1015	2502.69	4803.59	J1967	13.08	27.69	20	3752.8	29.44
J1016	1002.69	2278.49	J1017	16.59	46.26	20	2171.68	23.12
J1017	1002.69	1954.13	J1017	20	44.59	20	1954.13	20
J102	1002.69	2755.68	J102	20	43.15	20	2755.68	20
J1020	502.69	1273.73	J1020	20	115.43	20	1273.73	20
J1021	502.69	1073.73	J1021	20	78.15	20	1073.73	20
J1022	3002.69	1965.66	J1867	19.24	-13.8	20	1934.94	20.81
J1025	3002.69	1714.16	J1025	20	-33.12	20	1714.16	20
J1026	1002.69	2079.09	J717	19.74	39.63	20	2079.09	20
J1027	1002.69	2121.7	J717	19.81	39.89	20	2121.7	20
J1028	502.69	1597.21	J1028	20	51.37	20	1597.21	20
J1029	502.69	1559.69	J1029	20	51.21	20	1559.69	20
J103	2502.69	3843.25	J1967	18.23	26.9	20	3603.05	22.57
J1030	502.69	1254.23	J1030	20	50.03	20	1254.23	20
J1031	502.69	1061.43	J1031	20	48.87	20	1061.43	20
J1032	502.69	576.09	J1033	19.1	28.1	20	567.09	21.16
J1033	502.69	562.1	J1033	20	27.38	20	562.1	20
J1034	1002.69	4110.43	J1681	13.23	30.44	20	3082.82	29.71
J1035	1002.69	3650.16	J258	17.41	36.24	20	3307.95	23.83
J1038	2502.69	1978.37	J1275	19.9	6.63	20	1978.37	20
J1039	1002.69	3522.84	J1039	20	43.56	20	3522.84	20
J1040	1002.69	1725.98	J1040	20	35.13	20	1725.98	20
J1041	502.69	791.95	J1041	20	45.26	20	791.95	20
J1042	502.69	490.25	J1042	20	17.85	20	490.25	20
J1045	502.69	4149.54	J1967	19.48	36.64	20	4019.86	22.18
J1046	502.69	4896.88	J1967	14.93	36.67	20	4131.75	31.67
J1047	502.69	2406.87	J1047	20	52.66	20	2406.87	20
J1049	502.69	1414.48	J1049	20	116.71	20	1414.48	20
J105	1752.69	1717.88	J105	20	19.14	20	1717.88	20
J1051	502.69	1446.84	J1051	20	76.87	20	1446.84	20
J1055	502.69	1644.74	J1055	20	30.64	20	1644.74	20
J1056	501.97	1679.62	J607	16.4	129.19	20	1627.13	24
J1057	501.97	1889.68	J607	14.76	130.57	20	1815.86	25.32
J1058	502.69	1130	J1058	20	75.75	20	1130	20
J1059	502.69	1211.85	J1059	20	73.66	20	1211.85	20
J106	2502.69	3480.32	J1431	19.85	27.38	20	3480.32	20
J1060	502.69	1514.77	J1060	20	89.76	20	1514.77	20
J1061	502.69	1533.19	J1062	14.52	103.24	20	1485.28	25.63
J1062	502.69	1345.15	J1062	20	100.67	20	1345.15	20
J1063	502.69	3892.73	J1177	16.1	43.8	20	3527.79	31.32
J1064	502.69	1544.97	J1064	20	118.75	20	1544.97	20
J1067	502.69	1728.36	J1068	19.66	92.86	20	1728.36	20
J1068	502.69	1519	J1068	20	90.75	20	1519	20
J1069	502.69	2209.63	J422	13.67	91.82	20	2106.06	27.1
J107	1002.69	2219.64	J107	20	36.62	20	2219.64	20
J1070	502.69	1969.68	J1070	20	101.43	20	1969.68	20

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1071	502.69	1784.78	J1071	20	96.6	20	1784.78	20
J1072	502.69	2360	J1072	20	86.18	20	2360	20
J1073	502.69	2470.3	J1073	20	84.07	20	2470.3	20
J1074	502.69	2109.29	J1074	20	92.1	20	2109.29	20
J1075	502.69	2456.97	J1075	20	84.12	20	2456.97	20
J1076	502.69	690.65	J1076	20	37.88	20	690.65	20
J1077	1002.69	724.15	J1077	20	-7.08	20	724.15	20
J1078	502.69	850.95	J1078	20	54.02	20	850.95	20
J108	2502.69	3695.33	J1967	19.5	27	20	3579.86	21.08
J1081	502.69	991.92	J1081	20	43.35	20	991.92	20
J1082	502.69	848.91	J1082	20	38.98	20	848.91	20
J1083	502.69	841.19	J1083	20	38.26	20	841.19	20
J1084	502.69	599.29	J1084	20	26.41	20	599.29	20
J1085	1002.69	3422.45	J1177	9.88	39.6	20	2780.74	30.33
J1087	502.69	701.91	J1087	20	32.09	20	701.91	20
J109	2502.69	2394.43	J834	19.72	18.16	20	2394.43	20
J110	2502.69	4343.35	J1967	15.74	27.38	20	3732.56	25.54
J111	3002.69	3306.07	J1963	19.11	21.71	20	3202.75	21.03
J112	1002.69	2157.2	J112	20	32.62	20	2157.2	20
J1125	1002.69	2182.57	J1125	20	40.91	20	2182.57	20
J113	1002.69	1880.22	J113	20	33.04	20	1880.22	20
J115	1002.69	2039.25	J115	20	32.95	20	2039.25	20
J1153	1002.69	3728	J258	19.09	36.55	20	3611.5	21.27
J116	1002.69	1772.58	J116	20	31.21	20	1772.58	20
J117	1002.69	2883.66	J117	20	40.08	20	2883.66	20
J1187	1002.69	1072.05	J1187	20	22.93	20	1072.05	20
J119	2502.69	3508.35	J119	20	31.74	20	3508.35	20
J120	2502.69	3142.98	J120	20	28.86	20	3142.98	20
J121	3002.69	3569.86	J121	20	26.89	20	3569.86	20
J122	3002.69	4371.76	J1967	16.13	24.92	20	3825.29	25.3
J123	3002.69	4525.55	J1967	15.15	24.99	20	3818.43	26.73
J124	3002.69	3890.49	J1967	19.28	24.83	20	3768.92	21.29
J125	3002.69	4029.47	J1967	18.49	24.93	20	3777.63	22.78
J1259	3002.69	1519.38	J1259	20	-31.2	20	1519.38	20
J126	3002.69	4564.58	J1967	14.83	24.97	20	3851.36	26.66
J1263	3002.69	1632.43	J1263	20	-27.1	20	1632.43	20
J1265	1002.69	1593.31	J1265	20	33.64	20	1593.31	20
J1267	1002.69	1688.03	J1229	18.53	32.67	20	1635.28	21.28
J127	3002.69	3441.58	J127	20	24.91	20	3441.58	20
J1273	2502.69	1624.96	J1275	19.45	-11.32	20	1599.57	20.74
J1275	1002.69	1386.52	J1275	20	31.56	20	1386.52	20
J128	3002.69	3911.71	J1385	19.14	24.89	20	3789.47	21.46
J1281	3002.69	2264.49	J1281	20	2.02	20	2264.49	20
J1299	3002.69	2435.44	J1299	20	7.6	20	2435.44	20
J13	500	592.05	J1084	22.62	28.1	20	592.05	20
J130	3002.69	3226.28	J130	20	22.62	20	3226.28	20
J131	3002.69	4036.13	J1385	18.19	24.79	20	3783.87	22.77
J132	1002.69	3882.45	J1385	17.43	34.47	20	3518.47	23.69
J1325	1002.69	3991.67	J116	18.09	35.4	20	3742.19	22.7
J133	3002.69	4770.76	J1967	13.06	24.78	20	3727.16	29.37
J1339	3002.69	3068.34	J1339	20	21	20	3068.34	20
J134	3002.69	3965.03	J1963	17.42	24.42	20	3593.31	23.56
J135	1752.69	4763.75	J1967	12.96	31.34	20	3721.68	28.6
J1351	3002.69	4324.18	J1385	16.52	25	20	3783.65	25.43
J136	3002.69	5068.42	J1731	15.9	22.54	20	3801.32	30.57

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1363	3002.69	2731.98	J1363	20	15.09	20	2731.98	20
J137	2502.69	4769.15	J1967	13.14	27.58	20	3725.9	28.73
J138	3002.69	3470.36	J138	20	26.32	20	3470.36	20
J139	3002.69	3195.14	J1853	19.61	22.48	20	3195.14	20
J14	502.69	799.82	J1084	10.48	29.2	20	662.35	29.49
J140	3002.69	4094.8	J1681	18.14	23.61	20	3710.91	24.23
J1409	3002.69	1951.89	J1411	17.42	-6.34	20	1829.9	22.44
J141	3002.69	3685	J141	20	27.91	20	3685	20
J142	3002.69	4263.07	J1681	16.06	23	20	3596.97	26.84
J1423	3002.69	3953.36	J1967	19.24	25.04	20	3829.82	21.44
J143	2502.69	1482.89	J143	20	-26.85	20	1482.89	20
J144	3002.69	4648.54	J1681	10.54	21.36	20	3195.87	33.09
J145	3002.69	3213.23	J145	20	23.01	20	3213.23	20
J1451	2502.69	569.82	J1451	20	-332.65	20	569.82	20
J146	3002.69	4431.34	J1681	14.06	22.48	20	3461.99	29.52
J1467	2502.69	1034.78	J1467	20	-71.5	20	1034.78	20
J147	3002.69	1884.51	J147	20	-16.13	20	1884.51	20
J148	3002.69	4405.32	J1681	12.11	21.23	20	3166.32	32
J149	3002.69	4655.92	J1681	9.55	21.02	20	3200.95	33.49
J1500	502.69	654.79	J1501	17.03	27.67	20	613.87	23.86
J1501	502.69	519.42	J1501	20	21.46	20	519.42	20
J1502	502.69	535.85	J1501	18.53	21.46	20	519.1	21.56
J1503	502.69	932.48	J1503	20	50.89	20	932.48	20
J1504	502.69	1463.07	J1504	20	108.23	20	1463.07	20
J1505	502.69	1100.08	J1505	20	87.34	20	1100.08	20
J1506	502.69	1651.04	J778	19.08	36.15	20	1599.45	23.81
J1507	502.69	1378.74	J1507	20	73.4	20	1378.74	20
J1509	502.69	1605.78	J9	18.04	55.93	20	1555.6	22.52
J151	3002.69	4369.79	J1681	10.25	20.02	20	3004.23	33.74
J1510	502.69	1586.38	J9	18.95	55.93	20	1561.6	21.51
J1511	502.69	1510.21	J1511	20	62.26	20	1510.21	20
J1515	1000	4303.08	J21	7.79	33.63	20	3092.84	33.23
J152	502.69	1785.09	J614	18.23	33.58	20	1673.53	22.07
J153	3002.69	5113.6	J614	8.33	23.39	20	3515.6	32.48
J156	2502.69	2655.95	J156	20	22.33	20	2655.95	20
J1567	1002.69	2189.86	J1567	20	41.67	20	2189.86	20
J1575	1002.69	1866.39	J1575	20	39.36	20	1866.39	20
J1583	1002.69	2273.35	J1583	20	41.41	20	2273.35	20
J1587	1002.69	2270.48	J1589	19.79	41.18	20	2270.48	20
J159	1002.69	669.43	J159	20	1.5	20	669.43	20
J1591	1002.69	2262.34	J1591	20	40.9	20	2262.34	20
J16	502.69	1843.64	J20	17.86	35.98	20	1728.42	22.85
J1639	2502.69	2162.48	J1639	20	11.47	20	2162.48	20
J164	502.69	1884.54	J164	20	34.62	20	1884.54	20
J1649	2502.69	2250.34	J1649	20	14.21	20	2250.34	20
J165	501.97	3780.69	J626	6.18	93.47	20	2835.52	50.39
J1651	1752.69	2064.18	J1651	20	27.19	20	2064.18	20
J1667	1752.69	2016.89	J1667	20	25.99	20	2016.89	20
J1669	1752.69	3465.45	J1681	15.11	26.39	20	2815.68	28.9
J1673	1752.69	2074.81	J1675	19.99	27.19	20	2074.81	20
J168	3002.69	3514.39	J168	20	26.71	20	3514.39	20
J1689	1752.69	2405.18	J1681	16.49	22.95	20	2104.53	23.74
J169	501.97	1797.62	J169	20	135.41	20	1797.62	20
J1695	1752.69	2772.54	J1681	13.76	23.61	20	2166.05	27.19
J1707	1752.69	2201.54	J1711	18.46	23.84	20	2063.94	21.73

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1709	1752.69	2574.11	J1681	17.17	24.22	20	2252.35	24.17
J1713	1752.69	2197.92	J1681	17.11	21.91	20	1923.18	23.54
J1719	1002.69	1199.04	J1719	20	25.23	20	1199.04	20
J172	502.69	900.37	J347	19.43	35.64	20	886.3	20.75
J1721	1002.69	1048.71	J1721	20	21.39	20	1048.71	20
J1725	1002.69	739.72	J1725	20	7.98	20	739.72	20
J173	502.69	576.74	J173	20	25.57	20	576.74	20
J174	502.69	512.79	J174	20	20.85	20	512.79	20
J1765	2502.69	2182.71	J411	18.41	13.99	20	2046.29	22.99
J1771	3002.69	2278.81	J1773	18.68	-0.61	20	2207.6	21.67
J1773	3002.69	2041.62	J1773	20	-8.93	20	2041.62	20
J1787	502.69	1156.52	J778	-8.09	27.12	20	668.61	51.46
J179	1002.69	2389.61	J965	19.05	41.39	20	2352.28	20.76
J1795	1002.69	1291.19	J1805	18.61	28.08	20	1250.84	21.44
J1797	1002.69	1202.05	J1801	19.76	26.67	20	1202.05	20
J1805	1002.69	1146.49	J1805	20	25.27	20	1146.49	20
J1807	1002.69	1615.32	J1807	20	33.35	20	1615.32	20
J1817	3002.69	1304.66	J1817	20	-86.75	20	1304.66	20
J182	3002.69	3103.39	J174	17.51	18.82	20	2909.43	23.13
J1827	3002.69	2234.08	J1827	20	-0.77	20	2234.08	20
J183	3002.69	2739.38	J183	20	14.89	20	2739.38	20
J1831	3002.69	2118.24	J1831	20	-4.33	20	2118.24	20
J1833	3002.69	1246.37	J1833	20	-101.97	20	1246.37	20
J184	3002.69	2696.28	J184	20	13.96	20	2696.28	20
J1845	3002.69	2265.62	J1845	20	1.83	20	2265.62	20
J1853	3002.69	1227.39	J1853	20	-96.97	20	1227.39	20
J1859	3002.69	2301.2	J1859	20	3.33	20	2301.2	20
J186	502.69	1288.62	J174	16.84	38.95	20	1208.08	23.53
J1871	1752.69	2776.38	J1871	20	35.28	20	2776.38	20
J1875	3002.69	2487.4	J1875	20	9.14	20	2487.4	20
J188	502.69	706.78	J1501	18.68	30.75	20	684.69	21.96
J1885	1002.69	3417.8	J1237	18.09	39.51	20	3257.59	21.98
J1889	1002.69	1578.14	J1205	18.25	32.5	20	1528.82	21.41
J189	502.69	633.98	J804	15.87	32.6	20	604.26	24.05
J1891	2502.69	2158.58	J1223	18.04	10.57	20	2057.39	22.04
J1893	3002.69	2511.26	J1199	17.75	7.89	20	2393.55	22.17
J1897	1002.69	1730.12	J1211	19.48	37.18	20	1703.09	20.78
J1899	1002.69	1711.19	J1899	20	35.47	20	1711.19	20
J190	502.69	825.69	J1033	4.5	37.38	20	690.22	35.33
J191	502.69	1322.75	J191	20	49.98	20	1322.75	20
J1913	1002.69	2355.41	J1913	20	41.63	20	2355.41	20
J1915	1002.69	2263.02	J1163	15.33	35.76	20	2015.5	24.89
J1917	1002.69	2352.13	J1917	20	41.19	20	2352.13	20
J1927	3002.69	3345.85	J1283	19.93	24.57	20	3345.85	20
J1933	3002.69	4440.8	J1385	15.74	25.05	20	3885.7	25.47
J1939	3002.69	4090.51	J1967	18.17	24.92	20	3834.85	22.79
J1941	3002.69	1388.25	J1867	18.69	-72.62	20	1344.87	21.68
J1943	3002.69	3040.72	J1645	18.33	18.97	20	2945.7	21.57
J1945	1002.69	1755.89	J1945	20	36.06	20	1755.89	20
J1947	2502.69	2747.02	J1835	19.23	23.45	20	2704.1	20.76
J1949	3002.69	3614.97	J1307	18.94	25.9	20	3502.01	21.35
J195	1002.69	2194.57	J195	20	42.3	20	2194.57	20
J1951	2502.69	1551.67	J1951	20	-15.18	20	1551.67	20
J1955	1002.69	2044.15	J1955	20	34.83	20	2044.15	20
J1957	1002.69	1964.8	J1447	19.11	32.65	20	1903.4	21.04

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1963	1002.69	1650.25	J1963	20	30.41	20	1650.25	20
J197	502.69	841.73	J197	20	52.8	20	841.73	20
J1975	2502.69	3729.39	J1385	19.61	27.3	20	3612.85	21.38
J1977	1002.69	3445.94	J1417	18.03	39.48	20	3284.41	21.84
J198	502.69	875.27	J198	20	53.41	20	875.27	20
J1983	1002.69	4420.8	J1967	18.31	34.94	20	4144.5	22.57
J1987	2502.69	3529.17	J1987	20	29.43	20	3529.17	20
J1989	2502.69	3303.76	J1989	20	29.3	20	3303.76	20.01
J199	502.69	1065.05	J1076	17.02	49.21	20	1023.45	22.95
J1995	2502.69	1669.23	J1491	19.01	-7.48	20	1617.07	21.38
J1997	1002.69	2020.19	J987	19.89	42.29	20	2020.19	20
J1999	1002.69	2569.08	J1001	18.53	38.39	20	2488.79	21.28
J2	502.69	1733.86	J1559	17.08	107.49	20	1706.76	22.81
J20	502.69	1656.92	J20	20	35.8	20	1656.92	20
J200	501.97	3305.95	J626	5.72	91.08	20	2634.43	38.21
J2001	1002.69	2883.08	J2001	20	38.29	20	2883.08	20
J2005	3002.69	2778.79	J1843	19.62	15.48	20	2778.79	20
J2007	1002.69	1991.76	J955	19.7	41.06	20	1991.76	20
J2009	1002.69	1998.35	J963	19.38	39.86	20	1967.12	20.79
J201	1002.69	3367.21	J258	17.93	35.99	20	3156.76	22.26
J2011	1002.69	1636.33	J973	19.81	35.56	20	1636.33	20
J2013	1002.69	1868.53	J969	19.11	38.07	20	1839.33	20.77
J2015	2502.69	3530.71	J700	15.67	25.75	20	3089.37	25.55
J202	1002.69	3308.18	J258	18.88	36.07	20	3204.8	21.1
J2021	2502.69	2725.53	J2021	20	23.28	20	2725.53	20
J2023	2502.69	2659.52	J2023	20	22.55	20	2659.52	20
J2025	3002.69	3167.96	J700	19.16	20.83	20	3068.96	21.48
J2027	1002.69	1651.25	J881	19.95	36.18	20	1651.25	20
J2029	3002.69	2690.01	J2029	20	13.83	20	2690.01	20
J2033	1002.69	2175.06	J2033	20	39.22	20	2175.06	20
J2037	3002.69	2291.17	J2045	19.44	1.29	20	2255.37	20.84
J204	1002.69	3048.21	J204	20	44.9	20	3048.21	20
J2045	3002.69	2150.39	J2045	20	-3.54	20	2150.39	20
J2047	3002.69	2243.65	J2045	19.79	0.03	20	2243.65	20
J205	502.69	1185.53	J205	20	49.61	20	1185.53	20
J2053	502.69	1672.19	J1557	18.23	74.75	20	1646.06	21.75
J2055	502.69	1744.26	J1028	19.97	51.96	20	1744.26	20
J2057	502.69	1267.28	J778	-11.8	27.84	20	693.04	51.56
J206	502.69	891.12	J206	20	44.27	20	891.12	20
J2065	1002.69	4168.65	J1731	10.17	25.66	20	2475.14	30.68
J2069	1002.69	4478.17	J1731	7.89	25.64	20	2518.97	32.01
J207	3002.69	2526.62	J1811	19.1	8.87	20	2487.15	20.8
J2071	502.69	3275.56	J1731	16.11	27.5	20	2456.67	29.44
J2079	502.69	1459.76	J2079	20	34.68	20	1459.76	20
J208	3002.69	1696.52	J208	20	-32.46	20	1696.52	20
J2093	1002.69	1257.31	J159	16.83	23.44	20	1139.44	23.92
J21	502.69	1861.13	J21	20	34.82	20	1861.13	20
J210	502.69	2804.38	J441	18.83	82.16	20	2782.47	20.98
J2109	1752.69	3473.39	J1681	14.89	26.36	20	2822.13	28.27
J2111	1002.69	3551.47	J1681	17.35	30.46	20	3107.54	25.92
J2113	1002.69	3137.88	J2113	20	44.46	20	3137.88	20
J2115	1002.69	3103.58	J2115	20	43.91	20	3103.58	20
J2117	1002.69	3475.73	J1681	17.88	30.47	20	3149.88	24.3
J2119	1002.69	4230.1	J1681	12.52	30.47	20	3172.58	30.24
J212	2502.69	3057.97	J212	20	28.05	20	3057.97	20

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J2121	2502.69	2875.84	J921	18.18	23.67	20	2741.04	22.04
J213	2502.69	3702.24	J700	14.37	26.05	20	3123.76	27.17
J2133	1002.69	4402.22	J651	10.2	40.82	20	3576.8	30.5
J2135	502.69	1602.98	J2135	20	78	20	1602.98	20
J2139	2502.69	1961.97	J2139	20	4.82	20	1961.98	20
J214	2502.69	3037.61	J700	19.2	24.67	20	2942.69	21.28
J2141	2502.69	1841.05	J2141	20	-0.43	20	1841.05	20
J2143	2502.69	1806.88	J2143	20	2.07	20	1806.88	20
J2145	2502.69	2079.49	J2145	20	10.67	20	2079.49	20
J2147	2502.69	3974.61	J1967	19.18	27.78	20	3850.4	21.45
J2149	2502.69	4030.3	J1967	18.83	27.79	20	3904.35	21.45
J2151	2502.69	3655.78	J2151	20	33.42	20	3655.78	20
J2155	2502.69	3488.36	J2155	20	32.32	20	3488.36	20
J2157	2502.69	3713.17	J2157	20	33.63	20	3713.17	20
J2159	2502.69	3976.97	J1967	18.49	27.47	20	3728.41	22.6
J2161	2502.69	2455.28	J2161	20	19.34	20	2455.28	20
J2165	502.69	1123.48	J778	-5.96	27.12	20	667.07	47.34
J2173	1000	742.68	J2173	20	1.51	20	742.68	20
J2175	3000	3025.78	J2175	20	20.41	20	3025.78	20
J2177	3000	1678.94	J2177	20	-33.13	20	1678.94	20
J22	502.69	3970.13	J21	5.83	35.69	20	2729.46	34.34
J220	1002.69	7102.17	J778	15.61	38.43	20	6214.4	25.86
J221	2502.69	2967.22	J221	20	26.87	20	2967.22	20.01
J222	1002.69	5471.47	J778	12.38	36.91	20	4445.57	27.86
J224	1002.69	1320.91	J224	20	30.47	20	1320.91	20
J225	1002.69	4896.69	J1731	18.03	27.28	20	4131.58	26.54
J226	1002.69	4527.55	J1967	17.82	34.97	20	4244.58	22.56
J227	1002.69	4387.83	J1731	19.23	27.23	20	4113.59	22.57
J229	1002.69	1805.51	J667	18.05	35.62	20	1720.87	22.21
J23	502.69	1722.3	J1084	2.15	37.89	20	1237.9	37.97
J231	2502.69	1275.21	J231	20	-38.4	20	1275.21	20
J232	502.69	6871.69	J1967	1.13	36.72	20	4080.07	52.55
J233	502.69	6112.81	J1967	6.23	36.69	20	4107.05	48.99
J234	502.69	5666.36	J1967	9.16	36.67	20	4072.7	45.2
J235	502.69	5547.1	J1967	9.75	36.64	20	3986.97	46.01
J236	502.69	5218.17	J1967	11.9	36.62	20	4076.7	39.28
J237	502.69	5140.51	J75	10.06	41.38	20	4016.03	38.88
J238	502.69	5507.05	J651	2.62	43.76	20	3872.14	47.24
J239	1002.69	4692.62	J651	8.09	40.91	20	3666.11	34.03
J24	502.69	4768.23	J778	-9.47	37.7	20	2682.13	50.5
J241	1002.69	1837.83	J241	20	48.42	20	1837.83	20
J242	1002.69	2833.57	J242	20	53.55	20	2833.57	20
J243	1002.69	4834.89	J651	5.74	40.94	20	3626.17	41
J244	1002.69	3439.23	J659	17.71	42	20	3278.02	22.27
J245	1002.69	2976.91	J245	20	43.81	20	2976.91	20
J246	1002.69	3767.31	J651	15.53	40.64	20	3414.13	24.55
J247	2502.69	3305.11	J247	20	29.55	20	3305.11	20
J248	3002.69	3177.01	J248	20	23.16	20	3177.01	20.01
J249	1002.69	1812.3	J249	20	36.33	20	1812.3	20
J25	1002.69	5601.37	J778	9.96	36.69	20	4201.03	30.87
J250	3002.69	2907.14	J250	20	18.7	20	2907.14	20
J252	2502.69	1998.88	J252	20	9.77	20	1998.88	20
J253	1752.69	2884.41	J253	20	33.76	20	2884.41	20
J254	1752.69	1782.21	J254	20	20.79	20	1782.21	20
J256	1002.69	1941.28	J256	20	36.96	20	1941.28	20

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J257	**1002.69**	2441.52	J257	20	35.83	20	**2441.52**	20
J258	**1002.69**	1498.12	J258	20	29.75	20	**1498.12**	20
J259	**1002.69**	1684.81	J259	20	35.84	20	**1684.81**	20
J26	**1002.69**	5757.7	J1731	18.01	27.72	20	**4858.06**	26.46
J260	**3002.69**	3184.09	J1177	17.59	19.94	20	**2985.09**	23.22
J261	**1002.69**	2625.45	J261	20	40.45	20	**2625.45**	20
J262	**1002.69**	2931.16	J262	20	38.53	20	**2931.16**	20
J263	**1002.69**	2469.49	J263	20	35.71	20	**2469.49**	20
J264	**1002.69**	2649.73	J264	20	37.21	20	**2649.73**	20
J265	**1002.69**	2052.2	J1805	13.36	35.66	20	**1795.67**	26.46
J267	**1002.69**	2529.61	J267	20	42.61	20	**2529.61**	20
J269	**1002.69**	2082.28	J269	20	40.79	20	**2082.28**	20
J270	**3002.69**	1766.05	J270	20	-27.32	20	**1766.05**	20
J271	**1002.69**	2158.31	J271	20	39.15	20	**2158.31**	20
J272	**1002.69**	2192.43	J272	20	39.08	20	**2192.43**	20
J273	**2502.69**	2868.83	J273	20	25.24	20	**2868.83**	20
J274	**3002.69**	2386.96	J614	15.43	5.57	20	**2051.29**	25.13
J275	**1002.69**	2124.79	J275	20	40.11	20	**2124.79**	20
J276	**1002.69**	2588.57	J276	20	42.52	20	**2588.57**	20
J278	**1002.69**	2371.81	J278	20	42.64	20	**2371.81**	20
J28	**1002.69**	1692.88	J28	20	35.15	20	**1692.88**	20
J281	**2502.69**	3492.67	J700	18.69	27.23	20	**3383.52**	21.55
J283	**2502.69**	3283.2	J283	20	31.06	20	**3283.2**	20
J286	**2502.69**	3262.37	J286	20	30.81	20	**3262.37**	20
J287	**1002.69**	3252.52	J287	20	45.05	20	**3252.52**	20
J288	**1002.69**	2643.25	J1575	19.22	43.33	20	**2601.95**	20.79
J289	**1002.69**	3188.93	J289	20	44.25	20	**3188.93**	20
J290	**1002.69**	3241.74	J290	20	44.85	20	**3241.74**	20
J291	**1002.69**	2876.36	J291	20	44.12	20	**2876.36**	20
J292	**1002.69**	2676.56	J292	20	43.77	20	**2676.56**	20
J294	**1002.69**	3178.71	J1589	19.52	43.8	20	**3129.04**	20.73
J296	**1002.69**	3313.06	J296	20	43.74	20	**3313.06**	20
J297	**1002.69**	2517.75	J297	20	41.9	20	**2517.75**	20
J298	**1002.69**	3396.41	J1681	19.95	30.82	20	**3396.41**	20
J299	**2502.69**	1678.86	J299	20	-10.1	20	**1678.86**	20
J3	**502.69**	2064.01	J778	15.1	36.61	20	**1806.01**	41.43
J30	**1002.69**	2057.66	J1095	19.7	34.45	20	**2057.66**	20
J300	**502.69**	1129.59	J300	20	41.67	20	**1129.59**	20
J301	**502.69**	928.41	J301	20	38.54	20	**928.41**	20
J302	**502.69**	652.86	J347	19.99	29.18	20	**652.86**	20
J303	**502.69**	1688.64	J303	20	40.27	20	**1688.64**	20
J305	**502.69**	2045.48	J305	20	41.69	20	**2045.48**	20
J307	**1752.69**	3891.25	J1681	12.59	26.77	20	**2918.44**	30.6
J311	**3002.69**	4234.3	J1681	11.59	20.23	20	**3043.4**	32.48
J312	**3002.69**	3998.64	J1681	14.13	20.74	20	**3123.93**	29.79
J313	**2502.69**	4482.82	J1681	10.67	23.78	20	**3222.03**	31.76
J314	**2502.69**	3952.36	J1681	13.76	23.3	20	**3087.78**	29.5
J315	**1002.69**	3240.33	J1177	14.12	39.79	20	**2835.29**	26.53
J317	**1002.69**	4274.31	J1681	12.15	30.46	20	**3205.73**	30.68
J319	**1002.69**	3044.13	J1613	19.99	44.16	20	**3044.13**	20
J32	**502.69**	5598.02	J1967	11.36	36.78	20	**4198.51**	33.21
J321	**1002.69**	4345.72	J1681	11.44	30.44	20	**3123.49**	31.85
J322	**3002.69**	4215.56	J1681	17.4	23.59	20	**3688.62**	25.35
J323	**3002.69**	3981.32	J1967	18.94	24.95	20	**3856.9**	21.45
J324	**3002.69**	4757.05	J1731	16.06	22.11	20	**3567.79**	31.08

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J325	3002.69	4486.69	J1681	16.34	23.84	20	3785.64	26.64
J327	3002.69	4200.54	J1385	17.35	24.98	20	3806.74	24.08
J328	3002.69	4484.23	J1967	15.36	24.88	20	3783.57	26.82
J329	3002.69	4510.18	J1681	16.33	23.9	20	3805.47	26.87
J33	1002.69	3082.12	J33	20	43.33	20	3082.12	20
J330	2502.69	5027.72	J1967	11.32	27.68	20	3770.79	30.24
J331	3002.69	4685.7	J1731	15.98	21.92	20	3514.28	31.44
J332	3002.69	4657.32	J1731	15.85	21.79	20	3492.99	31.7
J334	1752.69	3432.1	J334	20	38.21	20	3432.1	20
J336	1752.69	4966.77	J1967	12.37	31.47	20	3880.29	29.14
J337	1002.69	4945.81	J1967	12.91	34.67	20	3863.92	29.11
J338	1002.69	4905	J1731	16.91	27.16	20	3985.31	27.68
J339	2502.69	3913.19	J1967	19.62	27.8	20	3913.19	20
J34	1002.69	2009.22	J34	20	41.54	20	2009.22	20
J340	2502.69	4063.79	J1967	18.65	27.81	20	3809.8	22.95
J341	2502.69	3759.5	J341	20	34.71	20	3759.5	20
J342	1002.69	3211.26	J342	20	45.86	20	3211.26	20.01
J343	1002.69	3961.58	J1731	19.26	27.08	20	3713.98	22.98
J344	1002.69	3550.5	J21	19.23	34.14	20	3439.55	21.68
J345	502.69	3640.21	J21	15.81	35.97	20	3185.19	26.98
J346	1002.69	4755.79	J1731	18.33	27.26	20	4161.32	25.27
J347	502.69	594.1	J347	20	26.37	20	594.1	20
J348	502.69	1680.59	J348	20	38.61	20	1680.59	20
J349	502.69	552.4	J349	20	23.96	20	552.4	20
J35	1002.69	301.01	J35	20	-296.29	20	301.01	20
J350	502.69	548.4	J174	19.18	22.81	20	539.83	20.74
J351	502.69	443.34	J351	20	13.4	20	443.34	20
J354	502.69	653.51	J804	17.3	35.18	20	633.08	22.63
J355	502.69	893.23	J1501	10.68	32.74	20	753.67	32.32
J356	502.69	825.56	J1501	19.54	34.57	20	812.66	20.96
J357	3002.69	2828.54	J1811	19.6	16.51	20	2828.54	20
J358	3002.69	2789.09	J358	20	16.11	20	2789.09	20
J359	3002.69	1776.71	J359	20	-24.45	20	1776.71	20
J36	1002.69	1926.18	J36	20	47.37	20	1926.18	20
J361	502.69	1137.9	J361	20	48.87	20	1137.9	20
J362	502.69	995.98	J1033	3.79	43.53	20	824.79	36.09
J363	502.69	998.19	J363	20	45.09	20	998.19	20
J364	502.69	854.1	J364	20	44.55	20	854.1	20
J366	502.69	1362.01	J1076	16.21	52.95	20	1298.17	23.74
J368	502.69	2000.97	J368	20	57.09	20	2000.97	20
J369	502.69	2034.89	J369	20	55.44	20	2034.89	20
J37	502.69	2253.69	J37	20	72.21	20	2253.69	19.99
J372	502.69	1712.98	J372	20	77.59	20	1712.98	20
J373	502.69	1681.18	J373	20	78.12	20	1681.18	20
J376	502.69	4112.03	J1177	9.01	43.66	20	3212.52	35.43
J378	502.69	5155.81	J1177	-3.27	43.72	20	3383.5	53
J379	502.69	4242.12	J1177	10.54	43.76	20	3446.73	40.09
J380	502.69	4765.07	J1177	3.77	43.75	20	3424.9	49.49
J381	502.69	4981.66	J1177	2.38	43.77	20	3502.73	49.72
J383	502.69	4435.02	J1177	8.56	43.76	20	3464.86	43.15
J384	502.69	4026.43	J1177	14.2	43.79	20	3523.13	34.57
J385	502.69	3673.63	J778	18.45	38.1	20	3444.03	27.33
J386	3002.69	1993.16	J1869	19.69	-12.41	20	1993.16	20
J387	2502.69	2678.52	J387	20	22.37	20	2678.52	20
J388	1002.69	2691.06	J941	17.86	37.59	20	2522.87	22.44

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J389	**2502.69**	2960.24	J700	18.83	23.79	20	**2867.73**	21.23
J39	**502.69**	2856.75	J778	19.64	37.67	20	**2856.75**	20
J391	**1002.69**	2699.22	J392	19.02	37.32	20	**2614.87**	21.14
J392	**1002.69**	2529.95	J392	20	37.1	20	**2529.95**	20
J394	**1002.69**	2353.88	J394	20	38.19	20	**2353.88**	20
J395	**1002.69**	2517.33	J395	20	38.2	20	**2517.33**	20
J397	**1002.69**	2220.61	J397	20	37.33	20	**2220.61**	20
J398	**502.69**	1766.92	J20	18.68	35.9	20	**1711.7**	21.23
J399	**502.69**	1765.39	J399	20	36.11	20	**1765.39**	20
J4	**502.69**	1595.14	J4	20	111.45	20	**1595.14**	20
J40	**3002.69**	3508.03	J778	17.89	22.24	20	**3288.78**	26.78
J400	**502.69**	2713.39	J21	12	35.22	20	**2119.84**	28.41
J401	**502.69**	3680.84	J21	12.84	35.86	20	**2990.68**	29.74
J405	**502.69**	3762.95	J1731	14.59	27.63	20	**2704.62**	32.55
J408	**2502.69**	1702.14	J407	11.03	-20.06	20	**1409.59**	28.93
J41	**502.69**	3540.71	J778	18.96	38.07	20	**3430.07**	23.6
J410	**2502.69**	1633.37	J410	20	-2.08	20	**1633.37**	20
J411	**2502.69**	2059.77	J411	20	13.99	20	**2059.77**	20
J412	**2502.69**	5149.9	J411	17.52	29.03	20	**4667.1**	22.55
J414	**3002.69**	4625.06	J1681	10.42	21.09	20	**3179.73**	32.9
J415	**502.69**	1726.21	J415	20	34.26	20	**1726.21**	20
J417	**501.97**	3404.62	J745	18	34.49	20	**3085.43**	34.66
J419	**501.97**	2174.7	J607	14.71	132.12	20	**2089.75**	25.56
J42	**502.69**	2489.11	J42	20	85.9	20	**2489.11**	20
J420	**502.69**	1070.82	J51	17	94.37	20	**1054.09**	22.99
J421	**502.69**	809.67	J421	20	76.71	20	**809.67**	20
J422	**502.69**	765.27	J422	20	62.12	20	**765.27**	20
J423	**502.69**	2093.31	J423	20	92.78	20	**2093.31**	20
J424	**502.69**	2114.01	J424	20	92.21	20	**2114.01**	20
J425	**502.69**	2233.8	J1059	18.93	82.24	20	**2216.35**	21.07
J426	**502.69**	1708.73	J1059	16.26	79.26	20	**1655.34**	24.05
J427	**502.69**	1354.92	J427	20	79.3	20	**1354.92**	20
J430	**502.69**	1337.99	J51	17.79	102.87	20	**1322.31**	22.31
J431	**502.69**	1847.16	J432	14.8	96.68	20	**1789.44**	25.85
J432	**502.69**	1770.13	J432	20	96.54	20	**1770.13**	20
J433	**502.69**	1901.1	J1060	16.93	92.97	20	**1856.54**	23.47
J434	**502.69**	1502.49	J434	20	83.89	20	**1502.49**	20
J435	**502.69**	1594.22	J435	20	97.13	20	**1594.22**	20
J436	**502.69**	1480.08	J436	20	85.13	20	**1480.08**	20
J437	**502.69**	1692.76	J437	20	89.17	20	**1692.76**	20
J438	**502.69**	2678.63	J438	20	88.27	20	**2678.63**	20
J439	**3002.69**	2691.88	J439	20	5.3	20	**2691.88**	20
J44	**502.69**	2652.94	J43	18.02	83.48	20	**2611.49**	21.83
J440	**502.69**	2553.65	J638	14.29	78.37	20	**2433.95**	25.39
J441	**502.69**	2525.37	J441	20	81.66	20	**2525.37**	20
J442	**502.69**	1617.91	J442	20	81.03	20	**1617.91**	20
J445	**502.69**	1860.6	J447	18.2	90.85	20	**1831.53**	22.75
J447	**502.69**	1736.24	J447	20	90.05	20	**1736.24**	20
J448	**502.69**	1715.54	J1505	13	97.91	20	**1641.83**	27.19
J449	**502.69**	1869.44	J778	18.63	36.62	20	**1781.81**	28.18
J45	**502.69**	2390.9	J45	20	87.34	20	**2390.9**	20
J450	**502.69**	1229.7	J450	20	76.91	20	**1229.7**	20
J453	**502.69**	2579.99	J453	20	85.77	20	**2579.99**	20
J455	**502.69**	2618.94	J455	20	86.35	20	**2618.94**	20
J456	**502.69**	2341.14	J456	20	85.67	20	**2341.14**	20

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J457	502.69	2286.73	J457	20	85.25	20	2286.73	20
J458	502.69	2283.83	J458	20	87.58	20	2283.83	20
J459	502.69	3094.84	J459	20	87.11	20	3094.84	20
J46	502.69	2705.01	J801	19.87	81.31	20	2705.01	20
J460	502.69	2208.33	J698	19.24	75.6	20	2191.07	20.91
J463	502.69	2194.54	J698	11.17	75.03	20	2023.09	29.06
J464	502.69	1400.88	J43	15.1	76.12	20	1346.16	24.97
J465	502.69	3265.5	J465	20	88.96	20	3265.5	20
J466	502.69	3393.31	J466	20	90.07	20	3393.31	20
J467	502.69	2212.12	J467	20	82.53	20	2212.12	20
J468	502.69	871.64	J468	20	55.16	20	871.64	20
J47	502.69	1805.63	J1557	18.83	75.69	20	1791.52	20.86
J470	502.69	3615.8	J1177	18.15	43.77	20	3446.31	25.66
J471	502.69	3724.97	J1177	16.86	43.77	20	3433.96	29.09
J472	502.69	2237.99	J472	20	81.82	20	2237.99	20
J473	502.69	894.65	J473	20	51.93	20	894.65	20
J474	502.69	821.94	J474	20	50.51	20	821.94	20
J475	502.69	2348.83	J1076	17.38	57.4	20	2275.43	23.44
J476	502.69	793.31	J476	20	46.47	20	793.31	20
J477	502.69	2084.83	J778	13.87	36.53	20	1759.08	44.73
J478	502.69	1983.45	J778	13.99	36.34	20	1673.54	37.99
J479	502.69	2264.05	J778	5.52	36.12	20	1591.91	49.64
J48	502.69	1709.06	J1553	6.01	84.24	20	1548.84	34.14
J480	502.69	2342.8	J778	3.16	36.08	20	1574.07	52.27
J481	502.69	2344.4	J778	0.39	35.86	20	1501.88	48.91
J482	502.69	2355.36	J778	-0.79	35.79	20	1508.9	48.24
J483	502.69	2468.97	J778	-5.12	35.71	20	1465.95	52.7
J484	502.69	2319.53	J778	-3.09	35.51	20	1413.46	45.64
J485	502.69	2761.71	J778	-12.37	35.8	20	1510.31	52.87
J486	502.69	3220.3	J486	20	90.4	20	3220.3	20
J487	502.69	3477.27	J778	18.64	38.03	20	3368.61	24.46
J488	502.69	3534.55	J778	17.78	38.01	20	3313.64	27.58
J489	502.69	2941.78	J489	20	84.13	20	2941.78	20
J49	502.69	1890.71	J1060	13.57	92.61	20	1809.47	26.45
J490	502.69	2890.95	J778	19.86	37.75	20	2890.95	20
J491	502.69	2653.57	J492	17.9	76.24	20	2612.11	21.85
J492	502.69	2376.06	J492	20	75.72	20	2376.06	20
J494	502.69	2435.44	J494	20	69.89	20	2435.44	20
J495	502.69	2702.45	J495	20	70.33	20	2702.45	20
J496	502.69	2492.88	J1084	7.85	40.16	20	1947.57	36.9
J497	502.69	2273.91	J1084	7.76	39.82	20	1776.49	36.54
J498	502.69	2052.98	J1084	7.08	39.33	20	1571.81	37.05
J499	502.69	1906.86	J1084	5.91	38.86	20	1459.94	36.5
J5	502.69	2196.38	J778	7.47	36.15	20	1612.97	46.78
J50	502.69	2177.32	J422	13.66	91.66	20	2075.26	26.87
J501	502.69	3801.25	J778	-8.09	37.23	20	2197.6	49.05
J503	502.69	3257.91	J778	-12.12	36.56	20	1781.67	53.34
J504	502.69	3118.17	J778	-11.7	36.4	20	1705.25	52.97
J505	502.69	2541.26	J778	0.87	36.25	20	1667.71	48
J506	502.69	2030.08	J778	12.56	36.25	20	1649.44	35.08
J507	502.69	1816.71	J778	16.86	36.25	20	1646.39	27.42
J508	502.69	1607.72	J9	19.92	56.16	20	1607.72	20
J509	501.87	1171.5	J1731	28.92	28.92	20	75.51	96.91
J51	502.69	980.8	J51	20	90.84	20	980.8	20
J511	500.15	2043.48	J1731	28.92	28.92	20	73.84	86.81

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J516	502.69	672.19	J1084	16.99	27.82	20	630.18	22.91
J517	501.15	673.19	J1084	18.48	28.79	20	652.16	21.61
J518	502.69	800.99	J1084	14.01	30.74	20	700.87	26.27
J519	502.69	896.28	J1084	12.19	32.21	20	756.24	28.19
J52	502.69	1712.98	J51	17.91	108.86	20	1692.91	22.29
J520	502.69	1201.68	J1084	5.92	34.79	20	920.03	34.13
J521	502.69	1632.59	J1084	12.69	38.61	20	1377.5	29.61
J523	502.69	1841.42	J523	20	51.35	20	1841.42	20
J525	2502.69	1376.24	J525	20	-36.87	20	1376.24	20
J526	3002.69	2928.6	J174	18.04	17.02	20	2791.33	22.37
J529	1752.69	4434.17	J1967	15.43	31.32	20	3741.34	26.39
J53	502.69	2270.08	J1059	14.5	82.07	20	2163.67	26.19
J530	1002.69	1852.87	J530	20	40.03	20	1852.87	20
J531	1002.69	1599.8	J531	20	34.73	20	1599.8	20
J532	1002.69	1333.08	J532	20	29.78	20	1333.08	20
J533	1002.69	1826.48	J533	20	39.28	20	1826.48	20
J534	2502.69	3606.61	J534	20	31.44	20	3606.61	20
J535	1002.69	1667.69	J1517	18.58	35.99	20	1615.57	21.6
J537	1002.69	1692.41	J537	20	34.15	20	1692.41	20
J538	1002.69	2911.09	J539	19.55	37.52	20	2865.6	20.55
J539	1002.69	1820.79	J539	20	33.85	20	1820.79	20
J54	502.69	2166.82	J1059	14.85	81.7	20	2082.18	25.17
J540	1002.69	2907.05	J2003	19.79	38.1	20	2907.05	20
J541	502.69	1956.44	J541	20	96.98	20	1956.44	20
J542	1002.69	410.68	J542	20	-118.37	20	410.68	20
J543	502.69	3000.19	J543	20	90.19	20	3000.19	20
J544	502.69	2758.7	J544	20	92.39	20	2758.7	20
J545	502.69	2715.25	J545	20	92.57	20	2715.25	20
J546	502.69	2710.28	J546	20	92.5	20	2710.28	20
J547	502.69	2822.37	J547	20	93.28	20	2822.37	20
J548	502.69	2901.33	J1075	13.34	84.76	20	2742.66	26.91
J554	3002.69	2505.28	J555	19.94	9.22	20	2505.28	20
J556	3002.69	2327.85	J556	20	3.16	20	2327.85	20
J559	3002.69	2255.08	J2045	18.59	-1.54	20	2184.61	21.7
J56	502.69	1478.33	J1059	13.62	76.72	20	1409.03	25.99
J561	1002.69	2192.51	J561	20	40.71	20	2192.51	20
J562	1002.69	2193.39	J562	20	38.46	20	2193.39	20
J566	1002.69	2396.47	J566	20	41.45	20	2396.47	20
J567	1002.69	2542.43	J562	19.57	39.65	20	2542.43	20
J57	502.69	1220.35	J580	14.67	72.03	20	1172.68	24.92
J571	1002.69	2282.66	J571	20	39.07	20	2282.66	20
J572	1002.69	2492.38	J913	19.23	38.69	20	2453.43	20.65
J573	1002.69	2370.08	J913	19.29	38.3	20	2333.04	20.64
J574	1752.69	4203.7	J1681	11.98	27.32	20	3021.41	31.68
J575	2502.69	3250.45	J230	19.87	27.88	20	3250.45	20
J577	1002.69	2443.21	J577	20	40.91	20	2443.21	20
J58	502.69	3013.29	J58	20	87.02	20	3013.29	20.01
J581	1002.69	5572.78	J1731	16.33	27.34	20	4179.58	30.88
J583	1002.69	2286.77	J583	20	38.71	20	2286.77	20
J584	1002.69	2113.09	J584	20	38.43	20	2113.09	20
J585	1002.69	2193.3	J585	20	39.7	20	2193.3	20
J587	1002.69	1318.84	J1179	18.92	28.84	20	1277.63	21.41
J59	502.69	2443.62	J59	20	85.73	20	2443.62	20
J590	3002.69	3212.21	J590	20	22.62	20	3212.21	20.01
J591	502.69	3047.86	J1073	19.48	85.1	20	3024.05	20.95

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J592	502.69	3570.92	J778	17.68	38.02	20	3347.73	28.76
J593	502.69	2641.75	J1557	19.95	78.58	20	2641.75	20
J594	502.69	2055.74	J778	15.31	36.62	20	1798.77	41.39
J595	502.69	2489.63	J778	-1.76	35.99	20	1556.02	55.19
J596	502.69	4424.42	J778	-8.86	37.56	20	2488.74	50.09
J597	1752.69	3929.39	J1681	12.47	26.71	20	2947.04	31.2
J6	502.69	2492.48	J778	-1.8	35.99	20	1557.8	55.3
J60	502.69	2250.42	J612	19.79	82.72	20	2250.42	20
J601	1002.69	4696.33	J1731	8.35	25.96	20	2641.69	32.22
J602	1002.69	5345.41	J1731	9.91	26.76	20	3173.84	31.52
J604	1002.69	4088.5	J731	18.15	33.43	20	3832.97	21.71
J605	1002.69	6030.56	J1731	12.8	27.51	20	4146.01	28.21
J607	501.97	1245.46	J607	20	125.99	20	1245.46	20
J608	502.69	2164.49	J614	16.17	33.91	20	1893.93	24.18
J61	502.69	3210.75	J61	20	87.78	20	3210.75	20
J614	502.69	1626.56	J614	20	33.49	20	1626.56	20
J618	1002.69	1289.99	J1177	19.17	28.28	20	1269.84	20.7
J62	502.69	3316.61	J62	20	89.39	20	3316.61	20
J622	502.69	2113.84	J614	11.7	33.54	20	1651.44	30.84
J626	501.97	1723.67	J626	20	89.07	20	1723.67	20
J627	501.87	462.36	J1731	28.92	28.92	20	76.08	66.31
J628	501.87	568.42	J1731	28.92	28.92	20	76.05	76.42
J629	501.15	680.42	J1731	28.92	28.92	20	75.09	50.27
J63	502.69	2179	J63	20	82.25	20	2179	20
J631	1002.69	2749.17	J642	20	38.85	20	2749.17	20
J632	1002.69	2772.09	J641	19.69	38.28	20	2772.09	20
J633	502.69	2675.5	J778	-2.52	36.25	20	1672.19	49.18
J635	502.69	1522.31	J635	20	41.33	20	1522.31	20
J636	502.69	1553.47	J1761	18.3	39.4	20	1504.92	21.29
J637	502.69	1581.32	J1761	17.55	39.4	20	1482.49	23.3
J638	502.69	2003.93	J638	20	77.02	20	2003.93	20
J639	502.69	2268.81	J640	18.94	84.6	20	2251.09	20.95
J64	502.69	4125.67	J1177	12.02	43.76	20	3416.57	38.79
J640	502.69	2238.54	J640	20	84.56	20	2238.54	20
J641	1002.69	1805.78	J641	20	34.53	20	1805.78	20
J642	1002.69	1828.05	J642	20	35.14	20	1828.05	20
J645	1002.69	3453.59	J651	19.37	40.66	20	3399.63	20.87
J647	2502.69	2974.87	J647	20	26.36	20	2974.87	20
J65	502.69	2286.56	J1076	14	57.03	20	2107.92	26.43
J651	1002.69	2674.72	J651	20	39.44	20	2674.72	20
J652	1002.69	2836.55	J652	20	41.6	20	2836.55	20
J653	1002.69	3684.74	J651	16.54	40.66	20	3396.87	24.2
J656	1002.69	2646.84	J656	20	46.89	20	2646.84	20
J657	1002.69	2318.68	J657	20	46.83	20	2318.68	20
J658	1002.69	2174.42	J658	20	46.37	20	2174.42	20
J659	1002.69	2886.92	J659	20	41.36	20	2886.92	20.01
J661	2502.69	2062.68	J661	20	10.11	20	2062.68	20
J662	1002.69	2789.71	J662	20	49.56	20	2789.71	20
J663	1002.69	2137.42	J663	20	48	20	2137.42	20
J664	1002.69	1841.58	J665	17.6	38.99	20	1755.26	22.64
J665	1002.69	1420.43	J665	20	33.98	20	1420.43	20
J666	1002.69	1476.4	J667	18.8	32.01	20	1430.27	21.46
J667	1002.69	1279.43	J667	20	28.98	20	1279.43	20
J669	1002.69	1547.89	J669	20	33.64	20	1547.89	20
J67	502.69	5370.88	J1177	-4.94	43.74	20	3440.72	55.55

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J671	1752.69	4324.28	J1681	7.92	26.37	20	2837.81	32.89
J672	3002.69	4716.73	J1681	11.6	22.06	20	3390.15	31.77
J673	2502.69	4138.67	J1963	16.02	27.62	20	3621.34	24.82
J674	3002.69	4719.57	J1681	5.34	19.21	20	2949.73	35.9
J675	2502.69	4811.88	J1967	13.06	27.69	20	3759.28	29.3
J679	1752.69	3925.14	J1681	11.2	26.36	20	2821.19	32.63
J68	502.69	4727.57	J1177	1.68	43.69	20	3324.07	45.55
J681	3002.69	3600.41	J681	20	27.41	20	3600.41	20
J682	3002.69	2342.76	J682	20	4.71	20	2342.76	20
J683	3002.69	2305.68	J683	20	3.52	20	2305.68	20
J684	3002.69	3931.11	J1681	19.23	23.75	20	3808.26	21.42
J692	1002.69	1965.76	J692	20	37.55	20	1965.76	20
J693	2502.69	1362.26	J693	20	-32.17	20	1362.26	20
J695	1002.69	1591.44	J695	20	35.32	20	1591.44	20
J696	1002.69	1552.28	J696	20	35.64	20	1552.28	20
J70	3002.69	3848.46	J1177	10.23	21.21	20	3126.87	31.25
J700	1002.69	2542.66	J700	20	35.96	20	2542.66	20
J701	1002.69	1720.29	J701	20	33.95	20	1720.29	20
J703	3002.69	3159.63	J706	18.08	20.33	20	3011.53	22.2
J705	3002.69	2603.44	J706	19.78	12.58	20	2603.44	20
J706	3002.69	2383.78	J706	20	7.3	20	2383.78	20
J707	3002.69	2366.76	J707	20	6.2	20	2366.76	20
J708	3002.69	2442.28	J708	20	8	20	2442.28	20
J709	3002.69	2583.9	J709	20	11.62	20	2583.9	20
J71	1002.69	4363.25	J651	10.25	40.79	20	3545.14	30.18
J711	3002.69	2776.06	J889	19.55	15.35	20	2732.68	20.78
J713	3002.69	2933.15	J174	19.65	18.75	20	2933.15	20
J715	1002.69	1958.1	J715	20	40.48	20	1958.1	20
J716	1002.69	1887.96	J716	20	39.08	20	1887.96	20
J717	1002.69	1904.1	J717	20	38.52	20	1904.1	20
J718	1752.69	4047	J1681	11.07	26.6	20	2908.78	32.65
J719	1752.69	3868.85	J1681	12.61	26.62	20	2901.64	31.31
J721	1752.69	3803.12	J1681	12.21	26.34	20	2852.34	31.08
J725	1752.69	3130.91	J1681	13.29	24.89	20	2348.18	27.53
J726	3002.69	2715.87	J726	20	14.33	20	2715.87	20
J727	2502.69	3762.04	J1681	15.41	23.41	20	3056.66	28.3
J728	2502.69	2189.17	J1653	19.6	12.05	20	2189.17	20
J729	2502.69	1836.47	J729	20	-1.15	20	1836.47	20
J73	1002.69	3042.87	J73	20	47.68	20	3042.87	20
J732	1000	1552.46	J1731	26.46	27.51	20	1552.46	20
J733	1000	2022.43	J1731	25.46	27.51	20	2022.43	20
J734	1000	1080.32	J1731	27.36	27.51	20	1080.32	20
J735	1000	714.66	J1731	27.98	27.51	20	714.66	20
J736	1000	900.9	J1731	27.68	27.51	20	900.9	20
J738	1002.69	1495.19	J738	20	31.28	20	1495.19	20
J739	1002.69	1166.56	J739	20	24.45	20	1166.56	20
J74	1002.69	1527.53	J1207	17.73	32.43	20	1455.92	22.28
J740	502.69	1934.36	J740	20	36.03	20	1934.36	20
J741	1002.69	987.34	J741	20	19.51	20	987.34	20
J742	1002.69	1016.86	J742	20	20.42	20	1016.86	20
J743	1752.69	3829.98	J1681	13	26.64	20	2872.49	31.48
J744	1752.69	3825.73	J1681	12.88	26.6	20	2869.3	31.13
J746	1002.69	1162.01	J746	20	23.78	20	1162.01	20
J747	3002.69	5362.98	J778	11.12	27.44	20	4189.83	30.88
J748	3002.69	5039	J778	14.32	27.7	20	4251.66	27.12

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J749	3002.69	4687.01	J778	16.7	27.61	20	4247.6	25.1
J75	3002.69	2627.78	J75	20	14.75	20	2627.78	20
J750	3002.69	4588.2	J778	17.4	27.6	20	4158.06	25.04
J757	1752.69	3467.54	J1681	9.68	24.86	20	2383.93	30.88
J76	1002.69	2943	J76	20	37.73	20	2943	20
J760	1002.69	2241.4	J760	20	47	20	2241.4	20
J761	1002.69	1734.2	J1177	14.85	33.05	20	1544.52	25.82
J762	3002.69	4099.48	J1963	17.25	24.93	20	3715.15	23.79
J763	3002.69	2900.35	J763	20	18.18	20	2900.35	20
J764	3002.69	2523.61	J1773	19.42	8.76	20	2484.18	20.81
J766	502.69	1281.84	J766	20	72.12	20	1281.84	20
J768	502.69	1123.18	J778	-10.42	26.02	20	631.79	50.28
J769	502.69	1057.55	J778	-7.23	25.64	20	611.4	52.59
J77	1002.69	2711.8	J77	20	47.04	20	2711.8	20
J770	502.69	1065.63	J778	-10.23	25.02	20	599.42	55.33
J772	502.69	959.18	J778	-1.95	25.19	20	599.49	42.4
J774	502.69	907.33	J776	-4.34	23.36	20	567.08	44.1
J778	502.69	508.62	J778	20	20.36	20	508.62	20
J78	1002.69	1932.4	J1211	19.92	39.14	20	1932.4	20
J780	502.69	757.24	J778	13.01	26.02	20	627.09	30.38
J783	502.69	639.3	J778	19.46	26.02	20	629.31	20.97
J786	1752.69	4246.55	J1681	8.67	26.45	20	2786.8	34.93
J787	1752.69	4062.03	J1681	10.25	26.44	20	2792.64	33.48
J789	1752.69	4107.07	J1681	9.45	26.34	20	2823.61	32.86
J790	1752.69	3954.67	J1681	10.8	26.34	20	2842.42	31.82
J791	1002.69	1711.25	J791	20	34.81	20	1711.25	20
J793	3002.69	2681.8	J793	20	13.88	20	2681.8	20
J795	502.69	1414.47	J795	20	43.89	20	1414.47	20
J796	502.69	1828.82	J778	14.33	35.99	20	1543.07	37.14
J797	502.69	1640.48	J778	18.29	35.99	20	1537.95	27.21
J8	502.69	3054.28	J778	-12.76	36.25	20	1670.31	53.59
J80	1002.69	2329.86	J80	20	43.48	20	2329.86	20
J801	3002.69	2615.91	J801	20	2.85	20	2615.91	20
J808	3002.69	4580.73	J1967	14.82	24.95	20	3864.99	26.84
J81	2502.69	3076.61	J81	20	27.95	20	3076.61	20
J811	3002.69	5261.9	J778	12.23	27.55	20	4193.07	30.28
J816	1002.69	3741.25	J1681	17.05	30.65	20	3273.59	25.48
J817	3002.69	3652.18	J1731	19.73	21.84	20	3652.18	20
J82	1002.69	3566.82	J258	17.01	36.1	20	3232.43	23.67
J827	1002.69	1945.32	J1177	12.52	34.3	20	1671.76	27.5
J833	1002.69	2043.73	J833	20	40.13	20	2043.73	20
J835	1002.69	2057.41	J1177	13.03	35.29	20	1768.09	27.87
J836	1002.69	1898	J836	20	33.1	20	1898	20
J837	1002.69	1740.08	J837	20	32.59	20	1740.08	20
J84	1002.69	2728.56	J84	20	36.83	20	2728.56	20
J85	1002.69	1579.39	J85	20	31.75	20	1579.39	20
J86	1002.69	3602.96	J86	20	46.24	20	3602.96	20
J864	1752.69	4117.4	J1681	11.28	26.94	20	2959.38	31.32
J866	1752.69	3999.23	J1681	9.57	26.19	20	2749.47	32.72
J868	1752.69	3901.63	J1681	9.97	26.07	20	2682.37	32.5
J87	2502.69	2672.99	J1199	18.96	21.73	20	2589.46	21.39
J874	1752.69	4082.21	J1681	7.69	25.94	20	2678.95	32.33
J875	1752.69	4068.1	J1681	8.38	26.07	20	2669.69	33.36
J876	1752.69	4288.45	J1681	6.83	26.15	20	2680.28	34.21
J88	1002.69	3636.61	J258	17.17	36.2	20	3295.68	23.75

2043 MDD Fire Flow Scenario Modeling Results

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J885	**1002.69**	1812.61	J885	20	37.43	20	**1812.61**	20
J89	**1002.69**	2211.47	J89	20	39.49	20	**2211.47**	20
J895	**1002.69**	1602.76	J895	20	33.46	20	**1602.76**	20
J899	**1002.69**	1755.2	J899	20	34.25	20	**1755.2**	20
J9	**502.69**	1563.84	J9	20	55.93	20	**1563.84**	20
J90	**1002.69**	3483.75	J1237	19.69	39.78	20	**3483.75**	20
J915	**1002.69**	1719.54	J915	20	37.37	20	**1719.54**	20
J92	**2502.69**	1937.11	J92	20	6.35	20	**1937.11**	20
J925	**2502.69**	1732.69	J925	20	-4.8	20	**1732.69**	20
J931	**2502.69**	2229.44	J931	20	14.08	20	**2229.44**	20
J935	**2502.69**	1465.76	J935	20	-29.76	20	**1465.76**	20
J937	**1002.69**	1720.17	J941	19.71	33.59	20	**1720.17**	20
J94	**1002.69**	3680.08	J258	18.41	36.4	20	**3450.08**	22.48
J943	**1002.69**	1283.41	J943	20	30.27	20	**1283.41**	20
J95	**1002.69**	2443.98	J95	20	41.31	20	**2443.98**	20
J96	**1002.69**	2630.64	J96	20	42.43	20	**2630.64**	20
J97	**2502.69**	2876.98	J1467	18.58	23.66	20	**2787.07**	21.38
J98	**1002.69**	2193.6	J98	20	39.84	20	**2193.6**	20
J99	**1002.69**	2179.71	J99	20	37.21	20	**2179.71**	20

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1	502.69	1848.35	J1	20	115.82	20	1848.35	20
J100	1002.69	5707.03	J258	19.58	41.2	20	5707.03	20
J1000	501.87	658.74	J1731	33.47	33.47	20	75.91	72.66
J1002	501.87	831.73	J1731	33.47	33.47	20	75.54	106.76
J1003	501.87	854.12	J1731	33.47	33.47	20	75.07	82.25
J1004	501.87	1080.49	J1731	33.47	33.47	20	76.24	87.1
J1007	501.15	1011.42	J1731	33.47	33.47	20	75.56	47.93
J1008	501.15	688.25	J1731	33.47	33.47	20	75.45	64.33
J101	1002.69	3718.82	J101	20	47.92	20	3718.82	20
J1015	2502.69	6290.63	J1963	17.38	35	20	5897.47	23.25
J1016	1002.69	2521.93	J1017	16.59	50.7	20	2403.71	23.44
J1017	1002.69	2154.36	J1017	20	49.04	20	2154.36	20
J102	1002.69	3247.74	J102	20	47.61	20	3247.74	20
J1020	502.69	1115.5	J1020	20	80.24	20	1115.5	20
J1021	502.69	817	J1021	20	42.98	20	817	20
J1022	3002.69	2169.76	J1867	19.24	-6.99	20	2135.86	20.93
J1025	3002.69	1880.86	J1025	20	-25.33	20	1880.86	20
J1026	1002.69	2350.66	J717	19.83	44	20	2350.66	20
J1027	1002.69	2391.25	J1027	20	45.64	20	2391.25	20
J1028	502.69	1730.42	J1028	20	54.96	20	1730.42	20
J1029	502.69	1688.26	J1029	20	54.79	20	1688.26	20
J103	2502.69	5300.91	J103	20	40.37	20	5300.91	20
J1030	502.69	1343	J1030	20	53.61	20	1343	20
J1031	502.69	1128.43	J1031	20	52.46	20	1128.43	20
J1032	502.69	604.42	J1033	19.1	31.69	20	594.97	21.25
J1033	502.69	590.17	J1033	20	30.96	20	590.17	20
J1034	1002.69	5760.94	J1681	19.7	34.9	20	5760.94	20
J1035	1002.69	4758.35	J1035	20	47.69	20	4758.35	20
J1038	2502.69	5440.94	J258	19.51	35.2	20	5355.92	20.74
J1039	1002.69	5488.69	J1237	19.91	44.35	20	5488.69	20
J1040	1002.69	1911.06	J1040	20	38.8	20	1911.06	20
J1041	502.69	830.46	J1041	20	48.81	20	830.46	20
J1042	502.69	510.69	J1042	20	21.4	20	510.69	20
J1045	502.69	4712.3	J1045	20	63.99	20	4712.3	20
J1046	502.69	5597.31	J1047	14.22	56.9	20	5160.02	26.54
J1047	502.69	2628.84	J1047	20	55.74	20	2628.84	20
J1049	502.69	1254.95	J1049	20	81.51	20	1254.95	20
J105	1752.69	5818.38	J1963	19.34	37.44	20	5636.56	21.35
J1051	502.69	1502.62	J1051	20	80.34	20	1502.62	20
J1055	502.69	1766.71	J1055	20	31.14	20	1766.71	20
J1056	501.97	1686.99	J607	16.4	132.47	20	1634.27	23.97
J1057	501.97	1900.53	J607	14.76	133.85	20	1826.29	25.31
J1058	502.69	840.71	J1058	20	40.57	20	840.71	20
J1059	502.69	883.07	J1059	20	38.48	20	883.07	20
J106	2502.69	4498.14	J106	20	35.9	20	4498.14	20
J1060	502.69	1268.96	J1060	20	54.56	20	1268.96	20
J1061	502.69	1359.65	J1060	14.33	54.56	20	1274.67	27.1
J1062	502.69	1144.84	J1062	20	65.47	20	1144.84	20
J1063	502.69	4224.78	J1063	20	94.65	20	4224.78	20
J1064	502.69	1394.76	J1064	20	83.55	20	1394.76	20
J1067	502.69	1520.93	J1068	19.66	57.53	20	1520.93	20
J1068	502.69	1272.46	J1068	20	55.41	20	1272.46	20
J1069	502.69	2220.42	J422	13.63	56.62	20	2081.64	26.61
J107	1002.69	2459.53	J107	20	40.43	20	2459.53	20
J1070	502.69	1899.89	J1070	20	66.6	20	1899.89	20

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1071	502.69	1688.85	J1071	20	62.92	20	1688.85	20
J1072	502.69	2288.62	J1072	20	88.61	20	2288.62	20
J1073	502.69	2511.47	J1073	20	87.06	20	2511.47	20
J1074	502.69	2198.13	J1074	20	95.54	20	2198.13	20
J1075	502.69	2583.04	J1075	20	87.53	20	2583.04	20
J1076	502.69	724.62	J1076	20	41.33	20	724.62	20
J1077	1002.69	770.49	J1077	20	-2.71	20	770.49	20
J1078	502.69	884.58	J1078	20	57.52	20	884.58	20
J108	2502.69	5682.5	J834	18.25	36.02	20	5416.13	21.86
J1081	502.69	1064.92	J1081	20	46.97	20	1064.92	20
J1082	502.69	912.47	J1082	20	42.6	20	912.47	20
J1083	502.69	905.87	J1083	20	41.89	20	905.87	20
J1084	502.69	641.44	J1084	20	29.33	20	641.44	20
J1085	1002.69	4029.7	J1177	10.48	43.97	20	3337.1	30.54
J1087	502.69	748.1	J1087	20	35.09	20	748.1	20
J109	2502.69	4734.58	J834	19.72	34.58	20	4734.58	20
J110	2502.69	5832.21	J1963	18.84	34.74	20	5649.96	21.47
J111	3002.69	4667.87	J111	20	32.16	20	4667.87	20
J112	1002.69	2815.64	J112	20	37.23	20	2815.64	20
J1125	1002.69	2486.73	J1125	20	45.36	20	2486.73	20
J113	1002.69	2241.96	J113	20	37.52	20	2241.96	20
J115	1002.69	2992.5	J1969	19.92	37.3	20	2992.5	20
J1153	1002.69	5670.03	J258	18.41	41.07	20	5404.24	22.14
J116	1002.69	2137.45	J116	20	35.72	20	2137.45	20
J117	1002.69	5763.18	J1327	18.45	43.35	20	5583.08	21.37
J1187	1002.69	1177.25	J1187	20	27.43	20	1177.25	20
J119	2502.69	4427.75	J119	20	39.13	20	4427.75	20
J120	2502.69	3812.79	J120	20	36.07	20	3812.79	20
J121	3002.69	4494.12	J121	20	35.39	20	4494.12	20
J122	3002.69	6118.5	J116	18.73	33.16	20	5927.3	21.57
J123	3002.69	6346.33	J1967	17.77	32.5	20	5949.68	23.18
J124	3002.69	6354.23	J1967	17.29	32.37	20	5857.8	23.56
J125	3002.69	6734.43	J1967	15.37	32.44	20	5892.63	26.05
J1259	3002.69	1868.44	J1259	20	-13.76	20	1868.44	20
J126	3002.69	6972.1	J1967	14.17	32.48	20	5882.71	27.5
J1263	3002.69	5242.77	J1229	19.78	34.31	20	5242.77	20.02
J1265	1002.69	5202.65	J1229	18.89	43.4	20	5040.07	21.35
J1267	1002.69	5115.28	J1229	18.53	43.34	20	4955.43	21.3
J127	3002.69	4546.86	J127	20	33.86	20	4546.86	20
J1273	2502.69	2669.19	J1275	19.45	22.65	20	2627.49	20.82
J1275	1002.69	1982.06	J1275	20	40.97	20	1982.06	20
J128	3002.69	5035.8	J128	20	38.4	20	5035.8	20
J1281	3002.69	2594.22	J1281	20	10.6	20	2594.22	20
J1299	3002.69	2918.81	J1299	20	18.38	20	2918.81	20
J13	500	635.86	J1084	22.84	31.01	20	635.86	20
J130	3002.69	4076.06	J130	20	30.75	20	4076.06	20
J131	3002.69	5222.34	J131	20	38.47	20	5222.34	20
J132	1002.69	5150.51	J1969	18.76	38.8	20	4989.55	21.44
J1325	1002.69	5516.21	J1325	20	49.21	20	5516.21	20
J133	3002.69	6475.01	J1967	16.37	32.26	20	5867.97	24.79
J1339	3002.69	3683.17	J1339	20	29.18	20	3683.17	20
J134	3002.69	5256.78	J1419	18.09	34.42	20	5010.37	22.06
J135	1752.69	6485.17	J1967	15.93	36.54	20	5674.53	25.83
J1351	3002.69	5853.68	J1351	20	40.61	20	5853.68	20
J136	3002.69	6830.69	J1967	14.91	32.48	20	5870.13	27.06

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1363	3002.69	3186.42	J1363	20	23.08	20	3186.42	20
J137	2502.69	6429.24	J1963	16.08	34.91	20	5826.49	24.48
J138	3002.69	4093.8	J138	20	33.48	20	4093.8	20
J139	3002.69	3875.98	J1853	19.61	30.98	20	3875.98	20
J14	502.69	843.65	J1084	10.48	32.04	20	711.83	29.4
J140	3002.69	5437.45	J1851	19.79	38.37	20	5437.45	20
J1409	3002.69	2243.22	J1411	17.9	1.58	20	2138.07	22.15
J141	3002.69	4721.65	J141	20	36.51	20	4721.65	20
J142	3002.69	7016.74	J1967	16.7	33.2	20	6358.92	24.74
J1423	3002.69	4883.74	J1423	20	37.47	20	4883.74	20
J143	2502.69	1629.15	J143	20	-19.51	20	1629.15	20
J144	3002.69	7794.53	J1681	13.67	30.77	20	6333.05	29.32
J145	3002.69	3885.9	J145	20	31.21	20	3885.9	20
J1451	2502.69	613.52	J1451	20	-325.29	20	613.52	20
J146	3002.69	7319.42	J1967	16.31	33.51	20	6633.23	24.83
J1467	2502.69	2302.06	J1467	20	15.78	20	2302.06	20
J147	3002.69	2121.24	J147	20	-7.33	20	2121.24	20
J148	3002.69	7676.08	J1681	14.01	30.73	20	6236.82	29.35
J149	3002.69	7126.96	J1681	15.19	30.38	20	6013.38	28.12
J1500	502.69	694.33	J1501	17.85	31.29	20	661.78	23.18
J1501	502.69	560.29	J1501	20	25.08	20	560.29	20
J1502	502.69	574.31	J1501	18.7	25.08	20	556.37	21.74
J1503	502.69	971.46	J1503	20	53.92	20	971.46	20
J1504	502.69	1493.79	J1504	20	111.3	20	1493.79	20
J1505	502.69	1124.89	J1505	20	90.41	20	1124.89	20
J1506	502.69	1706.75	J1506	20	84.27	20	1706.75	20
J1507	502.69	1426.1	J1507	20	76.45	20	1426.1	20
J1509	502.69	1686.54	J9	18.34	58.93	20	1660.19	21.36
J151	3002.69	8564.84	J1681	7.73	30.26	20	5888.33	35.29
J1510	502.69	1652.93	J9	19.94	58.93	20	1652.93	20
J1511	502.69	1580.07	J1511	20	65.26	20	1580.07	20
J1515	1000	5113.38	J21	8.86	37.23	20	3835.04	33.28
J152	502.69	2158.31	J614	19.19	36.69	20	2090.87	21.23
J153	3002.69	10328.78	J1681	8.53	32.17	20	7423.81	32.48
J156	2502.69	3167.33	J156	20	29.23	20	3167.33	20
J1567	1002.69	2480.9	J1567	20	46.07	20	2480.9	20
J1575	1002.69	2083.81	J1575	20	43.75	20	2083.81	20
J1583	1002.69	2598.76	J1583	20	45.81	20	2598.76	20
J1587	1002.69	2595.85	J1589	19.79	45.58	20	2595.85	20
J159	1002.69	775.26	J159	20	8.01	20	775.26	20
J1591	1002.69	2593.53	J1591	20	45.3	20	2593.53	20
J16	502.69	2024.3	J20	19.07	38.94	20	1961.04	21.62
J1639	2502.69	2474.8	J1639	20	19.36	20	2474.8	20
J164	502.69	2508.82	J164	20	37.89	20	2508.82	20
J1649	2502.69	2606.64	J1649	20	22.18	20	2606.64	20
J165	501.97	3823.47	J626	6.18	96.75	20	3046.83	50.66
J1651	1752.69	2356.4	J1651	20	33.24	20	2356.4	20
J1667	1752.69	2315.53	J1667	20	32.11	20	2315.53	20
J1669	1752.69	4408.49	J1669	20	46.44	20	4408.49	20
J1673	1752.69	2362.32	J1675	19.99	32.79	20	2362.32	20
J168	3002.69	4200.76	J168	20	34.14	20	4200.76	20
J1689	1752.69	3102.58	J1681	18.12	28.95	20	2908.67	22.32
J169	501.97	1806.87	J169	20	138.69	20	1806.87	20
J1695	1752.69	3604.58	J1681	15.43	29.61	20	3097.68	25.68
J1707	1752.69	2843.15	J1711	18.46	29.84	20	2709.88	21.61

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1709	1752.69	3290.78	J1709	20	35.83	20	3290.78	20
J1713	1752.69	2806.81	J1681	18.4	27.92	20	2631.39	22.21
J1719	1002.69	1378.35	J1719	20	29.52	20	1378.35	20
J172	502.69	980.33	J347	19.8	39.27	20	980.33	20
J1721	1002.69	1199.02	J1721	20	25.72	20	1199.02	20
J1725	1002.69	833	J1725	20	12.33	20	833	20
J173	502.69	623.5	J173	20	29.2	20	623.5	20
J174	502.69	554.92	J174	20	24.48	20	554.92	20
J1765	2502.69	2870.75	J1765	20	26.46	20	2870.75	20
J1771	3002.69	2652.27	J1773	18.68	10.23	20	2610.83	20.94
J1773	3002.69	2350.09	J1773	20	1.91	20	2350.09	20
J1787	502.69	1174.79	J778	-5.54	30.13	20	734.24	50.04
J179	1002.69	2731.01	J965	19.05	45.78	20	2688.34	20.87
J1795	1002.69	1422.7	J1805	18.61	32.45	20	1378.24	21.64
J1797	1002.69	1320	J1801	19.98	31.04	20	1320	20
J1805	1002.69	1263.16	J1805	20	29.64	20	1263.16	20
J1807	1002.69	1825.42	J1807	20	37.73	20	1825.42	20
J1817	3002.69	1414.81	J1817	20	-79.01	20	1414.81	20
J182	3002.69	3627.68	J174	19.59	26.61	20	3570.99	20.9
J1827	3002.69	2498.21	J1827	20	6.87	20	2498.21	20
J183	3002.69	3146.45	J183	20	22.57	20	3146.45	20
J1831	3002.69	2441.27	J1831	20	5.74	20	2441.27	20
J1833	3002.69	1353.98	J1833	20	-93.37	20	1353.98	20
J184	3002.69	3094.07	J184	20	21.66	20	3094.07	20
J1845	3002.69	2709.95	J1845	20	13.66	20	2709.95	20
J1853	3002.69	1339.38	J1853	20	-88.47	20	1339.38	20
J1859	3002.69	2616.6	J1859	20	11.25	20	2616.6	20
J186	502.69	1393.73	J1501	17.7	43.53	20	1328.4	22.96
J1871	1752.69	3187.05	J1871	20	40.29	20	3187.05	20
J1875	3002.69	2814.55	J1875	20	16.2	20	2814.55	20
J188	502.69	750.34	J1501	19.72	34.37	20	750.34	20
J1885	1002.69	4834.16	J1237	18.62	44.02	20	4683.09	21.5
J1889	1002.69	5299.91	J1205	18.25	45.27	20	5134.29	21.41
J189	502.69	661.31	J804	15.87	36.22	20	630.31	24.32
J1891	2502.69	5561.43	J1223	18.04	38.58	20	5300.73	22.13
J1893	3002.69	4026.14	J1199	17.75	29.7	20	3837.41	22.39
J1897	1002.69	1936.11	J1211	19.48	41.68	20	1905.86	20.89
J1899	1002.69	1949.37	J1899	20	40.08	20	1949.37	20
J190	502.69	859.14	J1033	4.5	40.96	20	724.9	35.53
J191	502.69	1420.99	J191	20	53.56	20	1420.99	20
J1913	1002.69	2706.01	J1913	20	46.07	20	2706.01	20
J1915	1002.69	2613.91	J1163	15.33	40.28	20	2368.86	24.83
J1917	1002.69	2739.4	J1917	20	45.79	20	2739.4	20
J1927	3002.69	4165.37	J1283	19.93	33.28	20	4165.37	20
J1933	3002.69	6210.51	J1967	18.36	32.44	20	5822.35	23.19
J1939	3002.69	5290.87	J1939	20	38.87	20	5290.87	20
J1941	3002.69	1507.99	J1867	18.69	-65.8	20	1484.43	20.95
J1943	3002.69	3729.51	J1645	18.33	28.7	20	3612.96	21.78
J1945	1002.69	1990.52	J1945	20	40.56	20	1990.52	20
J1947	2502.69	3200.3	J1835	19.23	30.41	20	3150.29	20.86
J1949	3002.69	4841.35	J1307	18.94	35.32	20	4765.7	20.78
J195	1002.69	2473.26	J195	20	46.67	20	2473.26	20
J1951	2502.69	1749.6	J1951	20	-6.79	20	1749.6	20
J1955	1002.69	2487.44	J1955	20	39.4	20	2487.44	20
J1957	1002.69	2544.46	J1447	19.11	37.66	20	2464.94	21.23

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J1963	1002.69	1831.86	J1963	20	34.1	20	1831.86	20
J197	502.69	876.15	J197	20	56.33	20	876.15	20
J1975	2502.69	4683.57	J1371	19.36	39.05	20	4610.39	20.79
J1977	1002.69	4325.52	J1417	18.03	43.7	20	4122.76	22.15
J198	502.69	911.97	J198	20	56.91	20	911.97	20
J1983	1002.69	5805.57	J1521	19.81	47.28	20	5805.57	20
J1987	2502.69	4831.22	J1987	20	36.77	20	4831.22	20
J1989	2502.69	4301.25	J1989	20	36.97	20	4301.25	20
J199	502.69	1121.04	J1076	17.02	52.66	20	1086	22.57
J1995	2502.69	2344.22	J1491	19.01	15.51	20	2307.59	20.78
J1997	1002.69	2249.63	J987	19.89	46.66	20	2249.63	20
J1999	1002.69	3055.43	J1001	18.53	42.79	20	2959.95	21.48
J2	502.69	1768.04	J1559	17.08	110.56	20	1740.41	22.9
J20	502.69	1879.81	J20	20	38.76	20	1879.81	20
J200	501.97	3478.36	J626	5.72	94.35	20	2771.82	38.58
J2001	1002.69	3644.2	J2001	20	42.74	20	3644.2	20
J2005	3002.69	3227.65	J1843	19.62	23.42	20	3227.65	20
J2007	1002.69	2219.09	J955	19.7	45.45	20	2219.09	20
J2009	1002.69	2218.59	J963	19.38	44.15	20	2183.93	20.9
J201	1002.69	4404.08	J1905	19.08	41.25	20	4266.45	21.34
J2011	1002.69	1821.76	J973	19.81	39.96	20	1821.76	20
J2013	1002.69	2090.6	J969	19.11	42.48	20	2057.93	20.88
J2015	2502.69	4342.86	J700	17.9	32.65	20	4071.43	23.24
J202	1002.69	4374.17	J202	20	43.85	20	4374.17	20
J2021	2502.69	3264.02	J2021	20	30.18	20	3264.02	20
J2023	2502.69	3132.73	J2023	20	29.46	20	3132.73	20
J2025	3002.69	3754.94	J893	20	30.08	20	3754.94	20
J2027	1002.69	1834.09	J881	19.95	40.55	20	1834.09	20
J2029	3002.69	3085	J2029	20	21.5	20	3085	20
J2033	1002.69	2496.44	J2033	20	43.6	20	2496.44	20
J2037	3002.69	2570.9	J2045	19.57	9.04	20	2570.9	20
J204	1002.69	3599.47	J204	20	49.28	20	3599.47	20
J2045	3002.69	2408.47	J2045	20	4.21	20	2408.47	20
J2047	3002.69	2517.05	J2045	19.89	7.77	20	2517.05	20
J205	502.69	1266.43	J205	20	53.2	20	1266.43	20
J2053	502.69	1699.36	J1557	18.23	77.72	20	1672.81	21.84
J2055	502.69	1898.53	J1028	19.97	55.55	20	1898.53	20
J2057	502.69	1327.86	J778	-11.8	30.86	20	757.29	51.78
J206	502.69	945.83	J206	20	47.84	20	945.83	20
J2065	1002.69	5886.29	J1731	12.52	31.42	20	4414.72	28.39
J2069	1002.69	6121.7	J1731	10.53	31.4	20	4399.97	29.76
J207	3002.69	2873.83	J1811	19.2	16.6	20	2828.93	20.91
J2071	502.69	3883.28	J2071	20	46.63	20	3883.28	20
J2079	502.69	1672.76	J2079	20	37.7	20	1672.76	20
J208	3002.69	1867.04	J208	20	-24.72	20	1867.04	20
J2093	1002.69	1531.63	J159	18.74	29.95	20	1483.77	21.51
J21	502.69	2166.42	J21	20	37.8	20	2166.42	20
J210	502.69	2916.21	J441	18.84	85.42	20	2893.42	21.04
J2109	1752.69	4497.85	J2109	20	45	20	4497.85	20
J2111	1002.69	4518.52	J1605	18.69	49.11	20	4447.92	20.88
J2113	1002.69	3869.29	J2113	20	49	20	3869.29	20
J2115	1002.69	3835.78	J2115	20	48.46	20	3835.78	20
J2117	1002.69	4451.86	J2117	20	49.28	20	4451.86	20
J2119	1002.69	6061.71	J1681	19.15	34.94	20	5872.29	21.6
J212	2502.69	3647.46	J212	20	34.95	20	3647.46	20

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J2121	2502.69	3432.61	J921	18.18	30.55	20	3325.34	21.56
J213	2502.69	4562.98	J700	16.65	32.95	20	4206.5	24.19
J2133	1002.69	5662.15	J651	12.89	45.38	20	4865.91	28.85
J2135	502.69	1627.67	J2135	20	80.96	20	1627.67	20
J2139	2502.69	2123.8	J2139	20	9.06	20	2123.8	20
J214	2502.69	3709.08	J214	20	33.79	20	3709.08	20
J2141	2502.69	2023.78	J2141	20	5.22	20	2023.78	20
J2143	2502.69	2113.62	J2143	20	10.63	20	2113.62	20
J2145	2502.69	2695.67	J2145	20	23.39	20	2695.67	20
J2147	2502.69	4855.56	J2147	20	41.08	20	4855.56	20
J2149	2502.69	4938.23	J2149	20	41.39	20	4938.23	20
J2151	2502.69	4352.82	J2151	20	39.45	20	4352.82	20
J2155	2502.69	4106.53	J2155	20	38.35	20	4106.53	20
J2157	2502.69	4447.98	J2157	20	39.66	20	4447.98	20
J2159	2502.69	5082.84	J2159	20	40.13	20	5082.84	20
J2161	2502.69	3020.69	J2161	20	26.49	20	3020.69	20
J2165	502.69	1161.5	J778	-4.69	30.13	20	725.94	47.02
J2173	1000	1001.5	J2173	20	20.08	20	1001.5	20
J2175	3000	3689.26	J2175	20	29.42	20	3689.26	20
J2177	3000	1863.51	J2177	20	-24.53	20	1863.51	20
J22	502.69	4651	J21	6	38.71	20	3342.9	34.55
J220	1002.69	8101.66	J220	20	50.8	20	8101.66	20
J221	2502.69	3565.03	J221	20	34.01	20	3565.03	20
J222	1002.69	6880.35	J778	14.36	40.4	20	5912.8	26.78
J224	1002.69	1414.56	J224	20	33.56	20	1414.56	20
J225	1002.69	6304.96	J778	18.75	40.36	20	6107.93	21.54
J226	1002.69	5889.39	J226	20	47.54	20	5889.39	20
J227	1002.69	5821.65	J227	20	47.4	20	5821.65	20
J229	1002.69	1992.85	J667	18.05	39.47	20	1930.57	21.67
J23	502.69	1825.27	J1084	2.15	40.63	20	1368.95	37.51
J231	2502.69	1961.52	J231	20	4.67	20	1961.52	20
J232	502.69	8147.76	J778	6.54	41.5	20	5983.51	44.25
J233	502.69	7055.35	J778	13.99	41.49	20	5952.95	35.91
J234	502.69	6502.26	J778	17.43	41.48	20	6095.87	26.58
J235	502.69	6356.49	J778	18.33	41.47	20	6058.53	25.12
J236	502.69	6022.23	J651	18.73	47.43	20	5834.03	23.2
J237	502.69	5968.21	J651	18.07	47.4	20	5688.45	24.68
J238	502.69	6460.93	J651	11.9	47.36	20	5451.41	36.32
J239	1002.69	5874.95	J651	12.64	45.44	20	5048.78	30.2
J24	502.69	5336.28	J778	-8.93	40.73	20	3168.41	50.67
J241	1002.69	2713.85	J241	20	58.47	20	2713.85	20
J242	1002.69	3516.72	J665	15.25	48.83	20	3241.97	25.68
J243	1002.69	5784.31	J1017	4.24	55.88	20	4699.75	37.38
J244	1002.69	4276.04	J659	18.55	46.47	20	4142.42	21.72
J245	1002.69	3587.83	J245	20	48.27	20	3587.83	20
J246	1002.69	4983.16	J651	16.68	45.22	20	4671.71	23.42
J247	2502.69	4464.93	J247	20	38.2	20	4464.93	20
J248	3002.69	3824.34	J248	20	32.91	20	3824.34	20
J249	1002.69	2073.36	J249	20	40.88	20	2073.36	20
J25	1002.69	7148.47	J778	10.91	40.26	20	5808.13	29.39
J250	3002.69	4866.79	J75	19.02	32.61	20	4714.71	21.34
J252	2502.69	2414.04	J252	20	18.37	20	2414.04	20
J253	1752.69	3799.2	J253	20	40.3	20	3799.2	20
J254	1752.69	2054.7	J254	20	27.58	20	2054.7	20
J256	1002.69	2282.62	J256	20	41.71	20	2282.62	20

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J257	**1002.69**	3005.06	J257	20	40.28	20	**3005.06**	20
J258	**1002.69**	1731.99	J258	20	34.19	20	**1731.99**	20
J259	**1002.69**	1888.5	J259	20	40.29	20	**1888.5**	20
J26	**1002.69**	6987.21	J778	18.71	40.78	20	**6768.86**	21.54
J260	**3002.69**	3756.89	J1177	19.73	28.1	20	**3756.89**	20
J261	**1002.69**	3122.03	J261	20	44.83	20	**3122.03**	20
J262	**1002.69**	3708.16	J262	20	42.97	20	**3708.16**	20
J263	**1002.69**	3041.16	J263	20	40.11	20	**3041.16**	20
J264	**1002.69**	3270.28	J264	20	41.59	20	**3270.28**	20
J265	**1002.69**	2287.93	J1805	13.36	40.03	20	**2037.69**	26.38
J267	**1002.69**	2921.79	J267	20	46.99	20	**2921.79**	20
J269	**1002.69**	2345.7	J269	20	45.17	20	**2345.7**	20
J270	**3002.69**	1945.81	J270	20	-19.54	20	**1945.81**	20
J271	**1002.69**	2474.85	J271	20	43.52	20	**2474.85**	20
J272	**1002.69**	2523.15	J272	20	43.45	20	**2523.15**	20
J273	**2502.69**	3442.3	J273	20	32.13	20	**3442.3**	20
J274	**3002.69**	3012.22	J614	16.76	16.89	20	**2729.82**	24.05
J275	**1002.69**	2412.61	J275	20	44.49	20	**2412.61**	20
J276	**1002.69**	3004.45	J276	20	46.95	20	**3004.45**	20
J278	**1002.69**	2702.17	J278	20	47.03	20	**2702.17**	20
J28	**1002.69**	1890.98	J28	20	39.09	20	**1890.98**	20
J281	**2502.69**	4227.14	J281	20	39.86	20	**4227.14**	20
J283	**2502.69**	3936.03	J283	20	38.05	20	**3936.03**	20
J286	**2502.69**	3915.21	J286	20	37.84	20	**3915.21**	20
J287	**1002.69**	3948.81	J287	20	49.44	20	**3948.81**	20
J288	**1002.69**	3067.92	J1575	19.22	47.73	20	**3019.98**	20.89
J289	**1002.69**	3880.07	J289	20	48.64	20	**3880.07**	20
J290	**1002.69**	3945.2	J290	20	49.25	20	**3945.2**	20
J291	**1002.69**	3407.28	J291	20	48.51	20	**3407.28**	20
J292	**1002.69**	3123.28	J292	20	48.16	20	**3123.28**	20
J294	**1002.69**	3868.8	J1589	19.52	48.2	20	**3808.35**	20.84
J296	**1002.69**	4111.17	J296	20	48.14	20	**4111.17**	20
J297	**1002.69**	2937.87	J297	20	46.29	20	**2937.87**	20
J298	**1002.69**	4241.85	J298	20	48.4	20	**4241.85**	20
J299	**2502.69**	1863.81	J299	20	-2.78	20	**1863.81**	20
J3	**502.69**	2114.05	J447	-1	93.64	20	**1858.05**	41.49
J30	**1002.69**	2385.11	J30	20	41.41	20	**2385.11**	20
J300	**502.69**	1232.29	J300	20	45.33	20	**1232.29**	20
J301	**502.69**	1009.27	J301	20	42.18	20	**1009.27**	20
J302	**502.69**	707.77	J302	20	33.17	20	**707.77**	20
J303	**502.69**	1819.62	J303	20	41.53	20	**1819.62**	20
J305	**502.69**	2288.03	J305	20	44.26	20	**2288.03**	20
J307	**1752.69**	5128.62	J1681	19.68	32.8	20	**5128.62**	20
J311	**3002.69**	8250.49	J1681	9.74	30.37	20	**6058.95**	33.23
J312	**3002.69**	5566.85	J312	20	41.1	20	**5566.85**	20
J313	**2502.69**	6713.41	J1681	16.61	31.52	20	**5874.24**	26.32
J314	**2502.69**	5439.37	J314	20	43	20	**5439.37**	20
J315	**1002.69**	3819.55	J1177	15.37	44.17	20	**3461.46**	25.54
J317	**1002.69**	6026.38	J1681	19.2	34.93	20	**5838.06**	21.66
J319	**1002.69**	3727.52	J1613	19.99	48.7	20	**3727.52**	20
J32	**502.69**	6902.76	J778	14	41.5	20	**5932.06**	28.56
J321	**1002.69**	6066.55	J1681	18.42	34.91	20	**5687.39**	23.27
J322	**3002.69**	6746.96	J1967	16.62	32.8	20	**6114.44**	24.57
J323	**3002.69**	5054.07	J323	20	38.41	20	**5054.07**	20
J324	**3002.69**	6060.52	J324	20	42.56	20	**6060.52**	20

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J325	3002.69	6935.39	J1967	14.77	32.57	20	5960.1	26.77
J327	3002.69	5587.54	J327	20	39.62	20	5587.54	20
J328	3002.69	6004.18	J1967	19.24	32.36	20	5816.55	21.63
J329	3002.69	6284.38	J1967	18.29	32.57	20	5891.61	23.24
J33	1002.69	3716.55	J33	20	47.43	20	3716.55	20
J330	2502.69	6848.69	J1967	14.31	34.15	20	5778.58	27.55
J331	3002.69	5863.07	J331	20	42.59	20	5863.07	20
J332	3002.69	5769.04	J817	19.69	42.07	20	5769.04	20
J334	1752.69	4243.15	J334	20	43.54	20	4243.15	20
J336	1752.69	6551.2	J1963	15.99	37.55	20	5834.66	25.41
J337	1002.69	6443.34	J1963	16.82	39.77	20	5839.28	24.65
J338	1002.69	6403.84	J1963	17.6	39.8	20	6003.6	23.04
J339	2502.69	4758.21	J339	20	40.7	20	4758.21	20
J34	1002.69	2521.77	J34	20	47.19	20	2521.77	20
J340	2502.69	4954.49	J340	20	41.96	20	4954.49	20
J341	2502.69	4463.54	J341	20	40.72	20	4463.54	20
J342	1002.69	3701.97	J342	20	49.82	20	3701.97	20
J343	1002.69	4707.52	J343	20	49.99	20	4707.52	20
J344	1002.69	4057.58	J344	20	51.76	20	4057.58	20
J345	502.69	4134.46	J21	19.39	38.98	20	4005.26	21.99
J346	1002.69	6150.68	J1040	18.64	45.63	20	5958.48	21.54
J347	502.69	644.43	J347	20	30	20	644.43	20
J348	502.69	1792.56	J348	20	39.59	20	1792.56	20
J349	502.69	596.75	J349	20	27.59	20	596.75	20
J35	1002.69	1555.65	J35	20	42.6	20	1555.65	20
J350	502.69	590.4	J174	19.4	26.44	20	581.18	20.83
J351	502.69	476.31	J351	20	17.03	20	476.31	20
J354	502.69	682.81	J804	17.3	38.8	20	661.47	22.82
J355	502.69	938.14	J1501	11.88	36.36	20	813.55	31.34
J356	502.69	880.19	J356	20	44.16	20	880.19	20
J357	3002.69	3260.99	J357	20	24.44	20	3260.99	20
J358	3002.69	3224.69	J358	20	23.72	20	3224.69	20
J359	3002.69	1966.73	J359	20	-16.68	20	1966.73	20
J36	1002.69	2845	J36	20	56.38	20	2845	20
J361	502.69	1214.62	J361	20	52.46	20	1214.62	20
J362	502.69	1038.76	J1033	3.79	47.11	20	868.34	36.36
J363	502.69	1066.88	J363	20	48.66	20	1066.88	20
J364	502.69	902.76	J364	20	48.11	20	902.76	20
J366	502.69	1432.15	J1076	16.44	56.38	20	1365.02	24.03
J368	502.69	2149.23	J368	20	60.55	20	2149.23	20
J369	502.69	2204.89	J369	20	58.93	20	2204.89	20
J37	502.69	2370.11	J37	20	75.31	20	2370.11	20
J372	502.69	1787	J372	20	81.06	20	1787	20
J373	502.69	1754.77	J373	20	81.61	20	1754.77	20
J376	502.69	4819.54	J1177	12.73	47.25	20	4141.79	31.04
J378	502.69	5956.21	J1177	2.23	47.3	20	4374.09	47.93
J379	502.69	4693.18	J1177	17.89	47.33	20	4473.19	25.61
J380	502.69	5360.63	J1177	10.97	47.33	20	4439.28	39.95
J381	502.69	5720.13	J1177	9.27	47.36	20	4647.6	40.82
J383	502.69	4946.97	J1177	15.93	47.35	20	4560.49	29.19
J384	502.69	4398.71	J384	20	93.52	20	4398.71	20.01
J385	502.69	3973.44	J385	20	91.45	20	3973.44	20
J386	3002.69	2219.11	J1869	19.69	-4.51	20	2219.11	20
J387	2502.69	3269.66	J387	20	29.27	20	3269.66	20
J388	1002.69	3236.04	J941	17.86	41.97	20	3084.35	22.1

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J389	2502.69	3630.57	J941	19.4	31.19	20	3573.84	20.71
J39	502.69	3007	J39	20	88.15	20	3007	20
J391	1002.69	3302.11	J392	19.04	41.7	20	3198.92	21.31
J392	1002.69	3078.4	J392	20	41.48	20	3078.4	20
J394	1002.69	2773.51	J394	20	42.56	20	2773.51	20
J395	1002.69	3017.36	J395	20	42.58	20	3017.36	20
J397	1002.69	2601.46	J397	20	41.71	20	2601.46	20
J398	502.69	1966.45	J20	19.42	38.86	20	1935.73	20.71
J399	502.69	2012.93	J399	20	39.08	20	2012.93	20
J4	502.69	1628.99	J4	20	114.52	20	1628.99	20
J40	3002.69	3781.8	J1549	19.05	41.29	20	3752.26	20.91
J400	502.69	3110.03	J21	12.07	38.2	20	2526.9	28.22
J401	502.69	4216.74	J21	15.52	38.87	20	3689.65	27.33
J405	502.69	4411.02	J2081	19.75	51.25	20	4411.02	20
J408	2502.69	5387.89	J407	14.36	35.21	20	4714.41	26.67
J41	502.69	3820.15	J41	20	89.26	20	3820.15	20
J410	2502.69	3532.26	J410	20	29.42	20	3532.26	20
J411	2502.69	3624.49	J411	20	28.02	20	3624.49	20
J412	2502.69	11611.47	J1681	18.36	34.89	20	10885.75	21.95
J414	3002.69	9154.31	J1681	7.57	30.58	20	6293.59	34.25
J415	502.69	2200.33	J415	20	37.47	20	2200.33	20
J417	501.97	3616.59	J626	18.83	100.13	20	3503.57	25.21
J419	501.97	2190.27	J607	14.71	135.39	20	2104.71	25.58
J42	502.69	2613.87	J42	20	89.26	20	2613.87	20
J420	502.69	898.09	J51	16.18	59.16	20	870.03	23.83
J421	502.69	644.55	J421	20	41.5	20	644.55	20
J422	502.69	557.94	J422	20	26.92	20	557.94	20
J423	502.69	2050.55	J423	20	57.53	20	2050.55	20
J424	502.69	2082.71	J424	20	56.92	20	2082.71	20
J425	502.69	2281.88	J1059	19.54	46.87	20	2264.05	20.83
J426	502.69	1468.97	J1059	15.51	44	20	1354.21	24.99
J427	502.69	1057.94	J427	20	44.23	20	1057.94	20
J430	502.69	1168.25	J51	15.99	67.67	20	1131.75	24.06
J431	502.69	1743.58	J432	13.15	61.48	20	1620.98	28.54
J432	502.69	1596.94	J432	20	61.35	20	1596.94	20
J433	502.69	1777.05	J1060	16.74	57.78	20	1707.64	23.28
J434	502.69	1236.86	J434	20	48.83	20	1236.86	20
J435	502.69	1436.06	J435	20	62.34	20	1436.06	20
J436	502.69	1279.46	J436	20	50.64	20	1279.46	20
J437	502.69	1618.61	J437	20	55.7	20	1618.61	20
J438	502.69	2756.98	J438	20	91.44	20	2756.98	20
J439	3002.69	2712.03	J439	20	5.86	20	2712.03	20
J44	502.69	2777.51	J43	18.02	86.73	20	2734.12	21.85
J440	502.69	2616.04	J638	14.29	81.52	20	2493.41	25.72
J441	502.69	2613.96	J441	20	84.87	20	2613.96	20
J442	502.69	1650.72	J442	20	84.04	20	1650.72	20
J445	502.69	1903.15	J447	19.09	93.9	20	1888.28	21.43
J447	502.69	1786.97	J447	20	93.12	20	1786.97	20
J448	502.69	1756.64	J1505	13	100.98	20	1688.02	26.77
J449	502.69	1913.66	J447	14.99	93.59	20	1853.86	25.67
J45	502.69	2245.88	J45	20	89.39	20	2245.88	20
J450	502.69	999.2	J580	19.24	39.63	20	983.59	20.92
J453	502.69	2633.96	J453	20	50.64	20	2633.96	20
J455	502.69	2741.49	J455	20	89.73	20	2741.49	20
J456	502.69	2372.64	J456	20	88.85	20	2372.64	20

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J457	502.69	2280.13	J457	20	88.26	20	2280.13	20
J458	502.69	2305.2	J458	20	90.41	20	2305.2	20
J459	502.69	3228.82	J459	20	90.47	20	3228.82	20
J46	502.69	2687.37	J593	19.8	85.52	20	2687.37	19.99
J460	502.69	2134.02	J460	20	85.45	20	2134.02	20
J463	502.69	2158.68	J698	11.17	77.87	20	2006.9	28.71
J464	502.69	1442.49	J43	15.1	79.37	20	1386.14	25.2
J465	502.69	3444.96	J465	20	92.37	20	3444.96	20
J466	502.69	3604.66	J466	20	93.5	20	3604.66	20
J467	502.69	2230.52	J467	20	85.61	20	2230.52	20
J468	502.69	906.37	J468	20	58.67	20	906.37	20
J47	502.69	1831.65	J1557	18.83	78.66	20	1817.34	20.91
J470	502.69	3879.14	J470	20	93.99	20	3879.14	20
J471	502.69	4024.31	J471	20	92.49	20	4024.31	20
J472	502.69	2271.33	J472	20	84.96	20	2271.33	20
J473	502.69	934.77	J473	20	55.42	20	934.77	20
J474	502.69	856.86	J474	20	54.04	20	856.86	20
J475	502.69	2417.82	J475	20	83.43	20	2417.82	20
J476	502.69	830.13	J476	20	50.01	20	830.13	20
J477	502.69	2139.79	J447	7.85	94.44	20	1972.62	33.23
J478	502.69	2055.44	J778	17.05	39.28	20	1894.86	29.74
J479	502.69	2360.22	J778	8.02	39.07	20	1807.04	45.31
J48	502.69	1728.51	J1553	6.01	87.21	20	1573.22	34.1
J480	502.69	2444.15	J778	5.51	39.04	20	1794.93	48.28
J481	502.69	2468	J778	1.96	38.83	20	1696.75	47.26
J482	502.69	2483.09	J778	0.59	38.77	20	1707.13	46.66
J483	502.69	2601.72	J778	-3.92	38.69	20	1666.73	51.32
J484	502.69	2467.48	J778	-2.63	38.51	20	1619.28	44.73
J485	502.69	2942.16	J778	-12.25	38.8	20	1700.93	52.98
J486	502.69	3404.21	J486	20	93.77	20	3404.21	20
J487	502.69	3676.52	J487	20	103.98	20	3676.52	20
J488	502.69	3780.17	J488	20	93.23	20	3780.17	20
J489	502.69	3111.26	J489	20	87.41	20	3111.26	20
J49	502.69	1766.87	J1060	13.57	57.41	20	1628.84	26.68
J490	502.69	3045.14	J490	20	89.34	20	3045.14	20
J491	502.69	2783.51	J492	18.38	79.37	20	2740.02	21.94
J492	502.69	2497.95	J492	20	78.87	20	2497.95	20
J494	502.69	2570.99	J494	20	72.92	20	2570.99	20
J495	502.69	2866.59	J495	20	73.35	20	2866.59	20
J496	502.69	2650.76	J1084	9.47	42.97	20	2153.74	35.7
J497	502.69	2412.66	J1084	9.17	42.61	20	1960.29	35.37
J498	502.69	2174.57	J1084	8.18	42.1	20	1766.84	34.91
J499	502.69	2018.4	J1084	6.7	41.62	20	1608.41	35.58
J5	502.69	2288.68	J778	10.06	39.1	20	1823.79	42.15
J50	502.69	2174.87	J422	13.64	56.46	20	2038.94	26.23
J501	502.69	4159.12	J778	-7.65	40.27	20	2534.46	49.07
J503	502.69	3498.45	J778	-11.8	39.58	20	2022.54	53.44
J504	502.69	3342.59	J778	-11.42	39.41	20	1932.43	53.08
J505	502.69	2684.91	J778	2.7	39.26	20	1887.83	46.17
J506	502.69	2136.73	J778	14.95	39.26	20	1869.64	31.02
J507	502.69	1912.5	J9	14.24	59.57	20	1792.97	25.36
J508	502.69	1699.06	J9	19.92	59.17	20	1699.06	20
J509	501.87	1171.5	J1731	33.47	33.47	20	75.51	96.91
J51	502.69	802.56	J51	20	55.64	20	802.56	20
J511	500.15	2043.48	J1731	33.47	33.47	20	73.84	86.81

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J516	502.69	715.57	J1084	16.99	30.73	20	670.85	23.2
J517	501.15	712.96	J1084	18.93	31.7	20	701.82	20.89
J518	502.69	850.28	J1084	14.01	33.07	20	757.28	26.03
J519	502.69	950.39	J1084	12.19	34.45	20	816.75	28.07
J52	502.69	1582.57	J51	16.71	73.65	20	1533.12	24.06
J520	502.69	1269.92	J1084	5.92	37.38	20	992.13	34.29
J521	502.69	1737.56	J1084	13.53	41.36	20	1520.37	28.49
J523	502.69	1976.02	J523	20	54.25	20	1976.02	20
J525	2502.69	1509.45	J525	20	-29.5	20	1509.45	20
J526	3002.69	3394.26	J526	20	26.36	20	3394.26	20
J529	1752.69	5833.48	J1963	19.49	37.47	20	5742.33	20.77
J53	502.69	2328.19	J1059	15.03	46.73	20	2182.67	26.07
J530	1002.69	2115.41	J530	20	44.81	20	2115.41	20
J531	1002.69	5273.1	J531	20	47.31	20	5273.1	20
J532	1002.69	1501.32	J532	20	34.46	20	1501.32	20
J533	1002.69	2167.98	J533	20	44.5	20	2167.98	20
J534	2502.69	4498.77	J534	20	37.94	20	4498.77	20
J535	1002.69	1908.88	J1517	18.58	40.86	20	1849.23	21.79
J537	1002.69	1927.8	J537	20	38.62	20	1927.8	20
J538	1002.69	3695.46	J539	19.76	41.97	20	3695.46	20
J539	1002.69	2117.09	J539	20	38.3	20	2117.09	20
J54	502.69	2183.65	J1059	15.02	46.37	20	2013.06	25.42
J540	1002.69	3675.63	J2003	19.86	42.55	20	3675.63	20
J541	502.69	1856.92	J1060	19.74	58.41	20	1856.92	20
J542	1002.69	1755.15	J542	20	42.84	20	1755.15	20
J543	502.69	3188.49	J543	20	93.67	20	3188.49	20
J544	502.69	2910.93	J544	20	95.86	20	2910.93	20
J545	502.69	2860.47	J545	20	96.03	20	2860.47	20
J546	502.69	2853.02	J546	20	95.95	20	2853.02	20
J547	502.69	2969.14	J547	20	96.7	20	2969.14	20
J548	502.69	3055.36	J1075	13.34	88.16	20	2912.14	26.27
J554	3002.69	2851.33	J554	20	16.89	20	2851.33	20
J556	3002.69	2620.99	J556	20	10.9	20	2620.99	20
J559	3002.69	2521.18	J2045	18.65	6.2	20	2481.78	20.96
J56	502.69	1198.37	J1059	13.62	41.54	20	1067.3	26.68
J561	1002.69	2494.3	J561	20	45.09	20	2494.3	20
J562	1002.69	2537	J562	20	42.84	20	2537	20
J566	1002.69	2759.87	J566	20	45.83	20	2759.87	20
J567	1002.69	2949.83	J567	20	46.5	20	2949.83	20
J57	502.69	972.01	J580	14.67	37.87	20	880.88	25.45
J571	1002.69	2649.67	J571	20	43.45	20	2649.67	20
J572	1002.69	2933.57	J913	19.37	43.07	20	2887.74	20.75
J573	1002.69	2776.09	J913	19.29	42.68	20	2732.71	20.74
J574	1752.69	5798.55	J1681	18.93	33.15	20	5617.35	21.64
J575	2502.69	5888.97	J575	20	39.03	20	5888.97	20
J577	1002.69	2836.3	J577	20	45.29	20	2836.3	20
J58	502.69	3109.99	J58	20	90.34	20	3109.99	20
J581	1002.69	7134.3	J778	11.49	40.28	20	5796.62	29.4
J583	1002.69	2663.17	J583	20	43.09	20	2663.17	20
J584	1002.69	2425.27	J584	20	42.81	20	2425.27	20
J585	1002.69	2512.58	J585	20	44.07	20	2512.58	20
J587	1002.69	1458.38	J1179	18.92	33.22	20	1435.59	20.81
J59	502.69	2520.39	J59	20	89.04	20	2520.39	20
J590	3002.69	4640.06	J590	20	34.48	20	4640.06	20
J591	502.69	3160.73	J1073	19.94	88.4	20	3160.73	20

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J592	502.69	3783.5	J592	20	103.71	20	3783.5	20
J593	502.69	2602.54	J593	20	85.35	20	2602.54	20
J594	502.69	2105.53	J447	-1.04	93.59	20	1850.56	41.45
J595	502.69	2605.91	J778	0.24	38.96	20	1750.85	53.13
J596	502.69	4913.6	J778	-8.4	40.6	20	2994.22	49.33
J597	1752.69	5278.61	J1681	19.49	32.74	20	5113.65	21.75
J6	502.69	2608.64	J778	0.21	38.96	20	1752.68	53.22
J60	502.69	2146.05	J612	19.79	85.3	20	2146.05	20
J601	1002.69	6182.83	J1731	12.53	31.56	20	4637.12	28.93
J602	1002.69	6574.55	J1731	16.07	32.01	20	5547.28	25.78
J604	1002.69	4665.62	J731	18.15	35.66	20	4374.02	22.03
J605	1002.69	7118.13	J731	16.88	36.19	20	6450.8	23.17
J607	501.97	1357.47	J607	20	129.26	20	1357.47	20
J608	502.69	2745.53	J614	16.48	37.02	20	2488.13	23.73
J61	502.69	3377.94	J61	20	91.17	20	3377.94	20
J614	502.69	2027.5	J614	20	36.59	20	2027.5	20
J618	1002.69	1427.67	J1177	19.17	32.65	20	1405.36	20.8
J62	502.69	3510.71	J62	20	92.81	20	3510.71	20
J622	502.69	2437.73	J614	13.78	36.65	20	2056.83	28.82
J626	501.97	1773.33	J626	20	92.34	20	1773.33	20
J627	501.87	462.36	J1731	33.47	33.47	20	76.08	66.31
J628	501.87	568.42	J1731	33.47	33.47	20	76.05	76.42
J629	501.15	680.42	J1731	33.47	33.47	20	75.09	50.27
J63	502.69	2182.03	J63	20	85.25	20	2182.03	20
J631	1002.69	3481.46	J631	20	44.16	20	3481.46	20
J632	1002.69	3500.82	J632	20	43.59	20	3500.82	20
J633	502.69	2840.23	J778	-1.09	39.26	20	1863.9	48.76
J635	502.69	1664.18	J635	20	44.3	20	1664.18	20
J636	502.69	1700.36	J1761	18.3	42.35	20	1647.23	21.48
J637	502.69	1697.52	J1763	17.15	47.17	20	1617.95	22.77
J638	502.69	2054.87	J638	20	80.16	20	2054.87	20
J639	502.69	2313.81	J640	18.94	49.3	20	2295.74	20.84
J64	502.69	4534.41	J1076	18.97	62.51	20	4463.56	21.92
J640	502.69	2279.11	J640	20	49.26	20	2279.11	20
J641	1002.69	2104.29	J641	20	39.13	20	2104.29	20
J642	1002.69	2125.62	J642	20	39.76	20	2125.62	20
J645	1002.69	4325.47	J645	20	54.23	20	4325.47	20
J647	2502.69	3967.1	J647	20	35.55	20	3967.1	20
J65	502.69	2409.48	J1076	14.54	60.43	20	2258.89	25.58
J651	1002.69	3306.17	J651	20	43.99	20	3306.17	20
J652	1002.69	3475.85	J652	20	46.12	20	3475.85	20
J653	1002.69	4568.48	J651	19.77	45.18	20	4568.48	20
J656	1002.69	3042.93	J656	20	51.38	20	3042.93	20
J657	1002.69	2602.03	J657	20	51.32	20	2602.03	20
J658	1002.69	2415.82	J658	20	50.84	20	2415.82	20
J659	1002.69	3534.58	J659	20	45.82	20	3534.58	20
J661	2502.69	2824.08	J661	20	25.34	20	2824.08	20
J662	1002.69	3391.34	J662	20	54.38	20	3391.34	20
J663	1002.69	2426.43	J663	20	52.81	20	2426.43	20
J664	1002.69	2660.81	J665	17.6	46.86	20	2556.87	22.4
J665	1002.69	1813.81	J665	20	41.85	20	1813.81	20
J666	1002.69	1615.25	J667	18.8	35.86	20	1590.01	20.83
J667	1002.69	1396.87	J667	20	32.83	20	1396.87	20
J669	1002.69	1702.67	J669	20	37.44	20	1702.67	20
J67	502.69	6215.54	J1177	0.91	47.32	20	4467.42	50.41

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J671	1752.69	6765.29	J1681	9.34	32.43	20	4862.55	32.5
J672	3002.69	9649.46	J1681	8.29	31.3	20	6784.77	33.57
J673	2502.69	5721.23	J1963	18.69	34.55	20	5542.44	21.44
J674	3002.69	7603.76	J1681	7.16	29.07	20	5227.58	35.33
J675	2502.69	6325.12	J1963	17.15	35	20	5830.97	23.98
J679	1752.69	5291.28	J1681	17.62	32.43	20	4795.22	25.21
J68	502.69	5482.78	J1177	6.44	47.28	20	4283.42	40.72
J681	3002.69	4454.57	J681	20	35.58	20	4454.57	20
J682	3002.69	2685.65	J682	20	13.07	20	2685.65	20
J683	3002.69	2639.33	J683	20	11.87	20	2639.33	20
J684	3002.69	5155.7	J1281	19.96	38.45	20	5155.7	20
J692	1002.69	2244.39	J692	20	41.98	20	2244.39	20
J693	2502.69	1504.44	J693	20	-25.06	20	1504.44	20
J695	1002.69	1767.37	J695	20	39.74	20	1767.37	20
J696	1002.69	1711.53	J696	20	40.05	20	1711.53	20
J70	3002.69	4599.66	J1177	12.14	29.49	20	3952.83	29.42
J700	1002.69	3150.37	J700	20	40.35	20	3150.37	20
J701	1002.69	1963.62	J701	20	38.36	20	1963.62	20
J703	3002.69	3725.92	J706	18.38	27.77	20	3609.49	21.68
J705	3002.69	2995.72	J705	20	19.88	20	2995.72	20
J706	3002.69	2734.55	J706	20	14.78	20	2734.55	20
J707	3002.69	2697.97	J707	20	13.7	20	2697.97	20
J708	3002.69	2783.15	J708	20	15.54	20	2783.15	20
J709	3002.69	2958.97	J709	20	19.19	20	2958.97	20
J71	1002.69	5665.59	J651	12.27	45.36	20	4868.86	28.6
J711	3002.69	3203.38	J889	19.55	22.98	20	3153.33	20.87
J713	3002.69	3399.15	J713	20	26.41	20	3399.15	20
J715	1002.69	2186.51	J715	20	44.85	20	2186.51	20
J716	1002.69	2111.88	J716	20	43.45	20	2111.88	20
J717	1002.69	2140.53	J717	20	42.89	20	2140.53	20
J718	1752.69	5488.4	J1681	17.79	32.64	20	5145.37	23.51
J719	1752.69	5147.68	J1681	19.62	32.66	20	5147.68	20
J721	1752.69	5105.36	J1681	18.66	32.42	20	4786.28	23.44
J725	1752.69	4388.8	J1681	14.12	30.89	20	3634.48	26.44
J726	3002.69	3450.99	J726	20	27.23	20	3450.99	20
J727	2502.69	5067.26	J1653	19.59	41.66	20	5067.26	20
J728	2502.69	2528.6	J1653	19.6	20.18	20	2528.6	20
J729	2502.69	2072.03	J729	20	6.97	20	2072.03	20
J73	1002.69	3577.3	J73	20	52.12	20	3577.3	20
J732	1000	1889.19	J1731	31.09	32.46	20	1889.19	20
J733	1000	2228.84	J1731	30.48	32.46	20	2228.84	20
J734	1000	1362.45	J1731	31.95	32.46	20	1362.45	20
J735	1000	918.28	J1731	32.57	32.46	20	918.28	20
J736	1000	1098.81	J1731	32.33	32.46	20	1098.81	20
J738	1002.69	1710.94	J738	20	35.44	20	1710.94	20
J739	1002.69	1334.61	J739	20	28.61	20	1334.61	20
J74	1002.69	1695	J1207	17.73	36.91	20	1615.55	22.59
J740	502.69	2469.2	J740	20	39.18	20	2469.2	20
J741	1002.69	1129.37	J741	20	23.88	20	1129.37	20
J742	1002.69	1170.45	J742	20	24.81	20	1170.45	20
J743	1752.69	5048.24	J743	20	47.78	20	5048.24	20
J744	1752.69	5091.31	J1681	19.74	32.64	20	5091.31	20
J746	1002.69	1372.82	J746	20	28.19	20	1372.82	20
J747	3002.69	6490.61	J778	13.91	33.25	20	5577.87	28.01
J748	3002.69	6143.37	J778	17.02	33.5	20	5663.42	24.11

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J749	3002.69	5468.28	J749	20	43.16	20	5468.28	20
J75	3002.69	4433.55	J75	20	31.37	20	4433.55	20
J750	3002.69	5343.15	J750	20	42.38	20	5343.15	20
J757	1752.69	4785.32	J1681	10.47	30.86	20	3588.99	30.5
J76	1002.69	3794.77	J76	20	42.2	20	3794.77	20
J760	1002.69	2494.38	J760	20	51.45	20	2494.38	20
J761	1002.69	1910.34	J1177	15.26	37.42	20	1761.1	24.7
J762	3002.69	5344.35	J762	20	37.58	20	5344.35	20
J763	3002.69	3615.95	J763	20	29.07	20	3615.95	20
J764	3002.69	3011.91	J1773	19.42	19.6	20	2964.85	20.92
J766	502.69	1324.7	J766	20	75.17	20	1324.7	20
J768	502.69	1175.16	J778	-10.42	29.03	20	688.57	50.46
J769	502.69	1100.21	J778	-6.63	28.65	20	670.44	52.06
J77	1002.69	3118.36	J77	20	51.47	20	3118.36	20
J770	502.69	1106.5	J778	-9.68	28.04	20	656.98	54.79
J772	502.69	1009.03	J778	-1.93	28.2	20	662.17	42.08
J774	502.69	950.05	J776	-4.34	26.38	20	608.63	44.63
J778	502.69	555.11	J778	20	23.38	20	555.11	20
J78	1002.69	2177.37	J78	20	44.88	20	2177.37	20
J780	502.69	795.91	J778	14.09	29.03	20	696.42	28.21
J783	502.69	671.35	J783	20	35.21	20	671.35	20
J786	1752.69	5945.82	J1681	14.17	32.5	20	4830.98	29.94
J787	1752.69	5589.88	J1681	16.11	32.48	20	4891.14	26.68
J789	1752.69	5822.99	J1681	14.11	32.38	20	4731.18	29.36
J790	1752.69	5460.24	J1681	16.22	32.36	20	4777.71	26.46
J791	1002.69	1896.85	J791	20	38.51	20	1896.85	20
J793	3002.69	3104.34	J793	20	21.79	20	3104.34	20
J795	502.69	1557.53	J795	20	47.56	20	1557.53	20
J796	502.69	1897.06	J778	17.2	38.96	20	1778.49	27.49
J797	502.69	1698.21	J1507	16.96	78.73	20	1658.41	22.88
J8	502.69	3266.26	J778	-12.51	39.26	20	1888.31	53.66
J80	1002.69	2696.45	J80	20	48.05	20	2696.45	20
J801	3002.69	2617.06	J801	20	2.06	20	2617.06	20
J808	3002.69	5992.5	J1967	19.42	32.43	20	5805.24	21.64
J81	2502.69	5475.8	J75	17.83	36.64	20	5133.56	23.02
J811	3002.69	6320.71	J778	15.43	33.36	20	5629.38	26.37
J816	1002.69	4853.09	J816	20	49.15	20	4853.09	20
J817	3002.69	4287.12	J817	20	35.39	20	4287.12	20
J82	1002.69	4637.07	J258	19.12	40.55	20	4492.17	21.45
J827	1002.69	2155.68	J1179	12.57	38.86	20	1886.22	27.49
J833	1002.69	2309.14	J833	20	44.51	20	2309.14	20
J835	1002.69	2277.89	J1177	13.61	39.67	20	2028.75	26.9
J836	1002.69	2279.47	J836	20	37.66	20	2279.47	20
J837	1002.69	2046.34	J837	20	37.14	20	2046.34	20
J84	1002.69	3437	J84	20	41.26	20	3437	20
J85	1002.69	1807.82	J85	20	36.19	20	1807.82	20
J86	1002.69	4759.25	J86	20	50.72	20	4759.25	20
J864	1752.69	5701.26	J1681	17.53	32.83	20	5166.77	24.68
J866	1752.69	5591.86	J1681	13.75	32.16	20	4543.39	29.28
J868	1752.69	5421.38	J1681	13.94	32.06	20	4404.87	29.15
J87	2502.69	5429.34	J1199	18.76	39.8	20	5259.67	21.5
J874	1752.69	6102.29	J1681	7.95	31.95	20	4386.02	32.1
J875	1752.69	5789.52	J1681	11.18	32.07	20	4432.6	31.1
J876	1752.69	6455.51	J1681	7.95	32.17	20	4639.9	32.84
J88	1002.69	4748.56	J258	19.59	40.64	20	4748.56	20

2043 MDD Fire Flow Scenario Modeling Results
With Improvements

ID	Total Demand (gpm)	Hydrant Available Flow (gpm)	Critical Node ID for Design Run	Critical Node Pressure at Available Flow (psi)	Critical Node Pressure at Fire Demand (psi)	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)	Hydrant Pressure at Design Flow (psi)
J885	**1002.69**	2033.43	J885	20	41.81	20	**2033.43**	20
J89	**1002.69**	2551.15	J89	20	43.94	20	**2551.15**	20
J895	**1002.69**	1806.06	J895	20	37.83	20	**1806.06**	20
J899	**1002.69**	2005.74	J899	20	38.62	20	**2005.74**	20
J9	**502.69**	1651.71	J9	20	58.93	20	**1651.71**	20
J90	**1002.69**	5474.32	J1237	19.78	44.34	20	**5474.32**	20
J915	**1002.69**	1910.91	J915	20	41.74	20	**1910.91**	20
J92	**2502.69**	2336.22	J92	20	16.43	20	**2336.22**	20
J925	**2502.69**	1932.4	J925	20	2.07	20	**1932.4**	20
J931	**2502.69**	2548.29	J931	20	20.94	20	**2548.29**	20
J935	**2502.69**	1598.11	J935	20	-22.9	20	**1598.11**	20
J937	**1002.69**	1963.21	J941	19.71	37.96	20	**1963.21**	20
J94	**1002.69**	5024.15	J94	20	46.8	20	**5024.15**	20
J943	**1002.69**	1402.34	J943	20	34.68	20	**1402.34**	20
J95	**1002.69**	2849.79	J95	20	45.81	20	**2849.79**	20
J96	**1002.69**	3084.73	J96	20	46.9	20	**3084.73**	20
J97	**2502.69**	3739.36	J97	20	34.67	20	**3739.36**	20
J98	**1002.69**	2528.62	J98	20	44.16	20	**2528.62**	20
J99	**1002.69**	3092.15	J99	20	42.96	20	**3092.15**	20

APPENDIX O

WUE DOCUMENTS

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

Date Submitted: 1/13/2023

Water Use Efficiency
Annual Performance Report - 2022

WS Name: ENUMCLAW WATER DEPARTMENT

Water System ID# : 23600 WS County: KING

Report submitted by: *Scott Woodbury*

Meter Installation Information:

Estimate the percentage of metered connections: *100%*

If not 100% metered – Did you submit a meter installation plan to DOH? No

Within your meter installation plan, what date did you commit to completing meter installation?

Current status of meter installation:

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period *01/01/2022* To *12/31/2022*

Incomplete or missing data for the year? *No*

If yes, explain:

Total Water Produced & Purchased (TP) – Annual volume gallons	*673,854,000* gallons	
Authorized Consumption (AC) – Annual Volume in gallons	*622,415,377* gallons	
Distribution System Leakage – Annual Volume TP – AC	*51,438,623* gallons	
Distribution System Leakage – DSL = [(TP – AC) / TP] x 100 %	*7.6 %*	
3-year annual average - %	*7.2 %*	*2020, 2021, 2022*

Goal-Setting Information:

Enter the date of most recent public forum to establish WUE goal: *03/06/2019*

Has goal been changed since last performance report? *No*

Note: Customer goal must be re-established every 6 years through a public process.

Customer WUE Goal (Demand Side):

Reduce the annual volume of single family residential customer leakage billing adjustments by 10% by the end of 2023 utilizing the new automated meter reading system to identify and notify customers of leaks more quickly than possible through the manual monthly read system.

Customer (Demand Side) Goal Progress:

We will continue compiling leak adjustment information on an annual basis to monitor progress toward the 10% reduction target.

Additional Information Regarding Supply and Demand Side WUE Efforts

Reduce DSL to 5% by the end of 2023 through additional steel water main replacements, by conducting
leak surveys and fixing any identified leak as soon as practicable, and completing the conversion to a new automated meter read system to more accurately measure consumptive use.

Describe Progress in Reaching Goals:

- Estimate how much water you saved.
- Report progress toward meeting goals within your established timeframe.
- Identify any WUE measures you are currently implementing.
- If you established a goal to maintain a historic level (such as maintaining daily consumption at 65 gallons per person per day for the next two years) you must explain why you are unable to reduce water use below that level.

We will continue replacing steel water main and fixing identified leaks. A total of 0.3 miles of steel lines were replaced in 2022 with 0.6 miles planned to be replaced in 2023. The last year of a 4 year effort to convert to automated meters was completed in 2021.

The following questions will help DOH better understand water usage, water resources management and drought response. The data will be used to provide technical assistance, not for regulatory purposes.

All questions are voluntary

Month	Date of Measurement	Static Water Level (feet below measuring point)	Dynamic Water Level (feet below measuring point)
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

Water level data:

Please provide the following information (if known) to help us better utilize the water level data.

Well tag Id number:

Well depth:

Water level accuracy (within 0.01 ft < 1 ft ~ 1 ft)

Completion type (e.g., cased open interval, cased open-ended, cased open-ended with perforations, etc…)

Location coordinates (latitude, longitude) and accuracy of the coordinates (< 1ft, ~1ft, >1000ft)

Water level parameter name (e.g. depth below measuring point, depth below top of casing, depth below ground surface)

Elevation of top of casing OR elevation of measuring point if different than top of casing (as specified in question 7)

Monthly/Seasonal Water Usage:

What was your maximum daily water demand for the previous year (in gallons per day)?

Month	Volume of Water Produced in gallons
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Water shortage response:

Did you activate any level of water shortage response plan the previous year?

☐ Yes ☐ No ☐ There was no need to

If you activated a water shortage response plan the previous year, what level did you activate? (Check all that apply)

☐ Advisory Conservation ☐ Voluntary Conservation

☐ Mandatory Conservation ☐ Rationing ☐ Other

What factors caused your water shortage the previous year?

☐ Drought ☐ Fire ☐ Landslides ☐ Earthquakes

☐ Flooding ☐ Water Supply Limitations ☐ Other

Do not mail, fax, or email this report to DOH

WATER RECLAMATION OPPORTUNITIES

The City currently operates its own Wastewater Treatment Plant that could be a source of reclaimed water for non-potable uses such as irrigation, commercial and/or other beneficial uses. Located at 451 Semanski Street S the plant uses treated effluent for facility cleaning and landscape irrigation within the secure plant grounds.

The following identifies additional potential water reclamation opportunities that the City may pursue. All of these opportunities would require Class A effluent which cannot be achieved with the upgraded Wastewater Treatment Plant. A filtration system would be required to produce the Class A effluent and could cost several hundred thousand dollars, depending upon the volume of Class A quality reclaimed water to be produced. As a consequence of this cost, and absence of cost-effective demand for reclaimed water, the City is not currently prepared to undertake water reclamation projects within its retail service area.

Water Trucks

Potential Use: Reclaimed water could be used for dust control and other construction purposes, street sweeping, and in line maintenance operations.

Potential Water Savings: 60,000 gallons per year or roughly one-sixth of current water truck usage.

Operational Feasibility: The alternative depends upon Class A effluent being available and would not be inclusive of all water truck usage since many would likely elect not to use the reclaimed water.

Financial Feasibility: Since the water trucks need to be filled with water regardless of the water source, there would be minimal additional cost for filling trucks with reclaimed water. However, the cost to produce a Class A effluent per unit volume would exceed the savings that would realized with the use of this option.

Enumclaw School District Fields Between Semanski St and 244th Ave SE

Potential Use: Field irrigation.
Potential Water Savings: 0.8 million gallons per year.

Operation Feasibility: Several Enumclaw School District fields are located approximately 1000 to 3300 feet west-southwest of the Wastewater Treatment Plant and have approximately 52 acres of total area. Irrigation pipe and associated appurtenances will need to be constructed to supply reclaimed water to the sites.

Financial Feasibility: Construction of the irrigation pipe would be highly costly. Further financial analysis is required to determine potential cost sharing opportunities that may be achieved between the City and the school district.

Boise Creek Park

Potential Use: Field irrigation.

Potential Water Savings: 1 million gallons per year

Operational Feasibility: The City could utilize reclaimed water for irrigation and landscaping at Boise Creek Park. The park is approximately 16 acres and is located at 1300 SE 469th Street, approximately 3300 feet southwest of the Wastewater Treatment Plant. Irrigation pipe and related appurtenances will need to be constructed to convey reclaimed water to the park.

Financial Feasibility: Construction of the irrigation pipe would be highly costly. Further financial analysis is required to determine potential cost sharing opportunities that may be achieved between the City and the school district.

City of Enumclaw

Potential Use: City park and ball field irrigation.

Potential Water Savings: 2.5 million gallons per year.

Operational Feasibility: The City could utilize reclaimed water to irrigate the City's approximately 31 acres of parks and ball fields spread throughout the City at 14 different locations (excluding Boise Creek Park).

Financial Feasibility: Construction of the irrigation pipe would be highly costly. Further financial analysis is required to determine potential cost sharing opportunities that may be achieved between the City and other potential reclaimed water users that may be located along the proposed alignment.

Enumclaw Golf Course

Potential Use: Course irrigation, maintenance, and grounds keeping.

Potential Water Savings: Irrigation water for the golf course is provided by non-potable surface water and ground water sources based on irrigation and domestic use water rights conveyed to Enumclaw by King County in 2004. Said rights were originally secured by King County to serve the golf course property, and are considered municipal purpose rights pursuant to the Municipal Water Law, RCW 90.03.015. In 2007, the City installed a replacement well for the two groundwater rights. Although well installation has occurred, the replacement well has not been connected to the City's water system as a new municipal water source due to funding constraints. Assuming funding can be found in the next 6 years to connect the golf course well to the City's water system, it shall: (1) serve as an additional peaking source for the existing system; and (2) continue to provide irrigation water to the golf course. Analysis of water use practices at the golf course will determine the feasibility of substituting reclaimed water to meet irrigation needs with reclaimed water, and the total amount of reclaimed water that would be needed.

Operational Feasibility: The course is located approximately 2.3 miles northeast of the Wastewater Treatment Plant. Irrigation pipe and related appurtenances would need to be constructed to convey reclaimed water to the course and the irrigation system modified to be able to use the reclaimed water.

Financial Feasibility: Construction of the necessary piping would be highly costly and would

require a Class A effluent system at the wastewater plant. Further financial analyses would need to consider potential cost sharing opportunities that may be achieved between the city and other potential reclaimed water users that may be located along the proposed alignment. The need for providing reclaimed water to the golf course to convert more golf course water to domestic use is beyond the current 20-year planning period of the Comprehensive Water System Plan.

Other Large Water Users

Potential Use: A list of Enumclaw's largest water users in 2011 is shown in **Table 4-5** of the City of Enumclaw's Comprehensive Water System Plan. Potential reclaimed water use would likely include outside watering and dairy facility cleaning.

Potential Water Savings: An estimated 4 million gallons per year could be saved assuming some of the large water users could convert a portion of their use to reclaimed water.

Operational Feasibility: Use of reclaimed water by many of the large water users would be unlikely because they are scattered throughout the water service area and their distance from the wastewater treatment plant would make it cost prohibitive. The customers nearer to reclaimed water piping that might be extended to the golf course or other reclaimed water use noted above are the most likely candidates for use of reclaimed water.

Financial Feasibility: Construction of the necessary piping would be highly costly and likely significantly exceed the cost savings that may be realized by using reclaimed water. Much depends on their location relative to the plant or reclaimed water piping installed for other uses.

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

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.

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.

Water System Name: Enumclaw Water Department
Date: January 2013
PWS ID# 236001
Contact: Scott Woodbury 360-615-5728

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):
     - ☐ 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: See Table 4-5 in Chapter 4 of the CWSP
   - **Large Self Suppliers** (choose one):
     - ☐ 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
     - ☑ The information requested is unknown or not available.
       Additional Comments: See Appendix F of the CWSP

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:
   _____
   _____

   ☑ 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: _____

   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:

   _____

   _____

   ☑ None. Additional Comments: See Appendix F of the CWSP

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

APPENDIX P

CROSS-CONNECTION CONTROL PROGRAM

CITY OF ENUMCLAW

Cross-Connection Control Program

INTRODUCTION

A Cross-Connection Control (CCC) program is a proactive and ongoing effort of a water purveyor to protect the health of its customers by preventing contamination and pollution of the municipal water supply, which is done by preventing backflow of contaminants or pollutants through cross-connection. A cross-connection is any physical connection, actual or potential, between a water system and any source of non-potable substance. All public water systems in Washington State are required to implement a CCC program. The purpose of a purveyor's CCC program shall be to protect the public water system from contamination via cross-connections. All required elements of a local CCC program must be documented and included in the Comprehensive Water System Plan. Compliance oversight is provided by the state Department of Health (DOH). The State mandate for and the required elements of a CCC program are contained in Washington Administrative Code (WAC) 246-290-490 Cross-Connection Control. The minimum required elements in a CCC program are as follows:

- An adopted local ordinance, resolution or code that establishes the purveyor's legal authority, describes operating policies and the corrective actions of a CCC program.
- Develop and implement procedures and schedules for evaluating new and existing service connections to assess hazards.
- Develop and implement procedures and schedules that eliminate or control cross-connections and ensure approved backflow preventers are properly installed.
- Ensure that personnel, including one certified Cross-Connection Control Specialist (CCS), are provided to develop and implement the CCC program.
- Develop and implement procedures to ensure approved backflow preventers are properly inspected and tested.
- Develop and implement a backflow prevention assembly testing quality control assurance program.
- Develop and implement procedures for backflow incident response.
- Include CCC program information in customer education materials.
- Develop and maintain CCC program records.
- Meet any additional CCC requirements if reclaimed water is distributed or received in the water service area.

PURPOSE AND SCOPE

This document sets forth the City's CCC program to protect the public water supply from possible contamination from backflow. The City's program is a combined program allowing for both premise isolation and in-premise or fixture protection.

AUTHORITY AND RESPONSIBILITY

The City's authority for ensuring its water system is adequately protected from potential contamination via cross connections is through Ordinance 1498 and the CCC program outlined in this document. A copy of the ordinance is included at the end of this document. The ordinance cites the controlling authority as the WAC section on cross connection control (now WAC 246-290-490) and the Cross Connection Control Manual of the Pacific Northwest Section of the American Water Works Association. These documents include definitions, acronyms, CCC history, cross connection hydraulic principles and examples, backflow preventor types and selection criteria, degree of hazard identification, testing and other procedures, and other information that the City will rely on and reference in the implementation of its CCC program. The CCC program shall be administered by the Certified Water System Operator who shall maintain certification as a Cross Connection Control Specialist.

Customers shall be responsible for all initial and continuing design, procurement, installation, permit, testing, inspection, maintenance, and other costs associated with complying with CCC requirements of the City. Any customer who violates any provisions and requirements of this document and CCC ordinance shall be subject to discontinuance of supply of City water to the premise. Discontinuance of the City potable supply to the premise shall remain in effect until corrective action, as required by the City, is completed, tested and approved.

Under the provision of WAC 246-290-490, purveyors are not responsible for eliminating or controlling cross connections within the customer's plumbing system. Under RCW 19.27, the responsibility for cross connection control within the customer's plumbing system falls under the jurisdiction of the local administrative authority. Coordination between the City water utility and the City local administrative authority or building department is summarized in the 2007 memo included at the end of this document. The City attempted to formalize coordination with the King County local administrative authority with permitting control over that portion of the City water service area outside the City limits, but was unsuccessful.

EVALUATION OF SERVICE CONNECTIONS

New service connections shall be evaluated during the building permit or utility service application review process. Installation of the required backflow assembly shall be a condition of water service from the City.

Existing connections shall be evaluated during the building permit review process for tenant improvements and during business license review process. Any other existing customer considered high hazard or that poses a potentially high risk for cross connections shall be inspected on an on-going basis as staffing time allows.

The City will inform customers in writing of the results of any evaluation and of any corrective action deemed necessary, the options for completing the corrective action, and the time allowed

for compliance. Up to 90 days will be allowed, however this time period may be shortened depending upon the degree of hazard involved and if shorter timeframes are required by the controlling authority adopted by City ordinance or any other pertinent factor. Upon installation, the customer shall arrange for inspection and testing of the assembly by a backflow assembly tester certified by the state of Washington who shall submit the test results to the City.

Customers that have failed to comply with the City's request shall receive written notice, via registered mail, that water service to the premise will be terminated within a period not to exceed 30 calendar days. In the event the customer informs the City of extenuating circumstances as to why the correction has not been completed, the City may grant a time extension up to but not exceeding 60 days. If the City determines at any time that a serious threat to the public health exists, the water service shall be terminated immediately, provided, however, that notice will be posted on the premises affected at the time said service is terminated. Except in the event of an emergency, the City shall notify the local administrative authority prior to denying or discontinuing water service to a customer.

Inspection shall be done during the initial installation, during on-site reviews of existing installations, and after any relocation.

When an initial installation or test identifies a backflow prevention assembly is not properly functioning, the customer shall correct the malfunction and have the assembly inspected and re-tested until the assembly operates correctly.

The City may allow that the public supply be protected by fixture protection as long as the level of protection is adequate to protect the City's distribution system as determined by the City’s CCC program administrator.

Residential flow-though fire systems using approved water pipe and materials shall not be required to install backflow protection. Residential fire systems not designed as a flow through system shall be metered separately from the potable supply and have backflow protection. All non-residential fire systems shall have detector meters.

Irrigation systems shall at a minimum be protected by a double check valve assembly.

CROSS-CONNECTION CONTROL AND ELIMINATION

The City will endeavor to eliminate potential cross-connections where possible. The City will not allow any potential cross-connections unless it is protected by an approved backflow prevention assembly. Customers shall be responsible for following the provisions of the City’s CCC program. In addition, owners shall be responsible for the elimination or protection of all cross-connections on their premises.

The City shall continue to eliminate potential cross-connections at existing facilities and require installation of backflow assemblies at all premises deemed to be high hazard or Table 9 facilities per WAC 246-290-490. Once potential high hazard cross-connections are evaluated and addressed, the City will concentrate its efforts on reducing potential medium and low risk cross connections.

Customers shall inform the City of any proposed or modified cross-connection and also any existing cross-connections of which the customer has actual knowledge but have not been found by the City.

PERSONNEL CERTIFICATION

WAC 246-290-490 requires that personnel, including one certified Cross-Connection Control Specialist (CCS), are provided by the purveyor to develop and implement a CCC program. The City complies with this requirement and will encourage all water utility operation and maintenance personnel to obtain and maintain CCS certification.

BACKFLOW ASSEMBLY INSPECTION AND TESTING

DOH requires that all backflow assemblies are routinely inspected and tested by certified personnel. Inspections and testing are required at the time of installation, annually thereafter, after a backflow incident, and/or after the assembly is repaired, reinstalled, or relocated.

Customers shall arrange for testing of any assemblies they own. The City will notify customers annually of required testing, and the testing must be completed before a corrective action date passes. The customer will be subject to all applicable testing, maintenance and repair fees.

Tests shall be performed by a State of Washington certified Backflow Assembly Tester (BAT) and the results reported to the City within 30 days on a form provided by or approved by the City. BATs shall notify the City of all test results, improper installations, unapproved assemblies, repairs, corrections to data, disconnections with removal of assemblies, and assembly replacements. Test reports shall be filled out completely and legibly and must include detector assembly readings where applicable. BATs must have current certification and calibration records on file or test reports will not be accepted.

When a test indicates that a backflow assembly is not functioning properly, the owner shall correct the malfunction within 5 working days or other timeframe as directed by the City. After correcting the problem, the owner shall arrange for re-inspecting and testing of the assembly.

TESTING QUALITY CONTROL ASSURANCE PROGRAM

The City shall ensure that all testing procedures are completed in a consistent manner. Only certified personnel shall be utilized to test all backflow assemblies. Personnel shall be trained as outlined by the State, fulfilling all necessary requirements in order to comply with WAC 246-290-490.

The City annually updates a list of BATs expressing interest in testing devices served by the City water system. Persons or organizations wishing to be added to this list are required to provide the City with copies of the following:

1. Proof of current certification by the State of Washington as a BAT for all persons that are authorized to perform tests.
2. Proof of current calibration tests performed for all testing equipment (annual calibration is required).

Each test submitted shall be reviewed by CCS certified staff for completeness, including BAT certificate number, equipment calibration data, differential pressure above minimum requirements, and system pressure reasonably close to that expected for the location based on the hydraulics of the water system.

As more BATs transition to submitting test reports electronically, the inclusion of a digital photo

of the device with the electronic test report may become standard and allow the reviewing CCS to verify that no changes have been made to the device from the previous year's test, since the tester may not be the same each year. It may be several years before all BATs submit electronically or carry camera phones to make this option feasible and for it to be accepted by BATs and not result in additional charges to device owners.

INCIDENT RESPONSE

Emergency response to a reported backflow incident shall be as follows:

1. Notify the City's Cross Connection Control Specialist of the incident immediately and DOH within 24 hours using the state approved incident report form included at the end of this document.
2. Shut down the affected mains to contain the affected contaminants and notify affected customers of the problem and the need to boil water for consumption and cooking if necessary.
3. Flush affected water mains to remove contaminants and disinfect as necessary. After the necessary disinfection contact time has passed, restore water service into the isolated area in a manner that removes air and allows unidirectional flushing. Take samples for water quality analysis in the affected mains and in other parts of the distribution system as necessary to ensure that all contaminants were removed. Keep the unidirectional flow scheme in operation until receipt of acceptable test results and concurrence from DOH to return to the system to normal operation. Ensure all valves are opened. Notify all parties previously contacted that normal operation is restored.

PUBLIC EDUCATION

Educational information regarding CCC will be included in the annual consumer confidence report, on utility bills, and on the City's website.

RECORD KEEPING

At a minimum the City shall record and maintain the following information:

- Master list of service connections and/or premises where backflow prevention assemblies are protecting the public water system or fixtures and assessed hazard level of each backflow assembly.
- Information on approved air gaps, including location, degree of hazard, installation date, inspection history, inspection results, and personnel conducting inspections.
- Backflow assembly information including location, assembly description, installation date, inspection history, test and repair history, test results, and inspecting personnel.
- Approved atmospheric vacuum breakers used for irrigation system applications including location, description, installation date, inspection history, and inspecting personnel.
- Program summary and backflow incident reports.

The City maintains a Microsoft Office Access database inventory of premise isolation and in-premise backflow assemblies currently served by the City water system. Device test reports, annual summary reports, and backflow incident reports are saved electronically. Together these records include the minimum information required by WAC 246-290-490.

RECLAIMED WATER REQUIREMENTS

Additional CCC requirements may be imposed by DOH in any permits issued in accordance with Chapter 90.46 RCW for systems that distribute or receive reclaimed water within their water service area. The City currently does not distribute or receive reclaimed water within its service area, therefore these requirements are not applicable.

DATE: January 2, 2007

TO: To all City of Enumclaw Staff working with any water supply system within the City of Enumclaw.

FROM: Steve Gurr, Building Official

SUBJECT: Cross Connection Control Procedure For Facilities Receiving Water From The City Enumclaw, or any other water purveyor

It has come to my attention that there is still some confusion as to when permits should be issued for cross connection control devices where the facility is served by the City of Enumclaw or any other purveyor or a private system with in the City of Enumclaw. This letter is to clarify this issue.

The Uniform Plumbing Code in chapter 6 section 603 requires that all water operated equipment or devices (lawn sprinkler systems, fire sprinkler systems, commercial hot water heating boilers, etc.), which may cause pollution or contamination, must be protected by an approved backflow protection device or assembly. It is the responsibility of the Jurisdictions Plumbing Official to regulate these in-premises devices.

Therefore we must issue permits for all such devices. Phillip Lay/Water Supernatant and Cross Connection specialist will be involved in the initial testing verification, code compliance, and annual testing record keeping of this devices for the water, building departments.

Where Premises protection required by WAC 246-290-490 and is the responsibility of the water purveyor, whether it is a private system, or a water purveyors. The purveyor will establish premises protection requirements for the facility. If the premises protection device is placed on the facility side of the meter or in the facility, the Building Department will issue a permit for such device as per the Uniform Plumbing Code with in the City of Enumclaw. Initial testing and annual monitoring of testing of such device shall be the responsibility of the outside purveyor.

If there is any questions or concerns please let me know.

Steve Gurr
Building Official
City of Enumclaw
(360) 825-3593 Ext. 5731

Chapter 14.16
CROSS-CONNECTION CONTROL PROGRAM

Sections:

14.16.010 Purpose.

14.16.020 Controlling authority.

14.16.030 Definitions.

14.16.040 Customer responsibility.

14.16.050 Prohibition.

14.16.060 Inspections.

14.16.070 Contingent service.

14.16.080 Backflow devices.

14.16.090 Violation – Penalty.

14.16.010 Purpose.

The protection of the public health of the water customers of the city by the control of actual or potential cross-connections. (Ord. 1498 § 1, 1985).

14.16.020 Controlling authority.

The policies, procedures and criteria established in WAC 248-54-285, and the accepted procedure and practice in Cross-Connection Control Manual – Pacific Northwest Section – American Waterworks Association, 3rd Edition, and later superseding editions. (Ord. 1498 § 2, 1985).

14.16.030 Definitions.

A. “Backflow” means the flow other than the intended direction of flow, of any foreign liquids, gases or substances into the distribution system of the public drinking water system.

B. “Contamination” means the entry into or the presence in the public drinking water system of any substance or matter which when present in drinking water above an acceptable level may adversely affect the health of the consumer and/or the aesthetic qualities of the water consumed.

C. Cross-connection means any physical arrangement connecting a public drinking water system, directly or indirectly, with anything, other than another public drinking water system, capable of contaminating the public drinking water system as a result of backflow.

D. “Customer” means any person(s), firm or corporation that is furnished drinking water through a legal service connection to the drinking water system.

E. “Department” means the Washington State Department of Social and Health Services.

F. “Illegal user” means any person(s), firm or corporation that is not authorized by the purveyor to use a customer’s service.

G. “Public drinking water system” means any water system or supply intended or used for human consumption or other domestic uses; including source, treatment, storage, transmission, and distribution facilities where water is furnished to any community, collection or number of individuals; however excluding a system serving one single-family residence.

H. “Purveyor” means the city of Enumclaw, or its authorized agent.

I. “Service” means a physical connection between the public drinking water system and the customer’s system. (Ord. 1498 § 3, 1985).

14.16.040 Customer responsibility.
It shall be the responsibility of the customer of the city water utility to provide cross-connection control in a manner approved by the city. (Ord. 1498 § 4, 1985).

14.16.050 Prohibition.
The installation or maintaining of any actual or potential cross-connection which would endanger the purveyor’s public drinking water system is prohibited. Any such cross-connection now existing is declared unlawful and shall be removed immediately. (Ord. 1498 § 5, 1985).

14.16.060 Inspections.
Authorized employees of the city with proper identification shall have free access at reasonable hours of the day, to all parts of the premises or within buildings to which water is supplied. Water service may be refused or terminated to any premises for failure to allow necessary inspections. (Ord. 1498 § 6, 1985).

14.16.070 Contingent service.
Water service to any premises shall be contingent upon the customer providing cross-connection control in the manner approved by the city. (Ord. 1498 § 7, 1985).

14.16.080 Backflow devices.
When backflow devices are required to be installed they shall be a model approved by the department and shall be tested a minimum of once a year. (Ord. 1498 § 8, 1985).

14.16.090 Violation – Penalty.

Service to any premises receiving its water from the purveyor's public drinking water system shall be contingent upon compliance with all rules and regulations of the department and the purveyor. Service shall be disconnected to any premises for failure to comply with rules and regulations of the department and this purveyor. (Ord. 1498 § 9, 1985).

APPENDIX Q

CIP COST ESTIMATES

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-1
Stevenson Ave from Marion St to Railroad St

NO.	ITEM	QUANTITY			UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$	40,000	$	40,000
2	Locate Existing Utilities	1	LUMP SUM	$	20,000	$	20,000
3	Erosion Control	1	LUMP SUM	$	10,000	$	10,000
4	8-inch DI Water Main, Including Fittings	0	LF	$	100	$	-
5	10-inch DI Water Main, Including Fittings	0	LF	$	120	$	-
6	12-inch DI Water Main, Including Fittings	1,150	LF	$	150	$	172,500
7	Additional Fittings	700	LB	$	5.00	$	3,500
8	Trench Safety Systems	1	LUMP SUM	$	5,750	$	5,750
9	8-inch Gate Valves	0	EA	$	2,500	$	-
10	10-inch Gate Valves	0	EA	$	3,500	$	-
11	12-inch Gate Valves	3	EA	$	5,000	$	15,000
12	Fire Hydrants	0	EA	$	6,500	$	-
13	Gravel Backfill	1,190	TN	$	35	$	41,650
14	Connections to Existing System	14	EA	$	5,000	$	70,000
15	Traffic Control	100	HRS	$	260	$	26,000
16	Sawcutting	2,000	LF	$	5	$	10,000
17	Crushed Surfacing Top Course	60	TN	$	45	$	2,700
18	Crushed Surfacing Base Course	360	TN	$	35	$	12,600
19	Concrete Pavement	80	SY	$	175	$	14,000
20	HMA Restoration	70	TN	$	220	$	15,400
21	HMA Overlay	0	TN	$	175	$	-
22	3/4" Service Connections	2	EA	$	1,500	$	3,000
23	1" Service Connections	0	EA	$	2,500	$	-
24	Commercial Service Connections	0	EA	$	4,000	$	-
25	Landscaping Restoration	60	SY	$	5	$	300
26	Topsoil	30	CY	$	50	$	1,500
27	Curb and Gutter	800	LF	$	50	$	40,000
28	Concrete Sidewalk	0	SY	$	70	$	-
29							
30							

Subtotal.....	$	503,900
Tax rate (8.8%)…..……..…..…..……..……		44,343
Subtotal:.....	$	548,243
Contingency (20%)……..…...……..……	$	109,757
TOTAL ESTIMATED CONSTRUCTION COST:.....	$	658,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$	198,000
TOTAL ESTIMATED PROJECT COST:.....	$	856,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-2
Marion St from Stevenson Ave to Edith Ave

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 13,000	$ 13,000
2	Locate Existing Utilities	1	LUMP SUM	$ 7,000	$ 7,000
3	Erosion Control	1	LUMP SUM	$ 4,000	$ 4,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	400	LF	$ 150	$ 60,000
7	Additional Fittings	300	LB	$ 5.00	$ 1,500
8	Trench Safety Systems	1	LUMP SUM	$ 2,000	$ 2,000
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	1	EA	$ 5,000	$ 5,000
12	Fire Hydrants	1	EA	$ 6,500	$ 6,500
13	Gravel Backfill	420	TN	$ 35	$ 14,700
14	Connections to Existing System	3	EA	$ 5,000	$ 15,000
15	Traffic Control	40	HRS	$ 260	$ 10,400
16	Sawcutting	20	LF	$ 5	$ 100
17	Crushed Surfacing Top Course	10	TN	$ 45	$ 450
18	Crushed Surfacing Base Course	10	TN	$ 35	$ 350
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	10	TN	$ 220	$ 2,200
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	5	EA	$ 1,500	$ 7,500
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	160	SY	$ 5	$ 800
26	Topsoil	30	CY	$ 50	$ 1,500
27	Curb and Gutter	10	LF	$ 50	$ 500
28	Concrete Sidewalk	270	SY	$ 70	$ 18,900
29					
30					

Subtotal.....	$ 171,400
Tax rate (8.8%)…..……..…..…..……..…….	15,083
Subtotal:.....	$ 186,483
Contingency (20%)……..…...…..……..…….	$ 37,517
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 224,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$ 68,000
TOTAL ESTIMATED PROJECT COST:.....	$ 292,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-3
Stevenson Ave from Railroad St to Roosevelt Ave

NO.	ITEM	QUANTITY			UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$	73,000	$	73,000
2	Locate Existing Utilities	1	LUMP SUM	$	37,000	$	37,000
3	Erosion Control	1	LUMP SUM	$	19,000	$	19,000
4	8-inch DI Water Main, Including Fittings	0	LF	$	100	$	-
5	10-inch DI Water Main, Including Fittings	0	LF	$	120	$	-
6	12-inch DI Water Main, Including Fittings	1,450	LF	$	150	$	217,500
7	Additional Fittings	800	LB	$	5.00	$	4,000
8	Trench Safety Systems	1	LUMP SUM	$	7,250	$	7,250
9	8-inch Gate Valves	0	EA	$	2,500	$	-
10	10-inch Gate Valves	0	EA	$	3,500	$	-
11	12-inch Gate Valves	4	EA	$	5,000	$	20,000
12	Fire Hydrants	2	EA	$	6,500	$	13,000
13	Gravel Backfill	1,490	TN	$	35	$	52,150
14	Connections to Existing System	9	EA	$	5,000	$	45,000
15	Traffic Control	120	HRS	$	260	$	31,200
16	Sawcutting	2,900	LF	$	5	$	14,500
17	Crushed Surfacing Top Course	200	TN	$	45	$	9,000
18	Crushed Surfacing Base Course	1,400	TN	$	35	$	49,000
19	Concrete Pavement	1,470	SY	$	175	$	257,250
20	HMA Restoration	10	TN	$	220	$	2,200
21	HMA Overlay	0	TN	$	175	$	-
22	3/4" Service Connections	0	EA	$	1,500	$	-
23	1" Service Connections	7	EA	$	2,500	$	17,500
24	Commercial Service Connections	10	EA	$	4,000	$	40,000
25	Landscaping Restoration	120	SY	$	5	$	600
26	Topsoil	20	CY	$	50	$	1,000
27	Curb and Gutter	1,300	LF	$	50	$	65,000
28	Curb Ramps	8	EA	$	4,000	$	32,000
29	Concrete Sidewalk	200	SY	$	70	$	14,000
30							

Subtotal.....	$	1,021,150
Tax rate (8.8%)…..……..…..…..……..…….		89,861
Subtotal:.....	$	1,111,011
Contingency (20%)……..…...…..……..…….	$	222,989
TOTAL ESTIMATED CONSTRUCTION COST:.....	$	1,334,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$	401,000
TOTAL ESTIMATED PROJECT COST:.....	$	1,735,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-4
Roosevelt Ave from Stevenson Ave to Watson St

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 46,000	$ 46,000
2	Locate Existing Utilities	1	LUMP SUM	$ 23,000	$ 23,000
3	Erosion Control	1	LUMP SUM	$ 12,000	$ 12,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	1,600	LF	$ 150	$ 240,000
7	Additional Fittings	900	LB	$ 5.00	$ 4,500
8	Trench Safety Systems	1	LUMP SUM	$ 8,000	$ 8,000
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	4	EA	$ 5,000	$ 20,000
12	Fire Hydrants	2	EA	$ 6,500	$ 13,000
13	Gravel Backfill	1,650	TN	$ 35	$ 57,750
14	Connections to Existing System	9	EA	$ 5,000	$ 45,000
15	Traffic Control	130	HRS	$ 390	$ 50,700
16	Sawcutting	100	LF	$ 5	$ 500
17	Crushed Surfacing Top Course	10	TN	$ 45	$ 450
18	Crushed Surfacing Base Course	20	TN	$ 35	$ 700
19	Concrete Pavement	60	SY	$ 175	$ 10,500
20	HMA Restoration	10	TN	$ 220	$ 2,200
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	0	EA	$ 1,500	$ -
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	8	EA	$ 4,000	$ 32,000
25	Landscaping Restoration	610	SY	$ 5	$ 3,050
26	Topsoil	110	CY	$ 50	$ 5,500
27	Directional Drilling	0	LF	$ 500	$ -
28	Curb and Gutter	1,000	LF	$ 50	$ 50,000
29	Curb Ramps	5	EA	$ 4,000	$ 20,000
30	Concrete Sidewalk	670	SY	$ 70	$ 46,900
	Subtotal.....				$ 691,750
	Tax rate (8.8%)….....				60,874
	Subtotal:.....				$ 752,624
	Contingency (20%)……				$ 151,376
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 904,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 272,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 1,176,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-5
Roosevelt Ave Transmission Main

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 152,000	$ 152,000
2	Locate Existing Utilities	1	LUMP SUM	$ 76,000	$ 76,000
3	Erosion Control	1	LUMP SUM	$ 38,000	$ 38,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	12-inch DI Water Main, Including Fittings	0	LF	$ 150	$ -
6	16-inch DI Water Main, Including Fittings	5,000	LF	$ 180	$ 900,000
7	Additional Fittings	3,000	LB	$ 5.00	$ 15,000
8	Trench Safety Systems	1	LUMP SUM	$ 25,000	$ 25,000
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	12-inch Gate Valves	0	EA	$ 5,000	$ -
11	16-inch Butterfly Valves	10	EA	$ 10,000	$ 100,000
12	Fire Hydrants	8	EA	$ 6,500	$ 52,000
13	Gravel Backfill	5,870	TN	$ 35	$ 205,450
14	Connections to Existing System	10	EA	$ 5,000	$ 50,000
15	Traffic Control	400	HRS	$ 390	$ 156,000
16	Sawcutting	600	LF	$ 5	$ 3,000
17	Crushed Surfacing Top Course	20	TN	$ 45	$ 900
18	Crushed Surfacing Base Course	110	TN	$ 35	$ 3,850
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	30	TN	$ 220	$ 6,600
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	0	EA	$ 1,500	$ -
23	1" Service Connections	5	EA	$ 2,500	$ 12,500
24	Commercial Service Connections	15	EA	$ 4,000	$ 60,000
25	Landscaping Restoration	2,090	SY	$ 5	$ 10,450
26	Topsoil	350	CY	$ 50	$ 17,500
27	Oversize Cost	1	LS	$ 26,250	$ 26,250
28	Curb and Gutter	1,000	LF	$ 50	$ 50,000
29	Curb Ramps	5	EA	$ 4,000	$ 20,000
30	Concrete Sidewalk	670	SY	$ 70	$ 46,900
	Subtotal.....				$ 2,027,400
	Tax rate (8.8%)….....				178,411
	Subtotal:.....				$ 2,205,811
	Contingency (20%)……				$ 441,189
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 2,647,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 795,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 3,442,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-6
Farman Street Looping

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 28,000	$ 28,000
2	Locate Existing Utilities	1	LUMP SUM	$ 14,000	$ 14,000
3	Erosion Control	1	LUMP SUM	$ 7,000	$ 7,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	1,150	LF	$ 150	$ 172,500
7	Additional Fittings	700	LB	$ 5.00	$ 3,500
8	Trench Safety Systems	1	LUMP SUM	$ 5,750	$ 5,750
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	3	EA	$ 5,000	$ 15,000
12	Fire Hydrants	0	EA	$ 6,500	$ -
13	Gravel Backfill	1,190	TN	$ 35	$ 41,650
14	Connections to Existing System	2	EA	$ 5,000	$ 10,000
15	Traffic Control	100	HRS	$ 260	$ 26,000
16	Sawcutting	0	LF	$ 5	$ -
17	Crushed Surfacing Top Course	0	TN	$ 45	$ -
18	Crushed Surfacing Base Course	0	TN	$ 35	$ -
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	0	TN	$ 220	$ -
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	0	EA	$ 1,500	$ -
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	450	SY	$ 5	$ 2,250
26	Topsoil	80	CY	$ 50	$ 4,000
27	Curb and Gutter	1,150	LF	$ 50	$ 57,500
28	Curb Ramps	0	EA	$ 4,000	$ -
29	Concrete Sidewalk	500	SY	$ 70	$ 35,000
30	Control Valve	1	LS	$ 75,000	$ 75,000
	Subtotal.....				$ 497,150
	Tax rate (8.8%)….....				43,749
	Subtotal:.....				$ 540,899
	Contingency (20%)…….....				$ 109,101
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 650,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 195,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 845,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-7
Boise Springs Transmission Main

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 200,000	$ 200,000
2	Minor Change	1	FA	$ 10,000	$ 10,000
3	Locate Existing Utilities	1	LUMP SUM	$ 10,000	$ 10,000
4	Additional Potholing	5	EA	$ 500	$ 2,500
5	Shoring and Trench Excavation Safety	1	LUMP SUM	$ 20,000	$ 20,000
6	Temporary Traffic Control	1	LUMP SUM	$ 125,000	$ 125,000
7	Erosion Control	1	LUMP SUM	$ 10,000.00	$ 10,000
8	Site Demolition, Clearing, Grubbing, &	1	LUMP SUM	$ 65,000	$ 65,000
9	Dewatering	1	LUMP SUM	$ 10,000	$ 10,000
10	Crushed Surfacing Top Course	650	TN	$ 40	$ 26,000
11	Planing Bituminous Pavement	1,530	SY	$ 7	$ 10,710
12	HMA for Trench Repair Cl. 1/2" PG 58	290	TN	$ 160	$ 46,400
13	HMA Cl. 1/2" PG 58H-22, Overlay	200	TN	$ 180	$ 36,000
14	Bank Run Gravel for Trench Backfill	2,360	TN	$ 38	$ 89,680
15	Foundation Gravel	10	TN	$ 100	$ 1,000
16	Controled Density Fill	10	CY	$ 500	$ 5,000
17	Removal of Unsuitable Material (Trenc	10	CY	$ 150	$ 1,500
18	12" DI Water Main and Fittings, Restrained Joint (Incl. Bedding)	2,820	LF	$ 250	$ 705,000
19	2-Inch HDPE DR11 Water Main and Fittings (Incl. Bedding)	520	LF	$ 60	$ 31,200
20	24" Steel Casing	90	LF	$ 400	$ 36,000
21	12" Gate Valve	8	EA	$ 4,000	$ 32,000
22	2" Gate Valve	1	EA	$ 1,500	$ 1,500
23	2" Air/Vaccuum Assembly	1	EA	$ 5,000	$ 5,000
24	Additional Fittings	400	LB	$ 7	$ 2,800
25	Connect to Existing Water Main/Facilit	6	EA	$ 10,000	$ 60,000
26	Creek Diversion	1	LUMP SUM	$ 125,000	$ 125,000
27	Creek Restoration	1	LUMP SUM	$ 225,000	$ 225,000
28	Site Restoration and Rehabiliation	1	LUMP SUM	$ 5,000	$ 5,000
29					
30					

Subtotal.....	$ 1,897,290
Tax rate (8.8%)…..……..…..…..……..…….	166,962
Subtotal:.....	$ 2,064,252
Contingency (20%)……..…...…..……..…….	$ 413,748
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 2,478,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$ 744,000
TOTAL ESTIMATED PROJECT COST:.....	$ 3,222,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-8
Porter St from Battersby Ave to McHugh Ave

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 56,000	$ 56,000
2	Locate Existing Utilities	1	LUMP SUM	$ 28,000	$ 28,000
3	Erosion Control	1	LUMP SUM	$ 14,000	$ 14,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	1,800	LF	$ 150	$ 270,000
7	Additional Fittings	1,000	LB	$ 5.00	$ 5,000
8	Trench Safety Systems	1	LUMP SUM	$ 9,000	$ 9,000
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	5	EA	$ 5,000	$ 25,000
12	Fire Hydrants	0	EA	$ 6,500	$ -
13	Gravel Backfill	1,850	TN	$ 35	$ 64,750
14	Connections to Existing System	12	EA	$ 5,000	$ 60,000
15	Traffic Control	150	HRS	$ 390	$ 58,500
16	Sawcutting	600	LF	$ 5	$ 3,000
17	Crushed Surfacing Top Course	20	TN	$ 45	$ 900
18	Crushed Surfacing Base Course	90	TN	$ 35	$ 3,150
19	Concrete Pavement	60	SY	$ 175	$ 10,500
20	HMA Restoration	30	TN	$ 220	$ 6,600
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	26	EA	$ 1,500	$ 39,000
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	590	SY	$ 5	$ 2,950
26	Topsoil	100	CY	$ 50	$ 5,000
27	Curb and Gutter	1,500	LF	$ 50	$ 75,000
28	Curb Ramps	8	EA	$ 4,000	$ 32,000
29	Concrete Sidewalk	0	SY	$ 70	$ -
30					

Subtotal.....	$ 768,350
Tax rate (8.8%)…..……...…...…..……..……	67,615
Subtotal:.....	$ 835,965
Contingency (20%)……..…...…..……..……	$ 168,035
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 1,004,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$ 302,000
TOTAL ESTIMATED PROJECT COST:.....	$ 1,306,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-9
Griffin Ave from Pioneer St to Florence St

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 48,000	$ 48,000
2	Locate Existing Utilities	1	LUMP SUM	$ 24,000	$ 24,000
3	Erosion Control	1	LUMP SUM	$ 12,000	$ 12,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	1,300	LF	$ 150	$ 195,000
7	Additional Fittings	800	LB	$ 5.00	$ 4,000
8	Trench Safety Systems	1	LUMP SUM	$ 6,500	$ 6,500
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	4	EA	$ 5,000	$ 20,000
12	Fire Hydrants	1	EA	$ 6,500	$ 6,500
13	Gravel Backfill	1,340	TN	$ 35	$ 46,900
14	Connections to Existing System	9	EA	$ 5,000	$ 45,000
15	Traffic Control	110	HRS	$ 390	$ 42,900
16	Sawcutting	2,600	LF	$ 5	$ 13,000
17	Crushed Surfacing Top Course	220	TN	$ 45	$ 9,900
18	Crushed Surfacing Base Course	1,520	TN	$ 35	$ 53,200
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	100	TN	$ 220	$ 22,000
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	6	EA	$ 1,500	$ 9,000
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	200	SY	$ 5	$ 1,000
26	Topsoil	40	CY	$ 50	$ 2,000
27	Curb and Gutter	1,000	LF	$ 50	$ 50,000
28	Curb Ramps	6	EA	$ 4,000	$ 24,000
29	Concrete Sidewalk	740	SY	$ 70	$ 51,800
30					

Subtotal.....	$ 686,700
Tax rate (8.8%)…..……..…..…..……..…….	60,430
Subtotal:.....	$ 747,130
Contingency (20%)……..…...…..……..…….	$ 149,870
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 897,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$ 270,000
TOTAL ESTIMATED PROJECT COST:.....	$ 1,167,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-10
Griffin Ave from Florence St to Highpoint St

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 72,000	$ 72,000
2	Locate Existing Utilities	1	LUMP SUM	$ 36,000	$ 36,000
3	Erosion Control	1	LUMP SUM	$ 18,000	$ 18,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	2,000	LF	$ 150	$ 300,000
7	Additional Fittings	1,100	LB	$ 5.00	$ 5,500
8	Trench Safety Systems	1	LUMP SUM	$ 10,000	$ 10,000
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	5	EA	$ 5,000	$ 25,000
12	Fire Hydrants	0	EA	$ 6,500	$ -
13	Gravel Backfill	2,060	TN	$ 35	$ 72,100
14	Connections to Existing System	10	EA	$ 5,000	$ 50,000
15	Traffic Control	160	HRS	$ 390	$ 62,400
16	Sawcutting	4,000	LF	$ 5	$ 20,000
17	Crushed Surfacing Top Course	360	TN	$ 45	$ 16,200
18	Crushed Surfacing Base Course	2,500	TN	$ 35	$ 87,500
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	150	TN	$ 220	$ 33,000
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	19	EA	$ 1,500	$ 28,500
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	0	SY	$ 5	$ -
26	Topsoil	0	CY	$ 50	$ -
27	Curb and Gutter	1,700	LF	$ 50	$ 85,000
28	Curb Ramps	5	EA	$ 4,000	$ 20,000
29	Concrete Sidewalk	1,240	SY	$ 70	$ 86,800
30					

Subtotal.....	$ 1,028,000
Tax rate (8.8%)…..……..…..…..……..…….	90,464
Subtotal:.....	$ 1,118,464
Contingency (20%)……..…...…..……..…….	$ 224,536
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 1,343,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$ 403,000
TOTAL ESTIMATED PROJECT COST:.....	$ 1,746,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-11
Lafromboise St Alley from Elmont Ave to Montgomery Ave

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 33,000	$ 33,000
2	Locate Existing Utilities	1	LUMP SUM	$ 17,000	$ 17,000
3	Erosion Control	1	LUMP SUM	$ 9,000	$ 9,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	1,100	LF	$ 150	$ 165,000
7	Additional Fittings	700	LB	$ 5.00	$ 3,500
8	Trench Safety Systems	1	LUMP SUM	$ 5,500	$ 5,500
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	3	EA	$ 5,000	$ 15,000
12	Fire Hydrants	0	EA	$ 6,500	$ -
13	Gravel Backfill	1,130	TN	$ 35	$ 39,550
14	Connections to Existing System	4	EA	$ 5,000	$ 20,000
15	Traffic Control	90	HRS	$ 260	$ 23,400
16	Sawcutting	0	LF	$ 5	$ -
17	Crushed Surfacing Top Course	330	TN	$ 45	$ 14,850
18	Crushed Surfacing Base Course	0	TN	$ 35	$ -
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	0	TN	$ 220	$ -
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	28	EA	$ 1,500	$ 42,000
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	0	SY	$ 5	$ -
26	Topsoil	0	CY	$ 50	$ -
27	Curb and Gutter	0	LF	$ 50	$ -
28	Curb Ramps	5	EA	$ 4,000	$ 20,000
29	Concrete Sidewalk	0	SY	$ 70	$ -
30					

Subtotal.....	$ 407,800
Tax rate (8.8%)….....	35,886
Subtotal:.....	$ 443,686
Contingency (20%)…….….....	$ 89,314
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 533,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$ 160,000
TOTAL ESTIMATED PROJECT COST:.....	$ 693,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-12
Montgomery Ave and Pioneer St

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 19,000	$ 19,000
2	Locate Existing Utilities	1	LUMP SUM	$ 10,000	$ 10,000
3	Erosion Control	1	LUMP SUM	$ 5,000	$ 5,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	500	LF	$ 150	$ 75,000
7	Additional Fittings	300	LB	$ 5.00	$ 1,500
8	Trench Safety Systems	1	LUMP SUM	$ 2,500	$ 2,500
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	2	EA	$ 5,000	$ 10,000
12	Fire Hydrants	2	EA	$ 6,500	$ 13,000
13	Gravel Backfill	520	TN	$ 35	$ 18,200
14	Connections to Existing System	6	EA	$ 5,000	$ 30,000
15	Traffic Control	40	HRS	$ 260	$ 10,400
16	Sawcutting	500	LF	$ 5	$ 2,500
17	Crushed Surfacing Top Course	20	TN	$ 45	$ 900
18	Crushed Surfacing Base Course	80	TN	$ 35	$ 2,800
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	20	TN	$ 220	$ 4,400
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	7	EA	$ 1,500	$ 10,500
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	100	SY	$ 5	$ 500
26	Topsoil	20	CY	$ 50	$ 1,000
27	Curb and Gutter	250	LF	$ 50	$ 12,500
28	Curb Ramps	2	EA	$ 4,000	$ 8,000
29	Concrete Sidewalk	0	SY	$ 70	$ -
30					

Subtotal.....	$ 237,700
Tax rate (8.8%)…..……...…..…..……..…….	20,918
Subtotal:.....	$ 258,618
Contingency (20%)……..…....…..……..…….	$ 52,382
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 311,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$ 94,000
TOTAL ESTIMATED PROJECT COST:.....	$ 405,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-13
Harding St from Kibler Ave to Griffin Ave

NO.	ITEM	QUANTITY			UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$	43,000	$	43,000
2	Locate Existing Utilities	1	LUMP SUM	$	22,000	$	22,000
3	Erosion Control	1	LUMP SUM	$	11,000	$	11,000
4	8-inch DI Water Main, Including Fittings	0	LF	$	100	$	-
5	10-inch DI Water Main, Including Fittings	0	LF	$	120	$	-
6	12-inch DI Water Main, Including Fittings	1,350	LF	$	150	$	202,500
7	Additional Fittings	800	LB	$	5.00	$	4,000
8	Trench Safety Systems	1	LUMP SUM	$	6,750	$	6,750
9	8-inch Gate Valves	0	EA	$	2,500	$	-
10	10-inch Gate Valves	0	EA	$	3,500	$	-
11	12-inch Gate Valves	4	EA	$	5,000	$	20,000
12	Fire Hydrants	1	EA	$	6,500	$	6,500
13	Gravel Backfill	1,390	TN	$	35	$	48,650
14	Connections to Existing System	7	EA	$	5,000	$	35,000
15	Traffic Control	110	HRS	$	260	$	28,600
16	Sawcutting	100	LF	$	5	$	500
17	Crushed Surfacing Top Course	10	TN	$	45	$	450
18	Crushed Surfacing Base Course	20	TN	$	35	$	700
19	Concrete Pavement	0	SY	$	175	$	-
20	HMA Restoration	10	TN	$	220	$	2,200
21	HMA Overlay	0	TN	$	175	$	-
22	3/4" Service Connections	46	EA	$	1,500	$	69,000
23	1" Service Connections	0	EA	$	2,500	$	-
24	Commercial Service Connections	0	EA	$	4,000	$	-
25	Landscaping Restoration	510	SY	$	5	$	2,550
26	Topsoil	90	CY	$	50	$	4,500
27	Curb and Gutter	1,300	LF	$	50	$	65,000
28	Curb Ramps	2	EA	$	4,000	$	8,000
29	Directional Drilling	100	LF	$	500	$	50,000
30	Concrete Sidewalk	870	SY	$	70	$	60,900
	Subtotal.....					$	691,800
	Tax rate (8.8%)….....						60,878
	Subtotal:.....					$	752,678
	Contingency (20%)……					$	151,322
	TOTAL ESTIMATED CONSTRUCTION COST:.....					$	904,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....					$	272,000
	TOTAL ESTIMATED PROJECT COST:.....					$	1,176,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-14
McHugh Ave from 2512 to 2840 McHugh

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 54,000	$ 54,000
2	Locate Existing Utilities	1	LUMP SUM	$ 27,000	$ 27,000
3	Erosion Control	1	LUMP SUM	$ 14,000	$ 14,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	12-inch DI Water Main, Including Fittings	1,750	LF	$ 150	$ 262,500
7	Additional Fittings	1,000	LB	$ 5.00	$ 5,000
8	Trench Safety Systems	1	LUMP SUM	$ 8,750	$ 8,750
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	12-inch Gate Valves	5	EA	$ 5,000	$ 25,000
12	Fire Hydrants	3	EA	$ 6,500	$ 19,500
13	Gravel Backfill	1,800	TN	$ 35	$ 63,000
14	Connections to Existing System	4	EA	$ 5,000	$ 20,000
15	Traffic Control	140	HRS	$ 260	$ 36,400
16	Sawcutting	3,500	LF	$ 5	$ 17,500
17	Crushed Surfacing Top Course	80	TN	$ 45	$ 3,600
18	Crushed Surfacing Base Course	530	TN	$ 35	$ 18,550
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	140	TN	$ 220	$ 30,800
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	19	EA	$ 1,500	$ 28,500
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	0	SY	$ 5	$ -
26	Topsoil	0	CY	$ 50	$ -
27	Curb and Gutter	1,300	LF	$ 50	$ 65,000
28	Curb Ramps	2	EA	$ 4,000	$ 8,000
29	Directional Drilling	0	LF	$ 500	$ -
30	Concrete Sidewalk	0	SY	$ 70	$ -

Subtotal.....	$ 707,100
Tax rate (8.8%)…..……..…..…..……..…….	62,225
Subtotal:.....	$ 769,325
Contingency (20%)……..…...…..……..…….	$ 154,675
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 924,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$ 278,000
TOTAL ESTIMATED PROJECT COST:.....	$ 1,202,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-15
Washington Ave from Porter Street to James Street

NO.	ITEM	QUANTITY			UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$	59,000	$	59,000
2	Locate Existing Utilities	1	LUMP SUM	$	30,000	$	30,000
3	Erosion Control	1	LUMP SUM	$	15,000	$	15,000
4	8-inch DI Water Main, Including Fittings	0	LF	$	100	$	-
5	10-inch DI Water Main, Including Fittings	0	LF	$	120	$	-
6	12-inch DI Water Main, Including Fittings	2,000	LF	$	150	$	300,000
7	Additional Fittings	1,100	LB	$	5.00	$	5,500
8	Trench Safety Systems	1	LUMP SUM	$	10,000	$	10,000
9	8-inch Gate Valves	0	EA	$	2,500	$	-
10	10-inch Gate Valves	0	EA	$	3,500	$	-
11	12-inch Gate Valves	5	EA	$	5,000	$	25,000
12	Fire Hydrants	5	EA	$	6,500	$	32,500
13	Gravel Backfill	2,060	TN	$	35	$	72,100
14	Connections to Existing System	13	EA	$	5,000	$	65,000
15	Traffic Control	160	HRS	$	260	$	41,600
16	Sawcutting	320	LF	$	5	$	1,600
17	Crushed Surfacing Top Course	10	TN	$	45	$	450
18	Crushed Surfacing Base Course	50	TN	$	35	$	1,750
19	Concrete Pavement	0	SY	$	175	$	-
20	HMA Restoration	20	TN	$	220	$	4,400
21	HMA Overlay	0	TN	$	175	$	-
22	3/4" Service Connections	15	EA	$	1,500	$	22,500
23	1" Service Connections	0	EA	$	2,500	$	-
24	Commercial Service Connections	5	EA	$	4,000	$	20,000
25	Landscaping Restoration	720	SY	$	5	$	3,600
26	Topsoil	120	CY	$	50	$	6,000
27	Curb and Gutter	1,000	LF	$	50	$	50,000
28	Curb Ramps	2	EA	$	4,000	$	8,000
29	Directional Drilling	0	LF	$	500	$	-
30	Concrete Sidewalk	670	SY	$	70	$	46,900
	Subtotal.....					$	820,900
	Tax rate (8.8%)….....						72,239
	Subtotal:.....					$	893,139
	Contingency (20%)……					$	178,861
	TOTAL ESTIMATED CONSTRUCTION COST:.....					$	1,072,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....					$	322,000
	TOTAL ESTIMATED PROJECT COST:.....					$	1,394,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT Z-1
New Pressure Zone

NO.	ITEM	QUANTITY			UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$	7,000	$	7,000
2	Locate Existing Utilities	1	LUMP SUM	$	4,000	$	4,000
3	Erosion Control	1	LUMP SUM	$	2,000	$	2,000
4	8-inch DI Water Main, Including Fittings	40	LF	$	100	$	4,000
5	10-inch DI Water Main, Including Fittings	20	LF	$	120	$	2,400
6	12-inch DI Water Main, Including Fittings	20	LF	$	150	$	3,000
7	Additional Fittings	100	LB	$	5.00	$	500
8	Trench Safety Systems	1	LUMP SUM	$	400	$	400
9	8-inch Gate Valves	1	EA	$	2,500	$	2,500
10	10-inch Gate Valves	1	EA	$	3,500	$	3,500
11	12-inch Gate Valves	1	EA	$	5,000	$	5,000
12	Fire Hydrants	0	EA	$	6,500	$	-
13	Gravel Backfill	80	TN	$	35	$	2,800
14	Connections to Existing System	6	EA	$	5,000	$	30,000
15	Traffic Control	10	HRS	$	260	$	2,600
16	Sawcutting	160	LF	$	5	$	800
17	Crushed Surfacing Top Course	10	TN	$	45	$	450
18	Crushed Surfacing Base Course	30	TN	$	35	$	1,050
19	Concrete Pavement	0	SY	$	175	$	-
20	HMA Restoration	10	TN	$	220	$	2,200
21	HMA Overlay	0	TN	$	175	$	-
22	3/4" Service Connections	0	EA	$	1,500	$	-
23	1" Service Connections	0	EA	$	2,500	$	-
24	Commercial Service Connections	0	EA	$	4,000	$	-
25	Landscaping Restoration	0	SY	$	5	$	-
26	Topsoil	0	CY	$	50	$	-
27	Curb and Gutter	0	LF	$	50	$	-
28	Curb Ramps	0	EA	$	4,000	$	-
29	Pressure Reducing Valve Station	4	EA	$	150,000	$	600,000
30							

Subtotal.....	$	674,200
Tax rate (8.8%)…..……..…..…..……..…….		59,330
Subtotal:.....	$	733,530
Contingency (20%)……..…...…..……..…….	$	147,470
TOTAL ESTIMATED CONSTRUCTION COST:.....	$	881,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....	$	265,000
TOTAL ESTIMATED PROJECT COST:.....	$	1,146,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
STORAGE IMPROVEMENT ST-1
New 2 MG Reservoir

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 259,000	$ 259,000
2	Minor Change	1	CALC	$ 20,000	$ 20,000
3	Demolition	1	LS	$ 25,000	$ 25,000
4	Clearing and Grubbing	1	LS	$ 25,000	$ 25,000
5	Locate Existing Utilities	1	LS	$ 10,000	$ 10,000
6	Project Temporary Traffic Control	1	LS	$ 20,000	$ 20,000
7	Erosion Control	1	LS	$ 25,000	$ 25,000
8	Trench Excavation Safety Systems	1	LS	$ 10,000	$ 10,000
9	Unsuitable Excavation	550	CY	$ 50	$ 27,500
10	Sitework	1	LS	$ 150,000	$ 150,000
11	Foundation Gravel	980	TN	$ 50	$ 49,000
12	Bank Run Gravel for Backfill	590	TN	$ 35	$ 20,650
13	Crushed Surfacing Top Course	550	TN	$ 45	$ 24,750
14	Site Restoration and Fencing	1	LS	$ 50,000	$ 50,000
15	Site Piping Valves and Appurtenances	1	LS	$ 210,000	$ 210,000
16	Connection to Existing	4	EA	$ 5,000	$ 20,000
17	Foundation Slab	1	LS	$ 250,000	$ 250,000
18	2 MG Steel Reservoir incl. coating	1	LS	$ 1,500,000	$ 1,500,000
19	Electrical, Control and Telemetry	1	LS	$ 150,000	$ 150,000

Subtotal.....	$ 2,845,900
Tax rate (8.8%)…...……...…...…….…….	250,439
Subtotal:.....	$ 3,096,339
Contingency (20%)……..…...…….…….	$ 619,661
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 3,716,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....…....…	$ 1,114,800
TOTAL ESTIMATED PROJECT COST:.....	$ 4,831,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT ST-1
New Reservoir Piping

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 17,000	$ 17,000
2	Locate Existing Utilities	1	LUMP SUM	$ 9,000	$ 9,000
3	Erosion Control	1	LUMP SUM	$ 5,000	$ 5,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	16-inch DI Water Main, Including Fittings	500	LF	$ 180	$ 90,000
7	Additional Fittings	300	LB	$ 5.00	$ 1,500
8	Trench Safety Systems	1	LUMP SUM	$ 2,500	$ 2,500
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	16-inch Butterfly Valves	1	EA	$ 10,000	$ 10,000
12	Fire Hydrants	0	EA	$ 6,500	$ -
13	Gravel Backfill	590	TN	$ 35	$ 20,650
14	Connections to Existing System	5	EA	$ 5,000	$ 25,000
15	Traffic Control	40	HRS	$ 260	$ 10,400
16	Sawcutting	0	LF	$ 5	$ -
17	Crushed Surfacing Top Course	0	TN	$ 45	$ -
18	Crushed Surfacing Base Course	0	TN	$ 35	$ -
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	0	TN	$ 220	$ -
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	0	EA	$ 1,500	$ -
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	230	SY	$ 5	$ 1,150
26	Topsoil	40	CY	$ 50	$ 2,000
27	Curb and Gutter	0	LF	$ 50	$ -
28	Curb Ramps	0	EA	$ 4,000	$ -
29	Directional Drilling	0	LF	$ 500	$ -
30	Concrete Sidewalk	0	SY	$ 70	$ -
	Subtotal.....				$ 194,200
	Tax rate (8.8%)…..……..…..……..…….				17,090
	Subtotal:.....				$ 211,290
	Contingency (20%)……..…...……..…….				$ 42,710
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 254,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 77,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 331,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
STORAGE IMPROVEMENT ST-2
Decommission 1 MG Reservoir

NO.	ITEM		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$ 36,000	$ 36,000
2	Demolition and Salvage	LUMP SUM	$ 100,000	$ 100,000
3	Backfilling and Grading	LUMP SUM	$ 250,000	$ 250,000
4	Site Restoration	LUMP SUM	$ 10,000	$ 10,000
	Subtotal.....			$ 396,000
	Tax rate (8.8%)…..……..…..…..……..…….			34,848
	Subtotal:.....			$ 430,848
	Contingency (20%)……..…...…..……..…….			$ 87,152
	TOTAL ESTIMATED CONSTRUCTION COST:.....			$ 518,000
	Engineering and Administrative Costs (30%):.....….....…			$ 155,400
	TOTAL ESTIMATED PROJECT COST:.....			$ 674,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
STORAGE IMPROVEMENT SO-1
New Watercress Well 1

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization and Demobilization	1	LS	$ 108,000	$108,000
2	Minor Change	1	CALC	$ 20,000	$ 20,000
3	Erosion Control	1	LS	$5,000	$5,000
4	Drilling for 24-inch Diameter Borehole	60	LF	$800	$48,000
5	24-Inch Diameter Production Casing	60	LF	$500	$30,000
6	Neat Cement Grout	30	CY	$700	$21,000
7	Downhole Video Inspection	1	EA	$2,000	$2,000
8	Alignment Test	1	LS	$5,000	$5,000
9	Cleaning and Disinfection	10	HR	$600	$6,000
10	Well Development	10	HR	$600	$6,000
11	Test Pump	1	LS	$30,000	$30,000
12	Test Pumping	24	HR	$400	$9,600
13	Drilling and Testing Fluids Disposal	1	LS	$10,000	$10,000
14	Piping, Valves, and Appurtenances	1	LS	$50,000	$50,000
15	Gravel Surfacing	200	TN	$45	$9,000
16	Well Pump	1	LS	$150,000	$150,000
17	Well Chlorination System	1	LS	$20,000	$20,000
18	Flow Meter and Vault	1	LS	$25,000	$25,000
19	Electrical, Instrumentation, and Integration	1	LS	$150,000	$150,000
20	Replace Existing Culvert	1	LS	$40,000	$40,000
21	Wellhouse Building	1	LS	$450,000	$450,000
22	Site Restoration	1	LS	$5,000	$5,000

Subtotal.....	$ 1,199,600
Tax rate (8.8%)…..……..…..…..……..…….	1,200
Subtotal:.....	$ 1,200,800
Contingency (20%)……..…...…..……..…….	$ 240,200
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 1,441,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....….....…	$ 432,300
TOTAL ESTIMATED PROJECT COST:.....	$ 1,874,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
STORAGE IMPROVEMENT SO-3
PC Johnson Well 3 Pump Replacement

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization and Demobilization	1 LS	$ 30,000	$30,000
2	Minor Change	1 CALC	$ 20,000	$ 20,000
4	Site Piping	1 LS	$50,000	$50,000
5	Submersible Well Pump	1 LS	$150,000	$150,000
6	Electrical, Instrumentation, and Integration	1 LS	$100,000	$100,000

Subtotal.....	$ 350,000
Tax rate (8.8%)…...……...…...…..……..…….	350
Subtotal:.....	$ 350,350
Contingency (20%)……..…...…..……..…….	$ 70,650
TOTAL ESTIMATED CONSTRUCTION COST:.....	$ 421,000
Engineering, Permitting, Construction, and Administrative Costs (30%):.....….....…	$ 126,300
TOTAL ESTIMATED PROJECT COST:.....	$ 548,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
BOOSTER STATION IMPROVEMENT BS-1
Replace Equipment at Lower New Horizons

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1 LUMP SUM	$ 19,000	$ 19,000
2	Minor Change	1 CALC	$ 5,000	$ 5,000
3	15 HP Duplex Pump Skid	1 LS	$ 100,000	$ 100,000
4	Piping, Valves, and Appurtenances	1 LS	$ 30,000	$ 30,000
5	Electrical, Control and Telemetry	1 LS	$ 50,000	$ 50,000
	Subtotal.....			$ 204,000
	Tax rate (8.8%)…..……..…..…..……..…….			17,952
	Subtotal:.....			$ 221,952
	Contingency (20%)……..…...…..……..…….			$ 45,048
	TOTAL ESTIMATED CONSTRUCTION COST:.....			$ 267,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....…....…			$ 80,100
	TOTAL ESTIMATED PROJECT COST:.....			$ 348,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
BOOSTER STATION IMPROVEMENT BS-2
Emergency Generator at Lower New Horizons

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1 LUMP SUM	$ 15,000	$ 15,000
2	Minor Change	1 CALC	$ 5,000	$ 5,000
3	Clearing and Grubbing	1 LS	$ 1,000	$ 1,000
4	Locate Existing Utilities	1 LS	$ 1,000	$ 1,000
5	Project Temporary Traffic Control	1 LS	$ 1,000	$ 1,000
6	Erosion Control	1 LS	$ 1,000	$ 1,000
7	Sitework	1 LS	$ 8,000	$ 8,000
8	Foundation Gravel	20 TN	$ 50	$ 1,000
9	Site Restoration and Fencing	1 LS	$ 2,500	$ 2,500
10	Generator Slab	1 LS	$ 3,000	$ 3,000
11	Generator Assembly	1 LS	$ 80,000	$ 80,000
12	Electrical, Control and Telemetry	1 LS	$ 40,000	$ 40,000
	Subtotal.....			$ 158,500
	Tax rate (8.8%)…..……..…..…..……..…….			13,948
	Subtotal:.....			$ 172,448
	Contingency (20%)……..…...…..……..…….			$ 34,552
	TOTAL ESTIMATED CONSTRUCTION COST:.....			$ 207,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....….....…			$ 62,100
	TOTAL ESTIMATED PROJECT COST:.....			$ 270,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT G-3
PC Johnson Automatic Transmission Main Control Valve

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 4,000	$ 4,000
2	Locate Existing Utilities	1	LUMP SUM	$ 2,000	$ 2,000
3	Erosion Control	1	LUMP SUM	$ 1,000	$ 1,000
4	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
5	10-inch DI Water Main, Including Fittings	0	LF	$ 120	$ -
6	16-inch DI Water Main, Including Fittings	20	LF	$ 180	$ 3,600
7	Additional Fittings	100	LB	$ 5.00	$ 500
8	Trench Safety Systems	1	LUMP SUM	$ 100	$ 100
9	8-inch Gate Valves	0	EA	$ 2,500	$ -
10	10-inch Gate Valves	0	EA	$ 3,500	$ -
11	16-inch Butterfly Valves	1	EA	$ 10,000	$ 10,000
12	Fire Hydrants	0	EA	$ 6,500	$ -
13	Gravel Backfill	30	TN	$ 35	$ 1,050
14	Connections to Existing System	2	EA	$ 5,000	$ 10,000
15	Traffic Control	10	HRS	$ 260	$ 2,600
16	Sawcutting	40	LF	$ 5	$ 200
17	Crushed Surfacing Top Course	10	TN	$ 45	$ 450
18	Crushed Surfacing Base Course	10	TN	$ 35	$ 350
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	10	TN	$ 220	$ 2,200
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	0	EA	$ 1,500	$ -
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	0	SY	$ 5	$ -
26	Topsoil	0	CY	$ 50	$ -
27	Curb and Gutter	0	LF	$ 50	$ -
28	Curb Ramps	0	EA	$ 4,000	$ -
29	Automated Control Valve Station	1	EA	$ 175,000	$ 175,000
30	Telemetry Improvements	1	LS	$ 50,000	$ 50,000
	Subtotal.....				$ 263,050
	Tax rate (8.8%)….....				23,148
	Subtotal:.....				$ 286,198
	Contingency (20%)……				$ 57,802
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 344,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 104,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 448,000

CITY OF ENUMCLAW
PRELIMINARY PROJECT COST ESTIMATE
MAINTENANCE IMPROVEMENT G-7
Rural Area Isolation Valves (annual)

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 5,000	$ 5,000
2	Locate Existing Utilities	1	LUMP SUM	$ 3,000	$ 3,000
3	Erosion Control	1	LUMP SUM	$ 2,000	$ 2,000
4	6-inch DI Water Main, Including Fittings	50	LF	$ 80	$ 4,000
5	8-inch DI Water Main, Including Fittings	0	LF	$ 100	$ -
6	12-inch DI Water Main, Including Fittings	0	LF	$ 150	$ -
7	Additional Fittings	100	LB	$ 5.00	$ 500
8	Trench Safety Systems	1	LUMP SUM	$ 250	$ 250
9	6-inch Gate Valves	5	EA	$ 2,000	$ 10,000
10	8-inch Gate Valves	0	EA	$ 2,500	$ -
11	12-inch Gate Valves	0	EA	$ 5,000	$ -
12	Fire Hydrants	0	EA	$ 6,500	$ -
13	Gravel Backfill	40	TN	$ 35	$ 1,400
14	Connections to Existing System	5	EA	$ 5,000	$ 25,000
15	Traffic Control	10	HRS	$ 260	$ 2,600
16	Sawcutting	100	LF	$ 5	$ 500
17	Crushed Surfacing Top Course	10	TN	$ 45	$ 450
18	Crushed Surfacing Base Course	20	TN	$ 35	$ 700
19	Concrete Pavement	0	SY	$ 175	$ -
20	HMA Restoration	10	TN	$ 220	$ 2,200
21	HMA Overlay	0	TN	$ 175	$ -
22	3/4" Service Connections	0	EA	$ 1,500	$ -
23	1" Service Connections	0	EA	$ 2,500	$ -
24	Commercial Service Connections	0	EA	$ 4,000	$ -
25	Landscaping Restoration	0	SY	$ 5	$ -
26	Topsoil	0	CY	$ 50	$ -
27	Curb and Gutter	0	LF	$ 50	$ -
28	Curb Ramps	0	EA	$ 4,000	$ -
29	Directional Drilling	0	LF	$ 500	$ -
30	Concrete Sidewalk	0	SY	$ 70	$ -
	Subtotal.....				$ 57,600
	Tax rate (8.8%)…..……..…..…..……..…….				5,069
	Subtotal:.....				$ 62,669
	Contingency (20%)……..…...…..……..…….				$ 13,331
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 76,000

APPENDIX R

WUE GOAL SETTING AND WSP ADOPTION DOCUMENTATION

CITY OF Enumclaw

AGENDA
REGULAR MEETING
ENUMCLAW CITY COUNCIL

July 10, 2023 ~ 7:00 p.m. ~ Enumclaw City Hall

1. CALL TO ORDER, FLAG SALUTE, AND ATTENDANCE:

2. ADJUSTMENTS TO THE AGENDA:

3. MOTION TO APPROVE MINUTES AS PUBLISHED:

A. Council Minutes 6-26-23 (page 3)

4. ANNOUNCEMENTS AND PRESENTATIONS:

A. PRESENTATIONS

1. State of the County Address – Reagan Dunn, King County Councilmember
2. Plateau Kids Network – Maryn Otto, President
3. Plateau Farmers' Market – Liz Clark, Market Manager and Lance Smith, Vice President

B. PUBLIC HEARING AND MEETING ANNOUNCEMENTS

1. Closed Record Public Hearing, Boise Creek Cove Preliminary Plat Application (LUA2022-0025) Ordinance No. 2757, Monday, July 24, 7:00 p.m., City Hall Council Chambers
2. Public Hearing, Adopting Draft 2023 Comprehensive Water System Plan, Resolution No. 1783, Monday, July 24, 7:00 p.m., City Hall Council Chambers

C. COMMUNITY EVENTS

1. *King County Fair,* Thursday to Saturday, July 13 – 15, 10:00 a.m. – 10:00 p.m., Sunday, July 16, 10:00 a.m. – 6:00 p.m., Expo Center
2. *Concerts in the Park,* Thursdays, July 20 – August 31, 6:00 p.m. – 8:00 p.m., various parks (page 8)
3. *Enumclaw Rotary Street Fair*, Friday – Saturday, July 21 – July 22,
4. *Annual Pacific Northwest Scottish Highland Games,* Saturday and Sunday, July 22 – 23, 8:00 a.m. – 5:30 p.m., Expo Center

5. COMMENTS FROM THE AUDIENCE: (Please Limit Comments to Three Minutes)

6. PUBLIC HEARINGS:

A. Accessory Dwelling Unit Regulation Amendments, Ordinance No. 2758 (page 9)

1. City Clerk Reads Ordinance by Title Only for the 1st Reading
2. Staff Report: Chris Pasinetti, Community Development Director
3. Council Comments:
4. Public Comments:

B. 2024 - 2029 Transportation Improvement Plan, Resolution No. 1782 (page 21)

1. City Clerk Reads Resolution by Title Only
2. Staff Report: Brian Spindor, Public Works Director
3. Committee Report:
4. Council Comments:
5. Public Comments:

7. TABLED BUSINESS:

8. COUNCIL COMMITTEE REPORTS:

A. Community & Economic Development – Wright, Chair; LaFleur, Chevassus
B. Community Services – Sauvageau, Chair; Koopman Frazier, Gruner

Water System Plan Update and

cityofenumclaw.net/600/Water-System-Plan-Update-and-Water-Use-E

iMap GIS SA RNI NWS One Call Ticket List ITIC Links BXWA Bidding EMC Campus PTrax ADS PRISM Cartegraph SwiftComply Public Works Board... Bipartisan Infrastruc... G&O Bid Documents

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CITY OF ENUMCLAW

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- Water System Plan Update and Water Use Efficiency Goal Setting

Recreation

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Water System Plan Update and Water Use Efficiency Goal Setting

Every ten years the City is required to prepare a comprehensive water system plan (CWSP) meeting the requirements of WAC 246-290-100. The City has prepared an updated plan for review. The current CWSP approval period ends on September 10, 2023. To review the draft CWSP click on the link on this page.

Customers and the public are invited to participate in the CWSP update and in the water use efficiency (WUE) goal setting process at a public hearing to be held at the regular City Council meeting on July 10, 2023, at 7 pm at 1339 Griffin Ave. Comments may also be submitted to Scott Woodbury at swoodbury@ci.enumclaw.wa.us or by calling 360-615-5728. For more information on the City's WUE program and proposed goals, see Chapter 5 and Appendix O of the draft CWSP.

CITY OF Enumclaw

AGENDA
REGULAR MEETING
ENUMCLAW CITY COUNCIL

July 24, 2023 ~ 7:00 p.m. ~ Enumclaw City Hall

1. **CALL TO ORDER, FLAG SALUTE, AND ATTENDANCE:**

2. **ADJUSTMENTS TO THE AGENDA:**

3. **MOTION TO APPROVE MINUTES AS PUBLISHED:**
   A. Council Minutes 7-10-23 (page 3)

4. **ANNOUNCEMENTS AND PRESENTATIONS:**
   A. ANNOUNCEMENTS
      1. *Coffee with the Mayor*, Monday, August 7, 9:00 a.m., City Hall Council; Chambers
      2. Farmers' Market Week Proclamation, August 6 - 12

   B. PRESENTATIONS
      1. New Employee Introductions
         a. Tim Floyd, Police Chief
            (i) Carol Graddon, Communications Officer
            (ii) Daniel Lynam, Communications Officer
            (iii) Rosalia Noronha, Police Officer
      2. Chamber of Commerce – Kerry Solmonsen, Director

   C. COMMUNITY EVENTS
      1. *Concerts in the Park,* Thursdays, July 27 - August 31, 6:00 p.m. - 8:00 p.m., Various Parks
      2. *Sundays on Cole Street*, Sundays, July 30 - August 27, 11:00 a.m. - 4:00 p.m., Cole Street
      3. *National Night Out,* Tuesday, August 1, 6:00 p.m. - 8:00 p.m., Plateau Community Church

5. **COMMENTS FROM THE AUDIENCE:** (Please Limit Comments to Three Minutes)

6. **PUBLIC HEARING:**
   A. Closed Record, Boise Creek Cove Preliminary Plat Application (LUA2022-0025), Ordinance No. 2757 (page 11)
      1. City Clerk Reads Ordinance by Title Only for the 2nd Reading
      2. Staff Report: Isaac Anzlovar, Associate Planner
      3. Council Comments:
      4. Public Input:

   B. Adopting Draft 2023 Comprehensive Water System Plan, Resolution No. 1783 (page 349)
      1. City Clerk Reads Resolution by Title Only
      2. Staff Report: Brian Spindor, Public Works Director
      3. Committee Report
      4. Council Comments:
      5. Public Input:

7. **TABLED BUSINESS:**

8. **COUNCIL COMMITTEE REPORTS:**
   A. Community & Economic Development - Wright, Chair; LaFleur, Chevassus
   B. Community Services – Sauvageau, Chair; Koopman Frazier, Gruner
   C. Finance – Koopman Frazier, Chair; Martinez, Gruner
   D. Public Safety – Chevassus, Chair; Martinez, Sauvageau
   E. Public Works – LaFleur, Chair; Wright, Gruner

ITEM# 2023.061

City Council
AGENDA BILL

MEETING DATE: 07/24/2023

SUBJECT: Draft 2023 Comprehensive Water System Plan (CWSP)

CATEGORY: RESOLUTION

BUDGET IMPACT:
Expenditure Budget: $
Revenue Budget: $
Proposed Budget Amendment: $

RELATED ORDINANCE OR RESOLUTION NO. 1783

ATTACHMENTS: Staff Report, Draft 2023 CWSP

STAFF CONTACT: Brian S. Spindor, P.E./Public Works Director

SUMMARY/BACKGROUND:

The City is required to update its CWSP every ten years. An updated draft CWSP has been prepared that shows that the water system will continue to comply with water quality regulations and fully accommodate expected growth. The review process must also include the opportunity for customers and others to provide input on goal setting for the water use efficiency program.

RECOMMENDATIONS:

DATE SENT TO COMMITTEE: 07/10/2023 DATE RETURNED: 07/24/2023

COUNCIL COMMITTEE: To be provided at the July 24th meeting following a public hearing

STAFF: Approve

(BELOW TO BE COMPLETED BY CITY CLERKS OFFICE)

COUNCIL ACTION:

- ☐ APPROVED
- ☐ DENIED
- ☐ TABLED/DEFERRED/NO ACTION
- ☐ MOVED TO SECOND READING (ordinances only)

1ST reading	7/24/23
Enactment reading	
ORDINANCE #	
RESOLUTION #	1783

CITY OF Enumclaw

STAFF REPORT

DEPARTMENT OF PUBLIC WORKS

TO: **Mayor / City Council**
FROM: **Brian Spindor, P.E. / Public Works Director**
DATE: **July 5, 2023**
SUBJECT: **Resolution No. 1783 – Draft 2023 Comprehensive Water System Plan**

Background:
Every ten years the City is required to submit a comprehensive water system plan (CWSP) for review and approval by the Washington State Department of Health (WDOH) meeting the requirements of WAC 246-290-100. The current CWSP approval period ends on September 10, 2023. An updated CWSP has been prepared and is available on the city website for review.

Analysis:
Major elements of the CWSP include:

- Existing system description
- Population and demand forecasts
- Policies and design criteria
- System evaluations and identifications of deficiencies
- Water use efficiency program
- Source protection program
- Operation and maintenance program
- Capital improvement plan
- Financial status and recommendations
- Other water system programs and information, including cross connection control, monitoring, emergency response, reporting, and construction standards.

The 2023 draft CWSP shows that the water system will continue to comply with water quality regulations and fully accommodate expected growth. Many improvements identified in the previous CWSP have been completed and a new set of improvements identified.

As required by WAC 246-290-830, the City must evaluate and reestablish water use efficiency goals as part of a CWSP approval. A public hearing will be held at the July 24 City Council meeting for customers and others to comment on the CWSP and efficiency goals after which Council will consider adoption of Resolution 1783.

Conclusion:
Following Council approval staff will make any requested revisions to the plan and release the plan for further public review. Copies of the draft plan will be forwarded to adjacent cities, water districts, tribes, King County, and state Departments of Ecology and Health for review. Review by the Department of Health can take up to 3 months. Any review comments will be addressed through a final plan prepared for adoption by the City Council jointly with other comprehensive plan amendments also being considered this year, with a likely adoption date of November 2023.

Recommendation:
After conclusion of the public hearing, staff recommends that Council approve Resolution 1783 to adopt the draft 2023 CWSP.

RESOLUTION NO. 1783

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ENUMCLAW, KING COUNTY, WASHINGTON ADOPTING THE DRAFT 2023 COMPREHENSIVE WATER SYSTEM PLAN.

Whereas, the Public Works Department is responsible for the construction, maintenance and operation of the water system, and

Whereas, every ten years the utility is required to submit a comprehensive water system plan (CWSP) meeting the requirements of WAC 246-290-100 for review and approval by the Washington State Department of Health (WDOH), and

Whereas, the current CWSP approval period ends on September 10, 2023, and

Whereas, an updated draft CWSP has been prepared that shows that the water system will continue to comply with water quality regulations and fully accommodate expected growth, and

Whereas, the City Council held a public hearing in the Enumclaw City Hall Council Chambers on July 24, 2023, at or about 7:00 p.m. to receive comments on the proposed draft CWSP and on proposed water use efficiency goals.

Now, therefore, the City Council of the City of Enumclaw, King County, Washington do hereby resolve as follows:

Section 1: The draft 2023 CWSP is hereby adopted.

Section 2: That a copy of this resolution and the draft CWSP is to be submitted to King County, Washington State Department of Health and other agencies as required.

RESOLVED IN REGULAR AND OPEN SESSION this _____ day of _____, 2023.

_____
Mayor Jan Molinaro

INTRODUCED_____
PASSED_____
APPROVED_____

Attested:

_____
Jessica Rose
City Clerk

Approved as to form:

_____
Brett C. Vinson
City Attorney

2. *Sundays on Cole Street*, Sundays, July 30 - August 27, 11:00 a.m. - 4:00 p.m., Cole Street
3. *National Night Out,* Tuesday, August 1, 6:00 p.m. - 8:00 p.m., Plateau Community Church

Mayor noted the events.

5. COMMENTS FROM THE AUDIENCE:

None

6. PUBLIC HEARING:

A. Closed Record, Boise Creek Cove Preliminary Plat Application (LUA2022-0025), Ordinance No. 2757

MAYOR OPENED THE PUBLIC HEARING AT 7:19 P.M.

Rose confirmed that the City Clerk's office received no communication from the public regarding the Boise Creek Cove Preliminary Plat Application.

City Clerk Read by Title Only

ORDINANCE NO. 2757

AN ORDINANCE OF THE CITY OF ENUMCLAW, KING COUNTY, WASHINGTON APPROVING THE BOISE CREEK COVE PRELIMINARY PLAT PROPOSED BY BATTERSBY AVE EAST, LLC LOCATED AT THE SOUTHEAST CORNER OF THE FARMAN STREET NORTH AND BATTERSBY AVENUE EAST (SE 440TH STREET) INTERSECTION, CONSISTING OF APPROXIMATELY 11.01 ACRES, PROPOSED TO BE SUBDIVIDED INTO EIGHTEEN (18) SINGLE-FAMILY RESIDENTIAL LOTS, PROVIDING FOR SEVERABILITY AND ESTABLISHING AN EFFECTIVE DATE.

Staff Report:

Anzlovar gave a PowerPoint presentation that provided an overview of the proposed preliminary plat approval requested by Battersby Ave East, LLC for an 18-lot subdivision known as the Boise Creek Cove Preliminary Plat.

Council Comments:

In response to a question by Sauvageau, Anzlovar confirmed that the traffic impact analysis showed that the intersection at Farman and Battersby should have very little traffic impact.

Public Input:

None

MAYOR CLOSED THE PUBLIC HEARING AT 7:31 P.M.

B. Adopting Draft 2023 Comprehensive Water System Plan, Resolution No. 1783

MAYOR OPENED THE PUBLIC HEARING AT 7:32 P.M.

Rose confirmed that the City Clerk's office received no communication from the public regarding the Draft 2023 Comprehensive Water System Plan.

City Clerk Read by Title Only

RESOLUTION NO. 1783

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ENUMCLAW, KING COUNTY, WASHINGTON ADOPTING THE DRAFT 2023 COMPREHENSIVE WATER SYSTEM PLAN.

Staff Report:

Woodbury gave a PowerPoint presentation that explained the current WSP approval ends September 10, 2023. Per WAC 246-290-830, the City must evaluate and reestablish water use efficiency goals as

part of a WSP approval. New water use efficiency goals are:

- Goal 1: Achieve and maintain DSL below 7% through additional steel water main replacements, by conducting annual leak surveys and fixing any identified leak as soon as possible.
- Goal 2: Reduce the annual volume of single-family residential customer leakage billing adjustments by 10% from 2023 to 2029 utilizing the new automated meter reading system to identify and notify customers of leaks more quickly than possible through the manual monthly read system.

Council Comments:
None

Public Input:
None

MAYOR CLOSED THE PUBLIC HEARING AT 7:46 P.M.

7. TABLED BUSINESS:
None

8. COUNCIL COMMITTEE REPORTS:

A. COMMUNITY AND ECONOMIC DEVELOPMENT – Councilmembers Wright, Chair; LaFleur, Chevassus

Wright stated the Committee last met on July 24. They discussed Ordinance No. 2758, middle housing resolution, and climate resilience grant review. The next meeting is scheduled for Monday, August 14, at 4:30 p.m. in Stevenson Yerxa.

B. COMMUNITY SERVICES – Councilmembers Sauvageau, Chair; Koopman Frazier, Gruner

Sauvageau stated the Committee last met on July 17. They discussed McFarland pickleball court fence, awareness bench, recreational bus, totem pole art maintenance, and Cole street closure. Montgomery Park project was discussed outside the meeting. The next meeting is scheduled for Monday, August 21, at 5:00 p.m. in the Council conference room at City Hall.

C. FINANCE – Councilmembers Koopman Frazier, Chair; Martinez, Gruner

Koopman Frazier stated the Committee last met on July 24. They discussed routine vouchers, credit card statements, and 2nd quarter financial report. The next meeting is scheduled for Monday, August 14, 6:30 p.m. in the Finance Department.

D. PUBLIC SAFETY – Councilmembers Chevassus, Chair; Sauvageau, Martinez

Chevassus stated the Committee last met on July 17. They discussed youth camping and mitigation efforts, spending limit on referral incentive, grant funding for Jail's Medication for Opioid Use Disorder (MOUD) program, and replacing obsolete tasers. The next meeting is scheduled for Monday, August 21, 6:00 p.m. at the Police Department.

E. PUBLIC WORKS – Councilmembers LaFleur, Chair; Wright, Gruner

Wright stated the Committee last met on July 24. They discussed gas hedging, long range paving decisions, Resolution No. 1783, Montgomery Park Project, Field House parking lot improvement and Cemetery seal coat. The next meeting is scheduled for Monday, August 14, 5:30 p.m. at Stevenson-Yerxa.

F. CHAMBER OF COMMERCE – Councilmembers Sauvageau, Liaison; Chevassus, Alternate

Sauvageau stated the Chamber Board last met on July 12. They discussed the 4th of July parade, boozy bingo, Crystal Mountain Ragnar Race, Best of Enumclaw involvement, and budget updates. The next meeting is scheduled for Wednesday, August 9, 8:00 a.m. at the Enumclaw School District office.

G. SOUND CITIES ASSOCIATION (SCA) - Councilmembers LaFleur, Liaison; Koopman Frazier, Alternate

Koopman Frazier stated that SCA last met on July 12, but was not able to attend. The next meeting is scheduled for Wednesday, August 9, at 7:00 p.m. virtually.

H. TOURISM ADVISORY BOARD (TAB) - Councilmember Chevassus, Liaison

Chevassus stated that TAB has not met since the last meeting. The next meeting is scheduled for Tuesday, August 1, 9:00 a.m. at The Local.

I. ENUMCLAW EXPO AND EVENTS ASSOCIATION (EEEA) BOARD - Councilmember Wright, Liaison

EEEA has not met since the last meeting. The next meeting will be held in August, date TBD at the Expo Center.

9. <u>CONSENT AGENDA:</u>

A. VOUCHER AND PAYROLL CERTIFICATION
1. Accounts Payable Vouchers # 198506 - 198726 - $2,694,481.65; Void Check #s N/A
2. June 2023 Payroll Voucher # 29043 - 29048 - $2,831.39; Payroll Direct Deposits - $640,069.53; Payroll Tax and Benefits - $642,513.20
3. ACH & Wire Transactions - $223,438.97

B. BUDGET AUTHORIZATION
1. Field House Parking Lot Improvements and Cemetery Seal Coat

C. PROJECT ACCEPTANCE
1. KCDA - Montgomery Park Project

D. ORDINANCE
1. Ordinance No. 2757 – Boise Creek Cove Preliminary Plat Application

E. RESOLUTION
1. Resolution No. 1783 – Adopting Draft 2023 Comprehensive Water System Plan

WRIGHT MOVED TO APPROVE THE CONSENT AGENDA. SAUVAGEAU SECONDED. MOTION CARRIED 6-0.

10. <u>GENERAL BUSINESS:</u>

A. ORDINANCES
1. Ordinance No. 2759 – Title 9 Criminal Law Amendments

City Clerk Reads Ordinance by Title Only

ORDINANCE NO. 2759

AN ORDINANCE OF THE CITY OF ENUMCLAW, WASHINGTON, AMENDING SECTIONS 9.44 OF THE ENUMCLAW MUNICIPAL CODE (EMC) TO ADOPT ADDITIONAL STATE STATUTE BY REFERENCE IN ORDER TO MAKE THE CITY'S CODE RELATING TO DRUG POSSESSION AND USE CONSISTENT WITH CHAPTER 1, LAWS OF 2023, 1ST SPECIAL SESSION.

Staff Report:

Vinson gave an overview of the changes to the 2023 State law and the amendments that had to be made to section 9.44 to reflect those changes.

RESOLUTION NO. 1803

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ENUMCLAW, KING COUNTY, WASHINGTON ADOPTING THE FINAL 2024 COMPREHENSIVE WATER SYSTEM PLAN.

Whereas, the Public Works Department is responsible for the construction, maintenance and operation of the water system, and

Whereas, every ten years the utility is required to submit a comprehensive water system plan (CWSP) meeting the requirements of WAC 246-290-100 for review and approval by the Washington State Department of Health (DOH), and

Whereas, the current CWSP was approved by DOH in September 2013, and

Whereas, on July 24, 2023, the City Council passed Resolution 1783 adopting a draft 2023 CWSP and water use efficiency goals and authorizing staff to forward the draft to King County, DOH, and other agencies, and

Whereas, comments received on the draft CWSP have been addressed in a final CWSP and the Council must adopt the final CWSP before final approval is issued by DOH.

Now, therefore, the City Council of the City of Enumclaw, King County, Washington do hereby resolve as follows:

Section 1: The final 2024 CWSP as submitted to the City Council is hereby adopted.

RESOLVED IN REGULAR AND OPEN SESSION this _____ day of _____, 2024.

_____
Mayor Jan Molinaro

INTRODUCED_____
PASSED_____
APPROVED_____
PUBLISHED_____

Attested:

_____
Jessica Rose
City Clerk

Approved as to form:

_____
Brett C. Vinson
City Attorney

APPENDIX S

AGENCY REVIEW CORRESPONDENCE

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Region Office
PO Box 330316, Shoreline, WA 98133-9716 • 206-594-0000

September 19, 2023

City of Enumclaw Water Department
c/o Scott Woodbury
2041 Railroad St
Enumclaw, WA 98022
swoodbury@ci.enumclaw.wa.us

RE: City of Enumclaw Water Department (Water System ID #23600)
2023 Water System Plan Comment Letter

Dear Scott Woodbury:

Thank you for the opportunity to review the City of Enumclaw Water System Plan (WSP), dated June 2023, and received by Ecology on August 3, 2023. Consistent with the Memorandum of Understanding between the Department of Health (DOH) and Department of Ecology (Ecology), regarding joint review and approval of WSPs, this letter is being sent to your office with Ecology's comments. Specific elements of the WSP review included the Water Right Self-Assessment as well as additional water rights documentation, including Ecology's water right files and previous City of Enumclaw WSPs and project reports, as applicable.

Ecology identified only minor issues during review of the WSP and supplemental documentation. These issues do not affect the sum total of instantaneous or annual quantities of the water rights in the City of Enumclaw portfolio and are summarized below.

Water Right Summary

In preparing this comment letter, Ecology reviewed specific elements of City of Enumclaw's WSP, including the Water Right Self-Assessment (Appendix I) as well as additional water rights documentation.

Please see Table 1 below for a comprehensive list of City of Enumclaw's water rights and their respective relationships and limitations as understood by Ecology. Please note that the water rights summarized here substantially agree with the City of Enumclaw Water Right Self-Assessment included in Appendix I of the 2023 WSP.

The first issue involves the purpose of use and ownership for water right G1-*02838, originally issued as Groundwater Certificate (GWC) 2514. Unlike the other Golf Course water rights held by Enumclaw (S1-*05251, G1-20890), GWC 2514 was not issued to a municipal water supplier and therefore is not considered a municipal supply water right as defined in RCW 90.03.015.

GWC 2514 was originally issued to a private individual for irrigation of 40 acres and stock watering, and the water right has not been formally changed to a municipal purpose of use. Ecology records do not show whether the full 80 acre-feet assigned as the annual quantity (Qa) under GWC 2514 has been put to beneficial use. Rough calculations suggest a demand of about 1.2 acre-feet per acre during an irrigation season that extends from April to September. As described in the WSP, the right was transferred to King County through purchase of the land in 1956/57 and was used to supply irrigation for expansion of the golf course to 18 holes. Assuming the expanded golf course area irrigated under this water right is 30 acres, similar to the original 9 holes, the water duty (and possible established annual quantity of the right) would be on the order of 35 acre-feet per year – significantly less than the certificated quantity.

However, the quantity of water which is available under GWC 2514 does not appear to be relevant to City of Enumclaw's total portfolio quantity due to the inclusion of this right within the total 516 acre-feet allocated under certificate G1-20890 for all golf course water rights. Any quantities not perfected or possibly relinquished under GWC 2514 would therefore not affect the total quantities recognized for the three rights. It is recommended that the City of Enumclaw seek a change in purpose of use, and possibly place of use, for GWC 2514 to ensure that this certificate is correctly recognized and protected as a municipal supply water right.

Table 1. Existing Water Rights

Tracking No.	Pre-1970 Certificate	Priority Date	Source Name	Qi (cfs)	QiA (gpm)	QaA (ac-ft/yr)	QaNA (ac-ft/yr)
S1-*05251	SWC 5127	9/3/1940	Golf Course	0.2	89.8	144.8	
G1-*02838	GWC 2514	11/28/1952	Golf Course		126	80	
G1-20890		9/6/1973	Golf Course[1]		550	291.2	224.8
S1-22798		2/25/1977	Boise Spring	2	897.6	1,270	
S1-*10594	SWC 5579	8/9/1951	Watercress Springs	1	448.8	724	
S1-*06308	SWC 5576	2/7/1945	Watercress Springs	0.75	336.6	543	
G1-*09339	GWC 6894	3/27/1968	Watercress Springs		1,500	1,220	
G1-*05705	GWC 4239	8/17/1960	Cemetery Well		97	28	
G1-20398		1/5/1973	Y Bar S		45	18.6	
G1-20529		4/4/1973	Y Bar S		45	18.6	
G1-23600		4/23/1980	PC Johnson Wellfield		550	880	
G1-24918		10/16/1986	PC Johnson Wellfield		950[2]		1,680
			Totals		**5,635.8**	**5,218.2**	

cfs = Cubic Feet per Second; ac-ft/yr = Acre-feet per Year; [1] =Qa recognized to be 516 ac-ft for all three Golf Course Rights
A= Additive; NA = Non-Additive; [2]= Certificated Qi is 1,500 gpm of which 950 gpm is additive

A review of Ecology records shows that the total instantaneous rate and annual quantities under all rights held by the City of Enumclaw is limited to 5,635.8 gpm and 5,218.2 ac-ft/yr, respectively. These totals agree with those presented by the City of Enumclaw in Appendix I of the WSP (Water Right Self-Assessment) but are larger than the quantities cited in Chapters 1 and 3 of the WSP (5,450 gpm and 5,146 ac-ft/yr).

In addition to the above issue, I have shown in Table 1 the correct nomenclature of the water rights included in the City of Enumclaw portfolio. Pre-1970 surface water right certificates are labeled SWC (Surface Water Certificate) followed by the certificate number. Pre-1970 groundwater certificates are labeled GWC (Ground Water Certificate) followed by the certificate number. Pre-1970 water rights were issued with unique numbers for the application, permit, and certificate phases.

Since 1970, all water rights have been assigned a tracking number that remains the same for the application, permit, and certificate phases as well as for subsequent changes to the right. Pre-1970 rights were assigned tracking numbers based on their application numbers and include an asterisk (*) after the region code (G1- for Northwest Region).

Change applications for water rights have a "C" added in front of the region code. The Y Bar S water rights (G1-20398 and G1-20529), which are currently in Trust status, were transferred to the City of Enumclaw through a change application and now that the changes are completed, they are no longer designated with the "C."

The tracking number is the default identifier that can be used in all database searches regarding water rights and should be used in the WSP and in correspondence with Ecology.

Planning calculations as presented in the WSP are based on water right total quantities of 5,450 gpm and 5,146 ac-ft/yr. The water right quantities from Ecology records (5,635.8 gpm and 5,218.2 ac-ft/yr) would not greatly increase the WSP source adequacy projections, but they should be recalculated.

Current use (2021) as presented in Tables 2-6 and 2-7 indicates 630.8 MGD which is the equivalent of 1,200 gpm and 1,936 ac-ft/yr. This lies within Enumclaw's existing water rights portfolio.

The WSP in Table 2-15 suggests that the peak hourly demand will exceed the maximum certificated pumping rate (Qi max) of 5,635.8 gpm by 2038 when the City of Enumclaw Equivalent Residential Units (ERUs) exceed approximately 10,000. In addition, the projections in Table 2-15 are based on 190 gpd/ERU and on a population increase between 2022 and 2043 of 2,870 people or 1,439 ERUs. Year 2021 use is presented in the WSP as 200 gpd/ERU and the average of 2013 to 2021 as 189 gpd/ERU (see Figure 2-1 and Table 2-9). A more conservative approach to planning should use the higher figure. At 200 gpd/ERU, the increase in annual water

use based on projections would be about 320 ac-ft/yr, resulting in a total projected annual demand of about 2,260 ac-ft/yr. Based on information provided, capacity does not appear to be an issue.

Finally, it is noted that while the Water Right Self-Assessment form indicates the use of the existing Tacoma Green River intertie in its 20-year projections, the WSP does not address this apparent deficiency, except as an emergency intertie source. If Enumclaw plans to utilize the Tacoma intertie source in the future it should be addressed in the WSP.

Please contact me by phone at (425) 577-0173 or by email at Doug.Wood@ecy.wa.gov if you have any questions.

Sincerely,

Douglas H. Wood, M.Sc., P.Geo, LHG
Hydrogeologist and Permitting Specialist
Water Resources Program

ecc: Krista Chavez, Department of Health

CITY OF ENUMCLAW

DEPARTMENT OF PUBLIC WORKS

December 5, 2023

Douglas H. Wood, M.Sc., P.Geo, LHG
Washington Department of Ecology
PO Box 330316
Shoreline, WA 98133-9716

RE: Response to Department of Ecology Comments on Draft Enumclaw Water System Plan

Dear Mr. Wood:

Thank you for your comment letter on the City of Enumclaw's 2023 Water System Plan. Our response is divided into separate sections as identified below.

Table 1 Summary of Enumclaw Water Rights / Self-Assessment Form

We have modified the Self-Assessment in Appendix I so that it agrees with Table 1 on page 2 of your letter. The revised assessment is attached with the changes highlighted in yellow. We have also corrected any discrepancies in the text of the plan to agree with Table 1, including those in Chapters 1 and 3 identified on page 3 of your letter.

We have also corrected the Self-Assessment form to clarify the Tacoma source capacity is 1000 gpm as cited in Table 1-5 of the plan and the total Qa purchased capacity is 232 ac-ft. The Qa of 76 in the original plan was the purchase capacity in million gallons (MG). While the City has already purchased capacity from Tacoma, converting Tacoma to a seasonal source is not anticipated in the 20-year planning period, as shown by Table 3-13.

Purpose of Use and Ownership of G1-02838 (GWC 2514)

Ecology's comments on the golf course water rights are noted. We have reviewed the longstanding description of the golf course water rights in the City's water system plan and confirmed that it is consistent with the historical documentation, including Ecology's action to bundle the three golf course water rights together.

Nomenclature Changes

We have changed the nomenclature of the water rights in the plan per the comments on page 3 of your letter.

Peak Hourly Demand (PHD)

The year 2043 peak hourly demand of 5,810 gpm in Table 2-15 is 1.7 times higher than the maximum day demand (MDD) of 3,419 gpm (4.9 MGD). The total Qi of the City sources isn't an accurate representation of what the City must supply to meet PHD as all systems have storage capacity to help supply the PHD. The MDD can easily be met by the City sources alone without considering any storage, even with a 200 gpd/ERU usage.

I appreciate your thorough review and the opportunity to respond. If you have any questions, please contact me at 360-615-5728.

Sincerely,

Scott Woodbury, PE
Assistant Public Works Director

ecc: Krista Chavez, DOH NW Regional Planner
Brietta Carter, PE, DOH NW Regional Engineer
Brian S. Spindor, PE, Public Works Director

Attachment

Water Right Self-Assessment Form for Water System Plans

331-372 • 1/13/2017

All water right permits, claims, and certificates must be evaluated in a water right self-assessment for all sources used to supply the water system. The self-assessment compares the parameters and other limitations of existing water rights against current and forecasted water production, as described in your water system plan, to determine whether the rights are adequate to serve your system's current and future water needs.

You must account for all sources of supply and total quantities of water withdrawn from the source. If you purchase water from another purveyor through a non-emergency intertie, you must complete the INTERTIES section of the self-assessment.

A Note on Exempt Wells

If you're seeking DOH approval of a new Group A or Group B water system using an exempt well, you must complete the self-assessment, although certain fields will not apply. Talk to your DOH regional planner about using the Water Right Self-Assessment form for a Small Water System Management Program instead of this version.

Local governments must ensure that an adequate potable water supply is available from the exempt well before issuing a building permit. Before developing a permit exempt well, check with your local authorities on their criteria for establishing an adequate potable water supply for your planned public water system.

Water Right Parameters

Below is a brief description of the parameters associated with a typical water right. For the self-assessment, you only need to describe the last two bulleted items if they apply to your water rights.

Source Type – this refers to whether the source is surface water, groundwater or a spring.
Source Location – this refers to the location of points of groundwater withdrawal or surface water diversion for each right.
Purpose of Use – this refers to the type of use, such as municipal water supply, community domestic, industrial or agricultural purposes.
Place of Use – this describes where water can be put to beneficial use under the right. Under the 2003 Municipal Water Law, RCW 90.03.386, the place of use for a water right held for municipal water supply purposes may be the system's service area as identified in an approved water system plan or small water system management program. See Ecology Policy 2030 for information on how Ecology administers the Municipal Water Law.

Period of Use – this refers to time-of-year limitations in which the water right may be put to use. If any water right has a time-of-year limitation, please include this information in the INTERRUPTIBLE WATER RIGHTS section.

Provisions or Limiting Conditions – this refers to any provisions or conditions placed on the water right. If a water right has a limiting condition or other provision, such as a collection and reporting requirement, other than a time-of year limitation, include this information in the ADDITIONAL COMMENTS section at the bottom of the self-assessment and in the water system plan narrative.

See Ecology Policy 1040 for more information on water right terminology. If you have questions about your water rights, please contact the Ecology regional office in your area.

Completing the Water Right Self-Assessment Form

The self-assessment is a Word document to allow users to make changes or to expand the document. You may use another format, if preferred, as long as all required information is included. Below is a description of all fields and how to complete them. This form is divided into four different sections. Each section is described in the headings below.

See the column identifiers (A, B, C, etc) at the bottom of each column for guidance in completing the necessary calculations.

Water Right Permit, Certificate, or Claim Number: This number is assigned by Ecology when a permit application is filed. It's listed at the top of the permit or certificate. For water right claims, this is the registration number stamped in the lower left hand corner of the claim form.

WFI Source #: Identify the individual sources (e.g. well #1, well #2) as defined on the DOH Water Facilities Inventory form. If a water right is associated with multiple sources, list all sources in the same row in this column. If a source is associated with multiple water rights, identify each water right on a separate row.

If you have any source(s) that is not currently being used (categorized as standby, back-up, or emergency), and the source has an associated water right that is not listed in column #1, please include the source and water right information in the ADDITIONAL COMMENTS section. This will identify that the source is still intended for a beneficial use under RCW 90.03.015(4). See Ecology Policy 1040.

EXISTING WATER RIGHTS SECTION *(olive green color, top section)*

This section refers to existing water rights. It does not include any water right applications that have been submitted to Ecology.

Primary Qi (Instantaneous Quantity): This is also known as instantaneous flow rate. It's the amount of water allowed to be taken under the right from the source during a period of peak operation. For surface water, this is generally expressed in terms of cubic feet per

second (cfs). For groundwater, this is generally expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm. Please indicate the units of measurement you are using for each source. If there are situations where the flow rate will be limited (e.g. limitations established on the source when other sources are utilized), please note them in the ADDITIONAL COMMENTS section in the form and in the WSP narrative.

Non-Additive Qi: This term was formally known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qi quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qi totals.*

Primary Qa (Annual Quantity): This is the amount of water that can be taken from the source under the right on an annual basis. It's usually expressed in terms of acre-feet. An acre-foot is the amount of water necessary to submerge an acre of land to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons of water.

Non-Additive Qa: This term was formerly known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qa quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qa totals.*

CURRENT SOURCE PRODUCTION SECTION *(light green color, top section)*

This section refers to how much water is withdrawn from the source under each water right for the most recent full calendar year. You will need to determine any excess or deficiency for each water right after calculating how much water was withdrawn compared to how much water is allowed under each water right. If demand has decreased over past years, you may wish to include historic maximum production information in the ADDITIONAL COMMENTS section. This will provide a more complete picture of the use of your water rights.

Use the water use data and demand projections from your water system plan to define current and projected water needs. You can determine if you'll need additional water rights based on the comparison of existing water rights, current water production, and projected 10- and 20-year needs.

Total Qi (Instantaneous Quantity): This refers to the total maximum instantaneous flow rate withdrawn from the source under each water right during the most recent calendar year. For surface water, this is expressed in terms of cubic feet per second (cfs). For groundwater, this is expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm.

Current Excess or Deficiency (Qi): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

Total Qa (Annual Quantity): This refers to the total volume of water withdrawn from each source under each water right during the most recent calendar year. It's usually expressed in acre-feet.

Current Excess or Deficiency (Qa): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

10-YEAR FORECASTED SOURCE PRODUCTION SECTION *(light blue color, top section)*

This section refers to how much water you project to withdraw from each source in ten years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 10-year forecasted amounts.

20-YEAR FORECASTED SOURCE PRODUCTION SECTION *(darker blue color, top section)*

This section refers to how much water you project to withdraw from each source in twenty years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 20-year forecasted amounts. If you are unable to provide 20-year forecasts for each source, you may choose to include the combined 20-year total at the bottom.

PENDING WATER RIGHTS SECTION *(second section of form)*

Please complete this section for any water right applications that have been submitted to Ecology. Please include the application number, whether it's a new or a change application, the date submitted, and the total quantities requested.

INTERTIES SECTION *(third section of form)*

This section must be completed by purveyors who purchase any amount of wholesale water. If your system sells water to another public water system, include the quantity sold in the CURRENT SOURCE PRODUCTION section.

Purchasers of wholesale water must account for all water obtained through the intertie for non-emergency supply purposes. This is to ensure that all sources of supply are considered when evaluating whether new water rights are needed within 20 years.

Please identify the maximum quantity of water, expressed in the same manner as the above sections, allowed under each intertie contract. If there are limiting conditions or temporary

agreements that effect the long-term use of the intertie, you must account for such limiting conditions when evaluating the current and forecasted water supply needs in your water system plan.

Finally, purchasers of wholesale water are responsible for ensuring that the underlying water right (held by the purveyor selling water) are adequate for such use. You should confirm that the selling system has accounted for the wholesale area in their water system plan to ensure that the water right authorizes the distribution of water through the intertie.

INTERRUPTIBLE WATER RIGHTS SECTION *(bottom section of form)*

This section refers to water rights that have an annual time-of-year interruption. Please complete this section for any water right listed in the above fields that has a time-of-year interruption. Please include the water right number, describe the limitation, and the time period of interruption. Purveyors with interruptible rights should develop a water shortage response plan as part of their water system plan to describe how demand will be met during periods of interruption through aggressive demand-side conservation, fixing leaks or other means.

ADDITIONAL COMMENTS SECTION *(bottom section of form)*

If the system has any source that is not currently being used on a regular basis (such a source may be categorized as stand-by, back-up, emergency), you should identify the source in this section if the source has an associated water right that is not listed in the above sections. The purpose is to identify that such water rights are still intended for a future beneficial use as required under RCW 90.03.015(4). See Page 2, Item 9 (b) in ECY Policy 2030. For these water rights, please briefly describe the future intended use of the source and when you expect to utilize the water right. This does not refer to sources categorized as seasonal sources.

You should also include any other comments in this section that will explain aspects of your water right portfolio that are not identified above.

Water Right Self-Assessment Form for Water System Plan

Mouse-over any link for more information. Click on any link for more detailed instructions.

Water Right Permit, Certificate, or Claim # *If water right is interruptible, identify limitation in yellow section below	WFI Source # If a source has multiple water rights, list each water right on separate line	Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM or CFS) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold				Current Source Production – Most Recent Calendar Year Qi = Max Instantaneous Flow Rate Withdrawn (GPM or CFS) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold				10-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold				20-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold			
		Primary Qi Maximum Rate Allowed	Non-Additive Qi Maximum Rate Allowed	Primary Qa Maximum Volume Allowed	Non-Additive Qa Maximum Volume Allowed	Total Qi Maximum Instantaneous Flow Rate Withdrawn	Current Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume Withdrawn	Current Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 10 Years	10-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 10 Years	10-Year Forecasted Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 20 Years	20-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 20 Years	20-Year Forecasted Excess or (Deficiency) Qa
S1-*05251	Golf Course	89.8			60					See comments		See comments					
S1-*10594	Watercress Spring	336.6		543		337			543	337			543				
S1-*06308	Watercress Spring	448.8		724		449			724	449			724				
G1-*02838	Golf Course	126			80	126				126							
G1-*05705	Cemetery Well	97		28			97		28		97		28				
G1-*09339	Watercress Spring	1500		1220		1500		693	527	1500		700	520				
G1-20398C	Y Bar S	45		18.6			45		18.6		45		18.6				
G1-20529C	Y Bar S	45		18.6			45		18.6		45		18.6				
G1-20890	Golf Course	550		516		550		103	413	550		131	385				
S1-22798	Boise Spring	897.6		1270		940	-42	1277	-7	898		1270					
G1-23600	PC Johnson Wellfield	550		880		550		34	846	550		200	680				
G1-24918	PC Johnson Wellfield	950			1680	660	290			950							
	TOTALS =	5635.8		5218.2		5112	435	2107	3111.2	5360	(277)	2301	2917.2	5360	(450)	2397	2821.2
Column Identifiers for Calculations:		A		B		C	=A-C	D	=B-D	E	= A-E	F	=B-F	G	=A-G	H	=B-H

PENDING WATER RIGHT APPLICATIONS: Identify any water right applications that have been submitted to Ecology.

Application Number	New or Change Application?	Date Submitted	Quantities Requested			
			Primary Qi	Non-Additive Qi	Primary Qa	Non-Additive Qa

INTERTIES: Systems receiving wholesale water complete this section. Wholesaling systems must include water sold through intertie in the current and forecasted source production columns above.

Name of Wholesaling System Providing Water	Quantities Allowed In Contract		Expiration Date of Contract	Currently Purchased Current quantity purchased through intertie				10-Year Forecasted Purchase Forecasted quantity purchased through intertie				20-Year Forecasted Purchase Forecasted quantity purchased through intertie			
	Maximum Qi Instantaneous Flow Rate	Maximum Qa Annual Volume		Maximum Qi Instantaneous Flow Rate	Current Excess or (Deficiency) Qi	Maximum Qa Annual Volume	Current Excess or (Deficiency) Qa	Maximum Qi 10-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 10-Year Forecast	Future Excess or (Deficiency) Qa	Maximum Qi 20-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 20-Year Forecast	Future Excess or (Deficiency) Qa
1 Tacoma Water	1000	232	None												
2															
3															
TOTALS =	1000	232													
Column Identifiers for Calculations:	A	B		C	=A-C	D	=B-D	E	=A-E	F	=B-F	G	=A-G	H	=B-H

INTERRUPTIBLE WATER RIGHTS: Identify limitations on any water rights listed above that are interruptible.

Water Right #	Conditions of Interruption	Time Period of Interruption
1		
2		
3		

ADDITIONAL COMMENTS:

- City plans to deed right S-5127C to Ecology.
- City has extended the Y Bar S rights (CG1-20398C, CG1-20529C) temporary trust donations to Dec 16, 2029.
- City plans to install an automatic valve to keep Boise Spring Qi and Qa from exceeding water right quantities.
- Currently Tacoma is only an emergency source. Although Enumclaw has purchased capacity from Tacoma, converting Tacoma to a seasonal source is not anticipated in the 20-year planning period. Qi deficiencies in the table above are met through the use of system storage.

Scott Woodbury

From: Wood, Doug (ECY) <DWOO461@ECY.WA.GOV>
Sent: Wednesday, December 6, 2023 8:05 AM
To: Scott Woodbury
Cc: Chavez, Krista R (DOH); Brian Spindor; Smith, Alicia (ECY); Carter, Brietta J (DOH)
Subject: RE: Dept. of Ecology - City of Enumclaw Water Department WSP ECY Comment Letter

CAUTION: This email originated from outside the City of Enumclaw network. Do not click links, open attachments or follow guidance unless you recognize the sender and know the content is safe.

Scott,

Thanks for your response. I will ensure your attachments are placed in Ecology's records.

Sincerely,

Doug Wood
Water Resources Program
Dept. of Ecology - NW Region
PO Box 330316, Shoreline, WA 98133-9716
Phone: (425) 577-0173

This communication is a public record and may be subject to disclosure as per the Washington State Public Records Act, RCW 42.56.

From: Scott Woodbury <SWoodbury@ci.enumclaw.wa.us>
Sent: Tuesday, December 5, 2023 3:23 PM
To: Wood, Doug (ECY) <DWOO461@ECY.WA.GOV>
Cc: Chavez, Krista R (DOH) <Krista.Chavez@DOH.WA.GOV>; Brian Spindor <bspindor@ci.enumclaw.wa.us>; Smith, Alicia (ECY) <alis461@ECY.WA.GOV>; Carter, Brietta J (DOH) <brietta.carter@doh.wa.gov>
Subject: RE: Dept. of Ecology - City of Enumclaw Water Department WSP ECY Comment Letter

Mr. Wood,

Please see the attached City of Enumclaw response to the DOE comment letter for the City's water system plan. I have also attached your comment letter for reference.

Thank you.

Scott Woodbury, P.E. | Assistant Public Works Director
City of Enumclaw | 1309 Myrtle Ave, Enumclaw 98022
360-615-5728 office | 253-261-1937 cell

From: Scott Woodbury
Sent: Wednesday, September 20, 2023 10:40 AM
To: Smith, Alicia (ECY) <alis461@ECY.WA.GOV>

Cc: Chavez, Krista R (DOH) <Krista.Chavez@DOH.WA.GOV>; Wood, Doug (ECY) <DWOO461@ECY.WA.GOV>; Brian Spindor <bspindor@ci.enumclaw.wa.us>
Subject: Dept. of Ecology - City of Enumclaw Water Department WSP ECY Comment Letter

Alicia,

I am confirming receipt of the attached comment letter. We appreciate receiving ECY's review and will address the comments in our final plan document.

Scott

From: Smith, Alicia (ECY) <alis461@ECY.WA.GOV>
Sent: Tuesday, September 19, 2023 1:58 PM
To: Scott Woodbury <SWoodbury@ci.enumclaw.wa.us>
Cc: Chavez, Krista R (DOH) <Krista.Chavez@DOH.WA.GOV>; Wood, Doug (ECY) <DWOO461@ECY.WA.GOV>
Subject: Dept. of Ecology - City of Enumclaw Water Department WSP ECY Comment Letter

CAUTION: This email originated from outside the City of Enumclaw network. Do not click links, open attachments or follow guidance unless you recognize the sender and know the content is safe.

Good afternoon Scott,

I hope this email finds you well. Please see the attached Department of Ecology comment letter for City of Enumclaw Water Department's water system plan.

Please contact Doug Wood with any questions you may have about this letter by phone at (425) 577-0173 or by email at Doug.Wood@ecy.wa.gov.

Thank you,

Alicia Smith (she/her)
Washington Department of Ecology
Water Resources Program | Northwest Region Office
PO Box 330316 | Shoreline, WA 98133-9716
Phone: (206) 594-0194

Scott Woodbury

From: Scott Woodbury
Sent: Monday, August 14, 2023 8:42 AM
To: Reisinger, Daniel
Cc: Powell, Marc; Lane, Doug; Knickerbocker, Jessica
Subject: RE: Enumclaw Draft Water System Plan
Attachments: City of Enumclaw Wholesale Capacity

Dan,

Thanks for reviewing our plan and finding this error in the self-assessment table. The 76 quantity is our Qa in MG/yr that should have been converted into the 232 AFY that you noted. We'll correct this in the final plan.

Scott

From: Reisinger, Daniel <DReisinger@cityoftacoma.org>
Sent: Monday, August 14, 2023 7:31 AM
To: Scott Woodbury <SWoodbury@ci.enumclaw.wa.us>
Cc: Powell, Marc <mpowell@cityoftacoma.org>; Lane, Doug <DLane@cityoftacoma.org>; Knickerbocker, Jessica <JKnicker@cityoftacoma.org>
Subject: RE: Enumclaw Draft Water System Plan

CAUTION: This email originated from outside the City of Enumclaw network. Do not click links, open attachments or follow guidance unless you recognize the sender and know the content is safe.

Scott,

Thank you for the opportunity to review the City of Enumclaw's Water System Plan. Jessica asked that I review your plan, where I focused solely on our intertie. Our records indicate that Enumclaw has purchased annual average supply under the 1997 agreement of 0.207 MGD or 232 AFY. The Water Rights Self Assessment in Appendix I (Page 373 of the pdf) states annual supply (Qa) shows 76 AFY. The Qi in the Water Rights Self Assessment matches our records. I have attached the email chain from 2009 that shows higher values. **Do you have records to indicate different annual average supply amounts?**

If you do not have other records, I can prepare a formal response letter with the revised Intertie Qa.
We have no other comments on the Water System Plan.

Thanks,
Dan

Daniel L Reisinger
System Planning Supervisor
Tacoma Water | Planning & Engineering
3628 S 35th St, Tacoma, WA 98409
M: (253) 316-2477
dreisinger@cityoftacoma.org

From: Scott Woodbury
Sent: Wednesday, July 26, 2023 1:05 PM
To: jknickerbocker@cityoftacoma.org; Fehr, Randy <RFehr@EnumclawFire.org>; ktsang@muckleshoot.nsn.us; djudkins@mvfire.org; jweidenfeller@thurstonpud.org; carrollandsons@msn.com
Subject: Enumclaw Draft Water System Plan

The City of Enumclaw has completed an update of its water system plan. As a fire district or Group A water system with facilities within or near the Enumclaw water service area, we are providing you a copy of our plan for review. Below is a link where you can download a copy.

https://www.cityofenumclaw.net/DocumentCenter/View/8287/Water-System-Plan-2023

Please confirm receipt of this email. I would appreciate your returning any comments you may have within 45 days from the date of this email.

Thank you.

Scott Woodbury, P.E. | Assistant Public Works Director
City of Enumclaw | 1309 Myrtle Ave, Enumclaw 98022
360-615-5728 office | 253-261-1937 cell

Scott Woodbury

From: Scott Woodbury <ScottWoodbury@ci.enumclaw.wa.us>
Sent: Monday, March 16, 2009 10:39 AM
To: Knoll, Ronald ; Evancho, Jane
Cc: Chris Searcy
Subject: City of Enumclaw Wholesale Capacity
Attachments: ADD_Committment.xls

Ron and Jane,

Thanks for e-mailing me the spreadsheet. I added a sheet at the end that removes any capacity for Y Bar S and shows that 399 ERU have been purchased under the 1997 agreement (pay-as-you-go). We will be going to the City Council soon regarding not purchasing any capacity for Y Bar S given the direction that the Tacoma board is going regarding "take or pay". I will let you know their decision.

Scott Woodbury, P.E.
Assistant City Engineer
City of Enumclaw Public Works
1309 Myrtle Ave
Enumclaw, WA 98022
360-615-5728
360-825-7232 fax
253-261-1937 cell

From: Knoll, Ronald [mailto:RKNOLL@ci.tacoma.wa.us]
Sent: Monday, March 16, 2009 9:50 AM
To: Scott Woodbury
Cc: Evancho, Jane
Subject: RE: Take or Pay for Future Connections

Scott,
Jane asked that I send you this electronic version of the connections spreadsheet. As the footnote says it is updated to reflect the spreadsheet that you sent to us in December, 2008.
Thanks,
Ron

ENUMCLAW COMMITTMENT

Date	New S/F Residential	S/F Average Consumption (gpd)[1]	S/F Peak Consumption (gpd)	ADD (MGD)	Cumulative ADD (MGD)	ADD (gpm)	Cumulative ADD (gpm)	Peak day (MGD)	Cumulative Peak day (MGD)	Peak day (gpm)	Cumulative Peak day (MGD)
10/1/1997				0.055	0.055	38.194	38.194	0.33	0.33	229.167	229.167
1998	70	662	384	0.046	0.101	32.181	70.375	0.073	0.403	50.847	280.014
1999	36	662	384	0.024	0.125	16.550	86.925	0.038	0.441	26.150	306.164
1999 (revised SDC)	46.5	279	302	0.013	0.138	9.009	95.934	0.027	0.468	18.761	324.925
2000	72	279	302	0.020	0.158	13.950	109.884	0.042	0.510	29.050	353.975
2001	44	279	302	0.012	0.170	8.428	118.313	0.025	0.535	17.551	371.526
2002	35	279	302	0.010	0.180	6.781	125.094	0.020	0.555	14.122	385.648
2003	39	279	302	0.011	0.191	7.556	132.650	0.023	0.578	15.735	401.383
2004	20	279	302	0.006	0.197	3.875	136.525	0.012	0.590	8.069	409.453
2005	34	279	302	0.009	0.206	6.588	143.113	0.020	0.609	13.718	423.171
2006	3	279	302	0.001	0.207	0.581	143.694	0.002	0.611	1.210	424.381
Y-S		279	302	0.000	0.207	0.000	143.694	0.000	0.611	0.000	424.381
Total	399.0			0.21		143.69		0.61		424.38	

206,919 Gallons per day **611,109 Gallons per day**

Red font is update from Enumclaw e mail forwarded from Jane on 10/7/08.
ADD for 1997 is taken from wholsale service letter dated June 13, 1997 to Enumclaw's PW director.
Peak day volume for 1997 is taken from the October 21, 1997 water service agreement as noted in City of Enumclaw resolution No. 759
Peak day volume after 1997 equals the sum of new S/F Residentials (ERU) times S/F Average day plus S/F Peak day consumption