



Planning • Management • Engineering
P.O. Box 123 • Port Orchard, WA 98366 • 888-881-0958 • 360-876-0958

April 9, 2025

Candida Grandillo-Dodds, PE
WSDOH ODW SWRO
PO Box 47823
Olympia, WA 98504-7823

Re: Shadow Creek Water System, ID #AE015H, Thurston County; ODW Projects #21-0704 and 22-1203, Updated WSP Submittal

Dear Candida Grandillo-Dodds,

The enclosed WSP (part B) is an updated WSP submittal for the existing Shadow Creek water system which is a Group A Community water system. The water system is seeking to expand to supply a total of 28 full-time residential homes at buildout. The development is located northeast of Olympia.

In order for the system to gain full approval for the 8 additional connections, the WSP Part B was required to be updated as well as an amendment of the service area for the adjacent Coppermill water system. A service area amendment for Coppermill from Thurston PUD is enclosed.

The water system and development are currently being built by Mance and Son Residential Developers, Inc. (John Mance). However, the water system will be owned by Thurston PUD after installation is complete. Thus, only a Part B WSP is being submitted.

Should you have any questions, or require further information, please feel free to contact me.

Sincerely
NORTHWEST WATER SYSTEMS, INC.

Allison Whittle
Allison Whittle, Design Engineer

Cc: Projects\200701



Drinking Water

Project Approval Application (PAA) Form

331-149 F • Revised 11/2/2022

Please complete all appropriate sections of this application form and include it with your project.

WATER SYSTEM Information

<u>Shadow Creek</u>	<u>AE015H</u>
Water System Name	PWS ID #
<u>WSP Part B Update</u>	<u>Thurston</u>
Submittal Description	County
<u>A-Community</u>	<u>Less than 100</u>
Classification	# of Service Connections

OWNER Information

<u>John Mance</u>	<u>Enter text</u>
Name	Owner ID #
<u>msrdinc@hotmail.com</u>	<u>360-491-2685</u>
E-mail address	Phone
<u>5448 78th Ave NE</u>	<u>Olympia</u>
Mailing address	City
<u>WA</u>	<u>98516</u>
State	Zip

PROJECT CONTACT Information

<u>Allison Whittle</u>	<u>NWS</u>
Name/Position	
<u>allison@nwwatersystems.com</u>	<u>360-976-0958</u>
E-mail address	Phone
<u>PO Box 123</u>	<u>Port Orchard</u>
Mailing address	City
<u>WA</u>	<u>98366</u>
State	Zip

CONSULTING/DESIGN ENGINEER Information

<u>Allison Whittle</u>	<u>NWS</u>
Name/Firm	
<u>allison@nwwatersystems.com</u>	<u>360-976-0958</u>
E-mail address	Phone
<u>PO Box 123</u>	<u>Port Orchard</u>
Mailing address	City
<u>WA</u>	<u>98366</u>
State	Zip

SMA Information

<u>Northwest Water Systems</u>	<u>119</u>
Name/SMA	SMA #
<u>info@nwwatersystems.com</u>	<u>360-876-0958</u>
E-mail address	Phone
<u>PO Box 123</u>	<u>Port Orchard</u>
Mailing address	City
<u>WA</u>	<u>98366</u>
State	Zip

BILLING Information*

<u>John Mance</u>	
Name	
<u>msrdinc@hotmail.com</u>	<u>360-491-2685</u>
E-mail address	Phone
<u>5448 78th Ave NE</u>	<u>Olympia</u>
Mailing address	City
<u>WA</u>	<u>98516</u>
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 # Enter Number

Loan # Enter Number

Enforcement

Docket # Enter Number

Type Enter Text

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

Choose Project Report

Project Report Type

Choose Predesign Study

Predesign Study

Choose Construction Documents

Construction Documents

Choose Other

Other

Choose Special Report or Plans

Special Report or Plans

Choose Existing System Approval

Existing System Approval

Choose Waiver

Waiver

PLANNING Information

How many connections does system currently have?	<u>3</u>
If system is private-for-profit, is it regulated by UTC?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Is system expanding?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Expanding service area?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Increasing number of approved connections?.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If the number of connections is expected to increase, how many <i>new</i> connections are proposed in the next ten (10) years?	<u>28</u>
Is your system pursuing additional water rights from Department of Ecology in the next 20 Years?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Is a new intertie proposed?.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Is the system located in a Critical Water Supply Service Area (is there a Coordinated Water System Plan)?.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If yes, have you sent a copy of the plan to the county or responsible agency for the CWSP?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Are you requesting distribution main project report and construction document submittal exception?.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If so, does the WSP contain standard construction specifications for distribution mains?	<input type="checkbox"/> Yes <input type="checkbox"/> 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.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
♦ All local governments within the service area.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
♦ County and city planning departments, one or both if applicable, adjacent water systems, etc..	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
List who have you sent the WSP to for review other than ODW?.....	<u>Thurston PUD</u>
Are you proposing a change in the place of use of your water right?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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?.....	<input type="checkbox"/> Yes <input type="checkbox"/> No
What are the years of the requested plan approval period (for example 2022 to 2032)?	<u>2025 to 2035</u>
Does your plan follow your preplan checklist?	<input type="checkbox"/> Yes <input type="checkbox"/> 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..... Enter Text

Please submit all documents electronically. We request one paper copy of planning documents be submitted to the address for your regional office below.

- | | | |
|--|--|---|
| <input type="checkbox"/> Eastern Regional Office
Department of Health
eroadmin@doh.wa.gov
Phone: 509-329-2100 | <input type="checkbox"/> Northwest Regional Office
Department of Health
dwnwro.wsprojects@doh.wa.gov
Phone: 253-395-6750 | <input checked="" type="checkbox"/> Southwest Regional Office
Department of Health
swro.admin@doh.wa.gov
Phone: 360-236-3030 |
|--|--|---|



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.

**SHADOW CREEK
WATER SYSTEM PLAN
PART B**

April 9, 2025

**PROJECT NUMBER
200701**

**NORTHWEST WATER SYSTEMS, INC.
P.O. BOX 123
PORT ORCHARD, WA 98366
(360)876-0958**

Water System Plan Part B for the Shadow Creek Water System WSID: AE015H

EXECUTIVE SUMMARY:

The Shadow Creek Water System is a Group A community water system that will supply a development of 28 full-time residential connections at buildout. The water system is being constructed by Mance and Son Residential Developers, Inc. and will be owned by the Public Utility District No. 1 of Thurston County (Thurston PUD or TPUD). The water system plan part B is supplemental to TPUD’s water system plan part A.

The Shadow Creek WSP part B was previously approved under ODW Project #21-0704. The purpose of updating the plan is to gain approval to expand the system to 28 connections. A capacity analysis for 28 connections was previously accomplished under ODW Project #22-1203 and the WSP Part B update is required for expanding beyond 20 connections.

The water system is supplied by two wells in a wellfield located in the NE ¼, NW ¼, Section 27, Township 19 N, Range 01W, and the well pumps run individually at 60 gpm to operate within the constraint of the maximum flow rate for the installed treatment system. The wells pump directly to four 5,000 gallon Norwesco reservoirs, and a booster station pressurizes the distribution system which consists of 4-in C900 PVC. Oxidation filtration is used to reduce the levels of iron and manganese below their respective EPA maximum contamination levels (MCL).

Population:	70 (at buildout)
Sources:	S01, Well #1, BMS04, 6-in, 237 ft, 60 gpm S02, Well #2, BLH562, 6-in, 236 ft, 60 gpm S03, Wellfield (S01 & S02)
Storage:	4 x 5,000 gallons
Pressurization:	Booster Pump
Distribution	4-in C900 PVC, 4,800 ft
Water Rights	100 gpm, 12.5 acre-feet per year
ADD/ERU	400 gpd
MDD/ERU	1,891 gpd
Current PHD	30 gpm
Buildout PHD	128 gpm
Fire Flow Requirements	Not required
Management	Certified Operator

TABLE OF CONTENTS

Chapter 1 System Description 1

 1.1 Ownership and Management 1

 1.2 System History and Background 1

 1.3 Related Plans..... 1

 1.4 Service Area, Maps, and Land Use..... 2

 1.5 System Policies..... 5

 1.6 Conditions of Services..... 5

 1.7 Watershed Plan Consistency..... 5

 1.8 Local Government Consistency..... 5

Chapter 2 Basic Planning Data 6

 2.1 Current Population, Service Connections, and Equivalent Residential Units (ERUs) 6

 2.2 Water Production and Usage..... 6

 2.3 Distribution System Leakage..... 9

 2.4 Water Supply Characteristics..... 9

 2.5 Water Supply Reliability Evaluation 9

 2.6 Future Population Projections and Land Use 9

 2.7 Future Water Demand 9

Chapter 3 System Inventory and Analysis 10

 3.1 System Design Standards..... 10

 3.2 Water Quality..... 10

 3.3 System Inventory and Asset Condition Assessment..... 10

 3.4 Capacity Analysis..... 11

 3.5 Distribution System Hydraulic Analysis..... 15

 3.6 Summary of System Deficiencies 16

Chapter 4 Water Use Efficiency Program 17

 4.1 Source and Service Metering 17

 4.2 Distribution System Leakage..... 17

 4.3 Water Use Efficiency Program 17

 4.4 Water Right Self-Assessment..... 17

Chapter 5 Source Water Protection 18

 5.1 Wellhead Protection 18

 5.2 Water Quality Analysis..... 19

Chapter 6 Operations and Maintenance 21

 6.1 Water System Management and Personnel 21

 6.2 Operations and Preventative Maintenance..... 21

 6.3 Comprehensive Water Quality Monitoring 21

 6.4 Emergency Response Program 21

 6.5 Cross Connection Control 21

 6.6 Record Keeping, Reporting, and Customer Complaint Program 21

 6.7 Summary of O&M Deficiencies 21

Chapter 7 Distribution Facilities Design and Construction Standards..... 22

Chapter 8 Capital Improvement Program 23

 8.1 Prioritization Criteria..... 23

 8.2 Prioritized List of Improvements..... 23

 8.3 Assessment of Improvements..... 23

Chapter 9 Financial Program 24

Chapter 10	Appendices and Supporting Documents.....	25
10.1	Hydraulic Analysis	25
10.2	Well Logs and Pumping Equipment	25
10.3	Water Quality.....	25
10.4	WSP Adoption Notice and Minutes	25
10.5	Local Government Consistency.....	25
10.6	Construction Maps and Drawings.....	25

LIST OF TABLES

Table 2.1.	Hawley Hills and Coppermill Water Usage Data	7
Table 2.2.	Shadow Creek Demand Summary.....	8
Table 2.3:	Estimated Future Water Use.....	9
Table 3.1:	Summary of Sources.....	10
Table 3.2:	Water Rights and Pumping Capacities	11
Table 3.3:	Summary of Buildings.....	11
Table 3.4.	Storage Requirement Summary.....	13
Table 3.5:	Summary of Distribution Model Results	15
Table 4.1:	Summary of WUE Program Requirements.....	17

LIST OF FIGURES

Figure 1.1:	Shadow Creek vicinity map.....	3
Figure 1.2:	Shadow Creek zoning designation from Thurston Co. GIS Parcel Maps.....	4
Figure 2.1.	Decreasing Trends in Water Usage on Thurston PUD Owned Systems.....	7
Figure 5.1:	Wellhead Protection Areas	19

Shadow Creek

Water System Plan

Acronyms

ADD	Average Daily Demand
C	Coefficient of Friction
DSL	Distribution System Leakage
ERU	Equivalent Residential Unit
GW	Groundwater Under the Influence of Surface Water
HGL	Hydraulic Grade Line
MCL	Maximum Contaminant Level
MDD	Maximum Daily Demand
MPA	Microscopic Particulate Analysis
NTNC	Non-Transient Non-Community
PHD	Peak Hourly Demand
ppb	Parts per Billion
ppm	Parts per Million
RSA	Retail Service Area
SMA	Satellite Management Agency
SWL	Static Water Level
SWSMP	Small Water System Management Program
UTC	Utilities and Transportation Commission
WDM	Water Distribution Manager
WFI	Water Facilities Inventory (form)
WSDM	Water System Design Manual
WSDOH	Washington State Department of Health
WSP	Water System Plan
WUE	Water Use Efficiency

Chapter 1 System Description

1.1 Ownership and Management

Shadow Creek is a new Community Group A water system that is in development by Mance and Son Residential Developers Inc. and will be owned by Thurston PUD. Shadow Creek will serve 28 full-time residential homes at buildout. The community is 11.5 miles northeast of Olympia in the NE and NW ¼, Section 27, Township 19, Range 01 West, W.M. Specific data about the system can be found in the Water Facilities Inventory included at the end of Chapter 1. Pertinent information about the water system is summarized below:

Water System Name:	Shadow Creek
System Type:	Group A Community Water System
WSDOH ID Number:	AE015H
Location:	Thurston County, Washington
Source:	Groundwater
Active Service Connections:	3 of 28
Total Approval Requested	28
Population Served:	70 (at buildout)
Type of Ownership:	Public Utility District (PUD)
Ownership Entity	Thurston PUD
Address:	1230 Ruddell Rd. SE Lacey, WA 98503
Phone:	(360) 357-8783

1.1.1 Owner and Operator Responsibilities

The water system is in development by Mance and Son Residential Developers, Inc. and ownership will be transferred to Thurston PUD upon buildout. All aspects related to the water system will be handled by the PUD including financial management, billing, operation, and maintenance. More information on the PUD’s policy and procedures regarding the management of their water systems can be found in the PUD’s WSP Part A.

1.2 System History and Background

The Shadow Creek Water System is a new system that is in the process of being developed by Mance and Son Residential Developers, Inc to supply a new residential development with 28 homes at buildout. The water system will be owned and managed by Thurston PUD. The developer has entered into an interim agreement for satellite management agency services (SMA) with Northwest Water Systems Inc. for the development period prior to the sale of the system to Thurston PUD.

1.3 Related Plans

Related planning documents have been coordinated with this Water System Plan for the Shadow Creek Water System.

List of Related Plans

Thurston County Coordinated Water System Plan

Deschutes Watershed Management Plan (WRIA 13).

Thurston County Comprehensive Plan

Thurston PUD's Water System Plan Part A

Coppermill Water System Plan

Identification of Inconsistencies

There is one inconsistency with the Coppermill water system. The Coppermill service area overlaps Shadow Creek and must be revised. An amendment and letter of acceptance from Thurston PUD, whom owns the Coppermill water system will be submitted alongside the WSP update. The WSP will be submitted to applicable agencies for review; no comments are anticipated.

Applicable Comments and Resolutions.

Resolutions will be made if comments are received. No comments are expected.

Adjacent Purveyor Comments and Resolutions

Resolutions will be made if comments are received. No comments are expected.

1.4 Service Area, Maps, and Land Use

The Shadow Creek retail service area encompasses an area of approximately 140 acres. A map of the Service Area, Retail Service Area, and Water Place of Use is attached below at the end of Chapter 1.

1.4.1 Retail Service Area

The retail service area is where a municipal water supplier has a duty to serve connections under the conditions described in Thurston PUD's WSP Part A. The retail service area is indicated on the service area map included at the end of Chapter 1.

1.4.2 Service Area Agreements

The Coppermill water system has an overlapping service area with Shadow Creek and must be revised via an amendment to Coppermill's WSP part B and service area map.

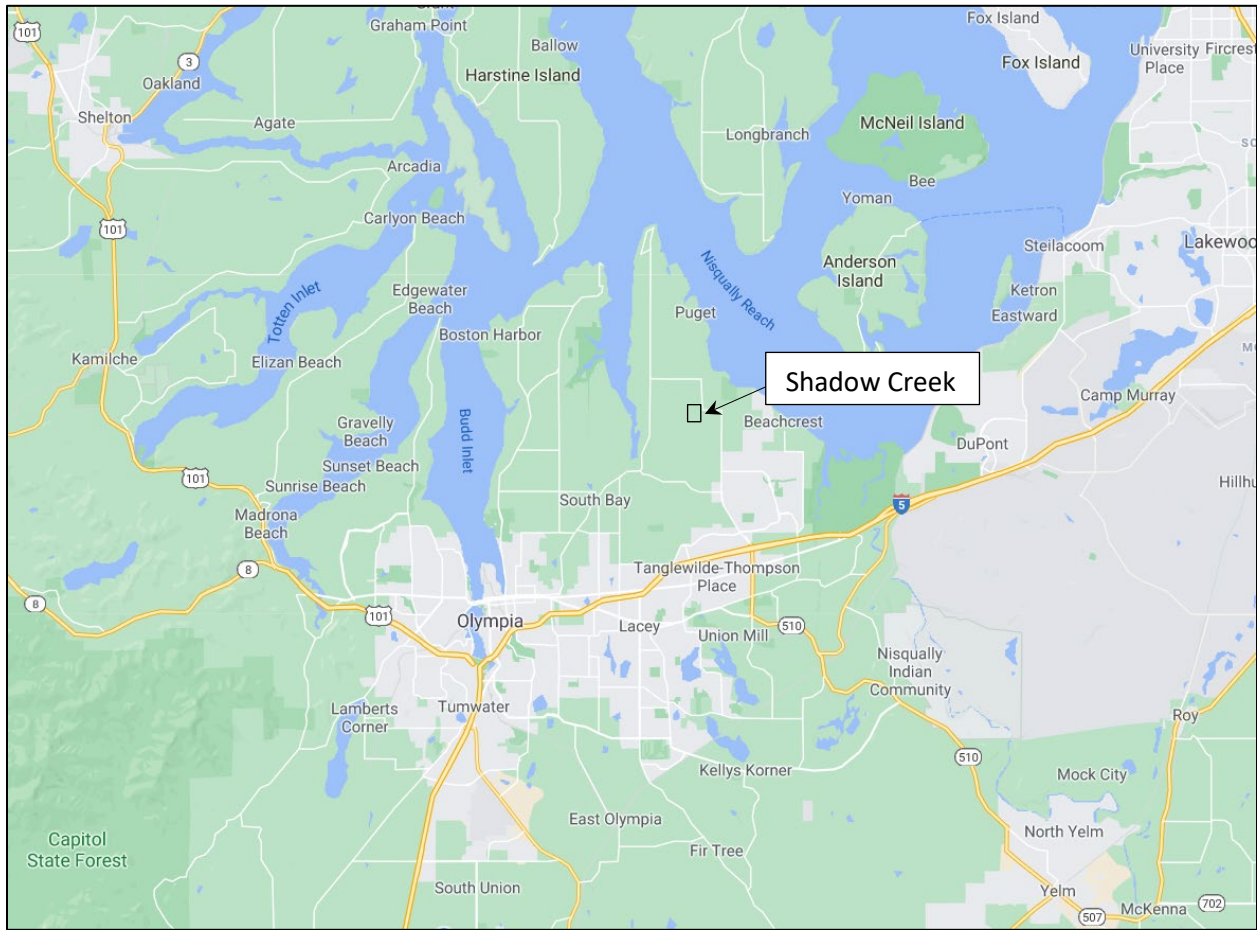


Figure 1.1: Shadow Creek vicinity map.

1.4.3 Land Use and Zoning

The Shadow Creek service area is zoned as Rural Residential Resource 1/5 (RRR 1/5); see Figure 1.2 below. The service area will supply residential homes per the area zoning.

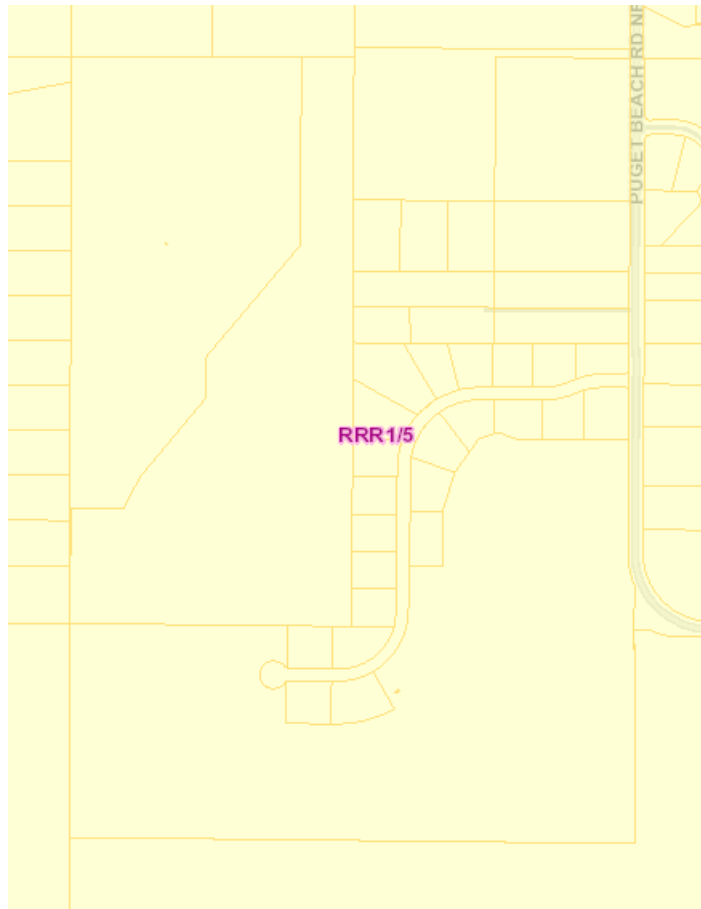


Figure 1.2: Shadow Creek zoning designation from Thurston Co. GIS Parcel Maps

1.5 System Policies

The Shadow Creek Water System service area policies are outlined in the Thurston PUD WSP Part A.

1.6 Conditions of Services

The PUD's conditions of service are outlined in the PUD's WSP Part A in Chapter 2.

1.7 Watershed Plan Consistency

As discussed in Section 1.3 above, Shadow Creek is within the Deschutes watershed (WRIA 13) which has a watershed management program. The wells on the system will operate under water-right permit G2-30740. Thus, there are no known inconsistencies at this time.

1.8 Local Government Consistency

Following the Municipal Water Law, Thurston PUD is working on obtaining a signed consistency statement from Thurston County to document that this WSP is consistent with local area planning. The consistency statement will be included in Chapter 10.5 when available.

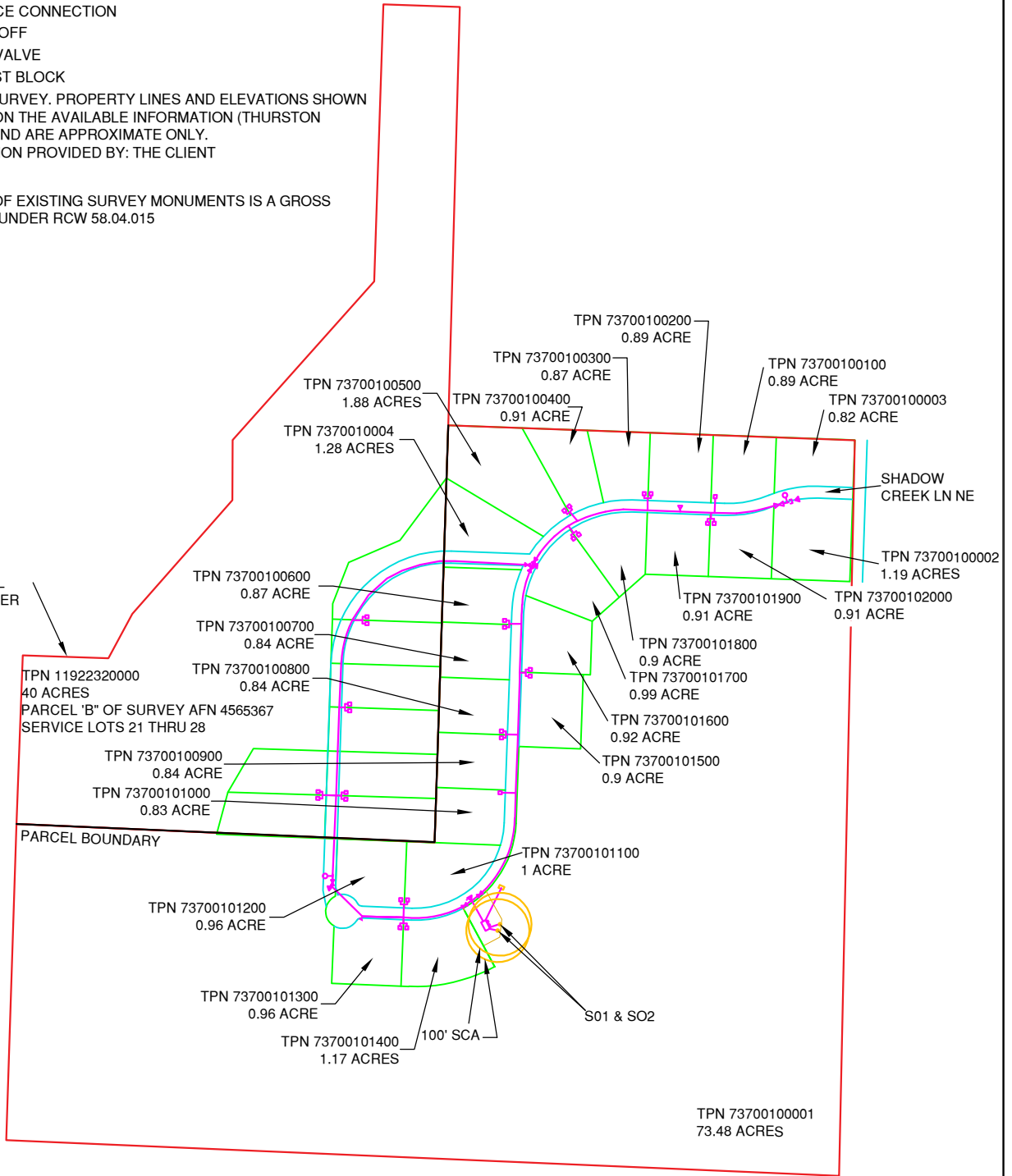
LEGEND

- SERVICE CONNECTION
- BLOW-OFF
- ⊗ GATE VALVE
- ▶ THRUST BLOCK

THIS IS NOT A SURVEY. PROPERTY LINES AND ELEVATIONS SHOWN ARE BASED UPON THE AVAILABLE INFORMATION (THURSTON COUNTY MAP) AND ARE APPROXIMATE ONLY. SITE INFORMATION PROVIDED BY: THE CLIENT

DISTURBANCE OF EXISTING SURVEY MONUMENTS IS A GROSS MISDEMEANOR UNDER RCW 58.04.015

SERVICE AREA, RETAIL SERVICE AREA, & WATER RIGHT PLACE OF USE



DRAWN BY:		SYSTEM SHADOW CREEK WATER SYSTEM		OWNER THURSTON PUD	
CHECKED BY:		FILE NO. 200701	FILE NAME SERVICE AREA MAP	SHEET NO.	
REVISION		DATE MARCH 19, 2025		SCALE 1" =500'	
DESCRIPTION	DATE				
NORTHWEST WATER SYSTEMS, INC. DESIGN - CONSULTING - MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958					



WATER FACILITIES INVENTORY (WFI) FORM

Quarter: 0
Updated: 03/13/2025

ONE FORM PER SYSTEM
Updated Changes in Blue

Printed: 3/27/2025
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. AE015 H	2. SYSTEM NAME SHADOW CREEK	3. COUNTY THURSTON	4. GROUP B	5. TYPE
------------------------------------	---------------------------------------	------------------------------	----------------------	----------------

6. PRIMARY CONTACT NAME & MAILING ADDRESS KEVIN R. ODEGARD NORTHWEST WATER SYSTEMS INC PO BOX 123 PORT ORCHARD, WA 98366	7. OWNER NAME & MAILING ADDRESS MANCE & SON RESIDENTIAL PRESIDENT DEVELOPERS JOHN W. MANCE 5448 78TH AVE NE OLYMPIA, WA 98516
STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS 7245 BETHEL-BURLEY RD SE CITY PORT ORCHARD STATE WA ZIP 98367	STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS CITY STATE ZIP

The system will remain a Group B system until at least 7 connections have been developed and put to use.

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (360) 876-0958 x113	Owner Daytime Phone: (360) 491-2685
Primary Contact Mobile/Cell Phone: (253) 377-1865	Owner Mobile/Cell Phone: (360) 789-9791
Primary Contact Evening Phone: (xxx)-xxx-xxxx	Owner Evening Phone: (xxx)-xxx-xxxx
Fax: (360) 876-4196 E-mail: Kxxn@nwwatersystems.com	Fax: E-mail: mxxxxxc@hotmail.com

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)	
<input type="checkbox"/> Not applicable (Skip to #12) <input type="checkbox"/> Owned and Managed <input checked="" type="checkbox"/> Managed Only <input type="checkbox"/> Owned Only	SMA NAME: Northwest Water Systems, Inc. SMA Number: 119

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)		
<input type="checkbox"/> Agricultural <input type="checkbox"/> Commercial / Business <input type="checkbox"/> Day Care <input type="checkbox"/> Food Service/Food Permit <input type="checkbox"/> 1,000 or more person event for 2 or more days per year	<input type="checkbox"/> Hospital/Clinic <input type="checkbox"/> Industrial <input type="checkbox"/> Licensed Residential Facility <input type="checkbox"/> Lodging <input type="checkbox"/> Recreational / RV Park	<input checked="" type="checkbox"/> Residential <input type="checkbox"/> School <input type="checkbox"/> Temporary Farm Worker <input type="checkbox"/> Other (church, fire station, etc.):

13. WATER SYSTEM OWNERSHIP (mark only one)	14. STORAGE CAPACITY (gallons)
<input type="checkbox"/> Association <input type="checkbox"/> County <input type="checkbox"/> Investor <input type="checkbox"/> Special District <input type="checkbox"/> City / Town <input type="checkbox"/> Federal <input checked="" type="checkbox"/> Private <input type="checkbox"/> State	20,000

15	16 SOURCE NAME	17 INTERTIE	18 SOURCE CATEGORY											19 USE	21 TREATMENT					22 DEPTH	23 CAPACITY (GALLONS PER MINUTE)	24 SOURCE LOCATION					
			WELL	WELL IN A WELL FIELD	WELL IN A WELL FIELD	WELL IN A WELL FIELD	WELL IN A WELL FIELD	WELL IN A WELL FIELD	WELL IN A WELL FIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER		PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE			CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN TERVERAL IN FEET
S01	Well #1 BLH562		X											X	N		X					214	60	NE NW	27	19N	01W
S02	Well #2 BLH562		X											X	N		X					211	60	NE NW	27	19N	01W
S03	Wellfield (Well #1 and #2)			X										X			X						60	NE NW	27	19N	01W

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
AE015 H	SHADOW CREEK	THURSTON	B	

	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?)		3	20
A. Full Time Single Family Residences (Occupied 180 days or more per year)	3		
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	0		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	0		
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	0
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	0	0	0
28. TOTAL SERVICE CONNECTIONS		3	20

29. FULL-TIME RESIDENTIAL POPULATION
A. How many residents are served by this system 180 or more days per year? 8

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

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

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students, daycare children and/or employees are present each month 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
	1	0	0	1	0	0	0	0	0	0	0	0

34. NITRATE SCHEDULE	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS
(One Sample per source by time period)			S01, S02

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:** _____

Chapter 2 Basic Planning Data

2.1 Current Population, Service Connections, and Equivalent Residential Units (ERUs)

2.1.1 Population and Demographics

The Shadow Creek water system will have at buildout 28 full-time connections that are single-family homes in with an estimated population of 2.5 persons per household or 70 persons total. The development is located approximately 11.5 miles northeast of Olympia in Thurston County. The community demographics will be middle-upper class homes. Per the census bureau, the 2019 projected median household income in Thurston County was \$72,003. Given that the development will consist of large high-end homes, it is very likely that the median household income for this neighborhood will be higher than the median household income for Thurston County.

2.1.2 ERU Analysis

One ERU is defined as the equivalent usage of a single-family residence occupied full time. As all the future connections will be single-family residences, there will be 28 ERUs at buildout.

2.2 Water Production and Usage

2.2.1 Meter Data

As the system is new there is limited available meter data. Therefore, there is not sufficient data on which to base demand estimations.

2.2.2 Usage by Customer Class

The system will only serve full-time residential connections.

2.2.3 System Parameters: ADD, MDD, and PHD

As there is minimal existing service meter data available for new systems, two analogous systems, Hawley Hills (ID #AB037F) and Coppermill (ID #AD478C), were used to model the demand for Shadow Creek. Coppermill is an adjacent system with 23 active connections (35 at buildout), and Hawley Hills is a nearby system with 51 active connections. Both systems are analogous in that they were built by the same developer, and they serve an upper-middle-class demographic with most of the homes being large (HH average 2,954 sq. ft., CM average 3,098 sq.ft.) with automatic in-ground irrigation systems. Due to this, the usage at both Hawley Hills and Coppermill has been historically high. The demand data for each system is below in Table 2.1. In 2020, Coppermill's water usage was 33% higher than Hawley Hills. There are several water system characteristics and ownership factors which seem to be the source in the difference in usage and which make Hawley Hills a more analogous system for modeling of water demand at Shadow Creek.

Table 2.1. Hawley Hills and Coppermill Water Usage Data

Year	Hawley Hills ADD (gpd/ERU)	% change from previous year	Coppermill ADD (gpd/ERU)	% change from previous year
2017	474	-	-	-
2018	472	-0.3	495	-
2019	357	-24.4	463	-6%
2020 ¹	377	+5.6	504	+9%

¹ADD numbers based on raw service meter data with no safety factors applied

First, the Hawley Hills water system (effective in 2007) was acquired by Thurston PUD in 2017 resulting in a 3-year transitional phased water rate period to bring Hawley Hills up to the PUD’s current water rate structure. This has led to a steady decrease in water usage. As shown above, in Table 2.1, there was an overall water usage decrease of 20% since the PUD took over the system in 2017. This trend of decreasing usage over the three years following the acquisition of a system by Thurston PUD has been seen on many other water systems with middle to upper-income demographics, including the neighboring systems of Marvin Gardens (ID #366997) and Deerfield Park 1 and 2 (IDs # 005582 and 03681J)(see figure below).

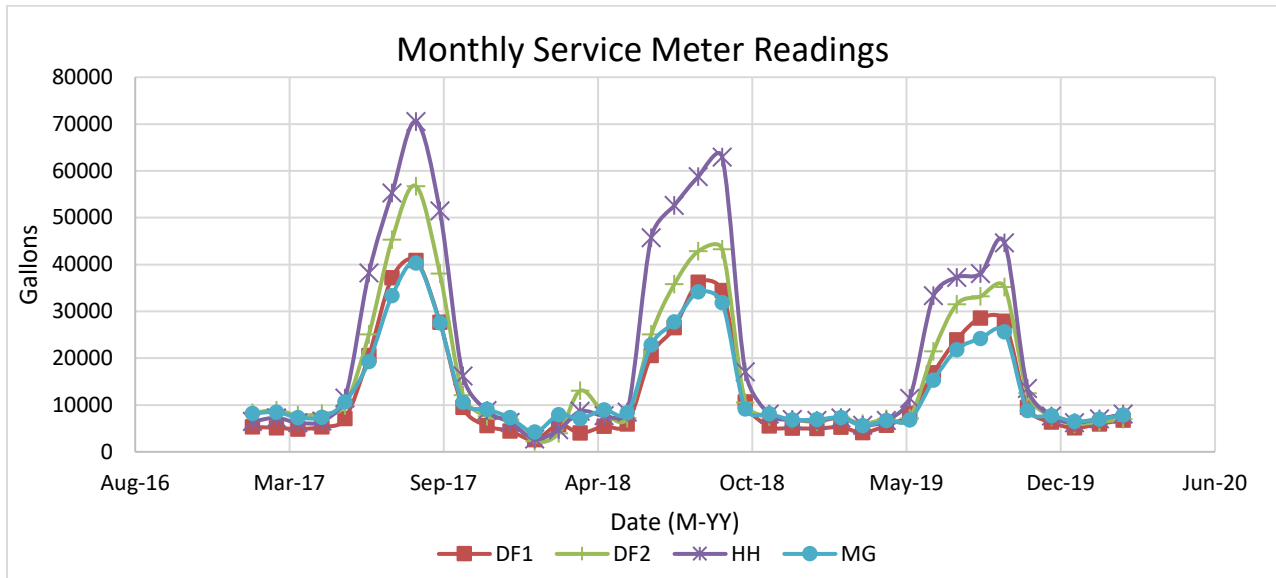


Figure 2.1. Decreasing Trends in Water Usage on Thurston PUD Owned Systems

During the time period of this data, Coppermill had a different rate structure than Hawley Hills, as Coppermill was developer owned at the time. For comparison, water rates at Coppermill in 2020 were approximately 1/3rd those at Hawley Hills on a per gallon basis. Shadow Creek will be owned and operated by Thurston PUD under their standard rate structure which will be a contributing factor to lower water usage at Shadow Creek.

¹ The water usage was higher in 2020 than in 2019 even though the monthly average temperatures between the 2 years were comparable. However, many families were quarantined at home throughout 2020. Thus, this is a possible correlation explaining the higher water usage in 2020.

Second, the platted lots at Shadow Creek are approximately 1 acre which is comparable to the lot sizes at both Hawley Hills and Coppermill. However, approximately 80% of the lots were cleared at both Hawley Hills and Coppermill (per developer and aerial photographs). Assuming 5,000 sq. ft of impervious areas, there is approximately 29,848 sq. ft available per parcel for irrigated lawns or landscaping. In contrast, the new Shadow Creek development will only have 40% of the lots cleared per the restrictions of the stormwater permit. Assuming 5,000 sq. ft of impervious surfaces, there will be approximately 12,424 sq. ft of available area per parcel for irrigated lawns and landscaping. This a 58% decrease in the available irrigated area which is very likely to have a significant impact on initial and long-term irrigation usage on the Shadow Creek water system.

Finally, all homes in the Shadow Creek plat must be built per the 2018 Washington State Energy Code (RE-3 R103.4), which became effective for all new construction permits on February 1st, 2021. Per the developer, all homes must use low-flow fixtures to comply with the energy code. This is expected to have a significant impact on reducing indoor water usage of the new homes. Because it was implemented just 4 years ago, little data is available showing the impact of the new energy code on water use. However, as a reference point, the AWWA 1999 Residential End Use of Water found the mean daily indoor use to be 173 gpd nationwide. The 2016 update showed that indoor water use dropped to 138 gpd due to efficiency increases in new water fixtures and appliances. A sampling of homes built per the EPA's Water Sense New Home Specification had an average daily indoor use of 110 gallons per home, which is likely similar to water use efficiency under the 2018 energy code. Given the significant reduction achieved by the use of high-efficiency water fixtures and appliances in new construction, it is anticipated that Shadow Creek will have lower indoor usage than both Hawley Hills and Coppermill.

Therefore, the water demand at Shadow Creek is based on the Hawley Hills meter data from 2020, which is expected to be conservative as described in the preceding paragraphs.

The ERU_{ADD} at Hawley Hills in 2020 was 377 gpd/ERU. The G2-30740 water right annual quantity of 12.5 acre-feet/year is based on the water right report of examination using 400 gpd/ERU as a daily average for 28 connections. This is a conservative estimate over Hawley Hills ERU_{add} by a safety factor of 1.06. Similarly calculated as ADD, the MMDD for Hawley Hills in 2020 was 1,042 gpd/ERU. Applying a safety factor of 1.1 and a peaking factor 1.65 to the MMDD, the resulting projected ERU_{MDD} for Shadow Creek is 1,891 gpd/ERU.

The peak hourly demand (PHD) was calculated using Equation 3-1 from the Design Manual (where C=3, F=0) as shown below.

$$PHD = \left(\frac{MDD}{1,440} \right) ((C * N) + F) + 18 \tag{1}$$

$$PHD = \left[\frac{1,891 \frac{gpd}{ERU}}{1440 \text{ min/day}} (3 * 28 \text{ ERU} + 0) + 18 \right] = 128 \text{ gpm}$$

Table 2.2. Shadow Creek Demand Summary

ERU	28
ERU _{ADD}	400 gpd/ERU
ERU _{MDD}	1,891 gpd/ERU
PHD	128 gpm

2.2.4 Pressure Zones

There is one pressure zone on the system.

2.3 Distribution System Leakage

As the system is new, there is no distribution system leakage. However, a safety factor was incorporated into the demand modeling to account for future leakage and water loss from the treatment backwash.

2.4 Water Supply Characteristics

The water system is supplied by 2 permanent wells located in a wellfield (drilled in 2020). The wells are at an elevation of 175 ft (MSL) and drilled to a depth of 237 ft and 236 ft. Both wells will be treated for elevated levels of iron and manganese via oxidation filtration.

2.5 Water Supply Reliability Evaluation

The water system is supplied by two high-capacity wells that are operating individually at 60 gpm limited by the capacity of the filtration units. Only one well is needed to meet the maximum day demand of the system. In addition, there is an automatic backup generator with the capacity to operate the entire system during a power outage scenario. Thus, there are several redundancies on the system resulting in a more reliable water supply.

2.5.1 Interties

No interties with other systems will exist due to the location of the water system.

2.6 Future Population Projections and Land Use

At buildout, the proposed water system will supply 28 residential connections with a projected future population of 70 persons.

2.7 Future Water Demand

At buildout, there will be 28 full-time residential connections on the water system. Full buildout is projected to occur in less than 10 years. The future water demand at buildout is projected below in Table 2.3.

Table 2.3: Estimated Future Water Use

	ERU	ADD (gpd)/ERU	Annual (ac-ft/yr)
Current	3	400	1.3
10 Year Projection	28	400	12.5
20 Year Projection	28	400	12.5

2.7.1 Other Systems

No interties exist. Thus, no water use by other systems is considered.

Chapter 3 System Inventory and Analysis

3.1 System Design Standards

All design and future construction shall be completed in accordance with the Washington State Department of Health Water System Design Manual (Design Manual). The following is a summary of relevant standards outlined in the Design Manual:

Water Demand	Chapter	3
PHD	Equation	3-1
Capacity Analysis	Chapter	4
Distribution System	Chapter	6
Hydraulic Analysis	Section	6.1

3.2 Water Quality

Water quality samples – including inorganic compounds, volatile organic compounds, synthetic organic compounds, and coliform – were taken. Both iron and manganese exceeded the maximum contamination levels (MCL) in Wells 1 and 2. Thus, the water will be treated using oxidation filtration to reduce the contaminants below the MCL. The full treatment report can be found in the project report.

The existing homes and new homes will be equipped with low-lead fixtures and indoor plumbing will likely be CPVC or Pex pipe. In addition, the distribution system will be comprised of PVC pipe. The existing pH is 7.1 for both wells. Thus, corrosion control is not anticipated to be an issue.

3.3 System Inventory and Asset Condition Assessment

3.3.1 Overview

Most of the infrastructure on the water system was newly constructed in 2023. The wellfield and pumphouse that contains the treatment units, reservoirs, and booster station are all at one location on the water system. Below is a summary of the system infrastructure.

3.3.2 Sources

The Shadow Creek water system is supplied by two permanent wells located in a wellfield. The available pump curves and well logs are provided in Appendix 10.2. A summary of the wells is shown in Table 3.1. The G2-30740 water right was attained by the water system. The water right has a maximum withdrawal of 12.5 ac-ft per year, which is sufficient for buildout of the water system.

Table 3.1: Summary of Sources

Well	Approval Status	Elevation (ft)	Pumps To	Controlled By	Capacity (gpm)	Static Water Level (ft)
S01	Permanent	175	Reservoir	Float Switch	60	101
S02	Permanent	175	Reservoir	Float Switch	60	100

3.3.3 Water Rights and Well Capacity

The wells will be operated under water right G2-30740. The water right has a maximum instantaneous withdrawal of 100 gpm and a maximum annual withdrawal of 12.5 ac-ft.

Table 3.2: Water Rights and Pumping Capacities

Well	Permit Number	Priority Date	Qi (gpm)	Qa (ac-ft/yr)	Capacity (gpm)
S01 & S02	G2-30740	2/7/2014	100	12.5	60

3.3.4 Storage

There are four 5,000 gallon Norwesco poly reservoirs located in the pumphouse. The reservoirs will be at a base elevation of approximately 175 ft (MSL).

3.3.5 Booster Pumps

The booster station is comprised of three, 3 HP Goulds HSC booster pumps that can supply 48.5 gpm each, which corresponds with a pumphouse pressure of 35.5 psi. The booster pumps are controlled by Aquivar variable frequency drives (VFD).

3.3.6 Buildings

There is one pumphouse that houses the treatment units, reservoir, and booster station.

Table 3.3: Summary of Buildings

Pumphouse Site	Year Constructed	Notes	Size
Pumphouse	2023	New	34 ft x 40 ft

3.4 Capacity Analysis

The capacity analysis is performed on a limiting capacity basis for each discrete element of the water system.

Water Right Capacity

The Shadow Creek water system is operating under water right G2-30740. The water right has a maximum instantaneous withdrawal of 100 gpm and a maximum annual withdrawal of 12.5 ac-ft. Shadow Creek can supply 28 ERU based on the annual water rights at this time. The instantaneous water right of 100 gpm allows for 76 ERU.

$$N_{wr, instant} = \frac{Q_{wr, instant} * 1440}{ERU_{MDD}} = \frac{100 \frac{gal}{min} * 1,440 \frac{min}{day}}{1,891 \frac{gpd}{ERU}} = 76 ERU \quad (2)$$

$$N_{wr, annual} = \frac{Q_{wr, annual}}{ERU_{ADD} * 365} = \frac{12.5 afy * 325,851 \frac{gal}{afy}}{400 \frac{gpd}{ERU} * 365 \frac{days}{year}} = 28 ERU \quad (3)$$

Source Capacity

Based on the pumping test, Wells 1 and Well 2 can supply 66 gpm each. Although the wells' output will be restricted by the filtration units to 60 gpm, operating individually, the full capacity of the wells could be made available with increasing treatment capacity. Thus, the combined capacity of the wells is calculated based on the actual capacity of the wells and the limitation per the current treatment is discussed and calculated in the treatment capacity section. Using Equation 4-3 from the design manual, the capacity of the source can be calculated where Q is the flow rate of the wellfield, and t is the length of time that the wellfield is pumped (20-hrs). See Eq. 4 below.

$$N_{source,day} = \frac{Q_j t_j}{ERU_{MDD}} \quad (4)$$
$$N_{source,day} = \frac{(132 \text{ gpm}) * \left(20 \frac{\text{hr}}{\text{day}}\right) \left(60 \frac{\text{min}}{\text{hr}}\right)}{1,891 \frac{\text{gpd}}{ERU}} = 84 \text{ ERU}$$

Treatment Capacity

The water is treated for iron and manganese. Both wells will directly supply the reservoir and will operate individually. Three oxidation filtration units with a maximum capacity of 20 gpm each will remove the iron and manganese before filling the reservoir. Each treatment unit can operate 1,425 min/day on a day when all the units will need to backwash. The backwash and rinse cycles require 15 minutes total and consumes 525 gallons of treated water per cycle. Thus, using Eq. 5 below, the capacity of the treatment system is 44 ERU provided that there is sufficient storage capacity.

$$N_{Treatment} = \frac{Q_T * t}{MDD_{RESIDENT}} \quad (5)$$
$$N_{Treatment} = \frac{3 * \left[(20 \text{ gpm}) * \left(1,425 \frac{\text{min}}{\text{day}}\right) - 525 \frac{\text{gal}}{\text{day}}\right]}{1,891 \frac{\text{gpd}}{ERU}} = 44 \text{ ERU}$$

There will be a bioswale sized to handle the full backwash capacity of the treatment system.

Storage Capacity

There are five reservoir storage components including operational, equalizing, standby, dead, and fire suppression storage.

Operational Storage

Operational storage (OS) decreases pump cycling and enhances circulation in the reservoir. The OS is dependent on the positions of the float switches in the reservoir, and it is the volume of water between the float switch that turns the pump on to fill the reservoir and the float switch that turns the pump off. According to the WSDM, the recommended operational storage to promote well pump longevity is 2.5 minutes times the well pump output. With a conservative, combined max well pump output of 132 gpm, this equates to 330 gallons. Actual operational storage is 6-in between the float switches which equates to about 849 gallons total in four 5,000 gallon reservoirs with a diameter of 8.5 ft.

Dead Storage

Dead Storage (DS) is the unusable volume in the storage tank and is dependent on the plumbing of the tank. There will be 6-in between the base and emergency booster shut-off and approximately 20.375-in between the operational storage cutoff level and top of the tank. Thus, based on the geometry of the tank, this equates to 2,744 gallons total in four 5,000 gallon reservoirs.

Equalizing Storage

Equalizing storage (ES) is the required volume to meet the system's peak demand if the source capacity is less than the PHD. Using the well pump capacity of 60 gpm and Eq. 6 below, the required equalizing storage volume is 10,200 gallons.

$$ES = (PHD - Q_s) * 150 \quad (6)$$

$$ES = (128 \text{ gpm} - 60 \text{ gpm}) * 150 \text{ min} = 10,200 \text{ gallons}$$

Standby Storage

Standby storage (SS) is backup storage in case the sources or the pumps are unable to supply water temporarily. As there will be redundancy in the system with two wells and an automatic backup generator capable of powering the whole system, standby storage is not necessary.

Fire Storage

Fire suppression storage is not required for the new development as the community is outside the urban growth area. Please see the attached letter from the fire marshal at the end of Chapter 3.

Storage Capacity

Storage components and the required volumes are summarized below in Table 3.4.

Table 3.4. Storage Requirement Summary

Storage Component	Volume (gallons)
Operational Storage	849
Dead Storage	2,744
Equalizing Storage	10,200
Standby Storage	0
Fire Storage	0
Total Required	13,793
Available Storage	20,448 ¹
Excess Storage	6,655

¹ Manufacturer's marketed nominal tank size is 5,000 gallons which does not include empty dome volume above access hatch. The actual volume of each tank is estimated to be 5,112 gallons, for a total of 20,448 gallons in four tanks.

Four 5,000 gallon tanks are installed to meet the demand of the water system. The only storage components that are directly affected by the number of connections are the equalizing storage and the standby storage. However, the system will only have equalizing storage. Thus, the capacity of the four

5,000 gallon tanks was calculated by using Equation 4-6 from DOH 331-123, the theoretical capacity of the equalizing storage was calculated to be 39 ERU as shown below in Eq. 7.

$$N_{ES} = \frac{1}{C} \left[\frac{1440}{ERU_{MDD}} \left(\frac{ES}{150} + Q_s - 18 \right) - F \right] \quad (7)$$

$$N_{ES} = \frac{1}{3} \left[\frac{1440}{1,891} \left(\frac{10,200 + 6655}{150} + 60 - 18 \right) - 0 \right] = 39 \text{ ERU}$$

Booster Capacity

The booster station consists of three 3HP Goulds HSC booster pumps which have a capacity of approximately 48.5 gpm each (145.5 gpm total) at 35.5 psi.

Using a rearranged version of Equation 3-1 from (DOH 331-123), the capacity of the booster station was calculated where ERU_{MDD} is 1,891 gpd/ERU and the variables C and F were based on Table 3-1 from DOH 331-123. Thus, the capacity of the distribution system is 32 ERU as shown below in Eq. 8.

$$N = \left(\frac{1,440 \frac{\text{min}}{\text{day}} * (Q - 18)}{ERU_{MDD}} - F \right) * \frac{1}{C} \quad (8)$$

$$N = \left(\frac{1,440 \frac{\text{min}}{\text{day}} * (145.5 \text{ gpm} - 18)}{1,891 \frac{\text{gpd}}{\text{ERU}}} - 0 \right) * \frac{1}{3} = 32 \text{ ERU}$$

Distribution System

A hydraulic analysis model was developed as described in Section 3.5. A limiting factors analysis was conducted by iteratively increasing PHD (via increasing demand at each node using a global multiplying factor) until the pressure dropped below 30 psi and or velocity exceed 8 fps. With a supply pressure of 51 psi (limiting condition), the velocity was 8 fps at a total flow (PHD) of approximately 313 gpm. This occurred before the pressure dropped below 30 psi. Using a rearranged version of Equation 3-1 from (DOH 331-123), the capacity of the distribution was calculated where ERU_{MDD} is 1,891 gpd/ERU and the variables C and F were based on Table 3-1 from DOH 331-123.

$$N = \left(\frac{1,440 \frac{\text{min}}{\text{day}} * (Q - 18)}{ERU_{MDD}} - F \right) * \frac{1}{C} \quad (9)$$

$$N = \left(\frac{1,440 \frac{\text{min}}{\text{day}} * (313 \text{ gpm} - 18)}{1,891 \frac{\text{gpd}}{\text{ERU}}} - 25 \right) * \frac{1}{2.5} = 80 \text{ ERU}$$

Summary

The limiting capacity of the Shadow Creek water system is the annual water rights which has the capacity for 28 ERU. This is currently sufficient for full-build out of 28 connections.

Limitation	ERU Limit
Source Capacity	84
Distribution Capacity	80
Treatment Capacity	44
Water Rights, Instantaneous	76
Booster Capacity	32
Reservoir Capacity	45
Water Rights, Annual	28

3.4.1 Water Rights Self-Assessment

The water right self-assessment is attached below at the end of 4.

3.4.2 Source of Supply Analysis

The Shadow Creek water system is served by 2 permanent groundwater sources withdrawing from the same aquifer. As established in Section 3.4, the sources have adequate capacity to serve the new development, and they can continuously meet MDD with one source off-line.

3.5 Distribution System Hydraulic Analysis

The distribution system is comprised of 4-in C900 PVC.

3.5.1 Model Description

The system hydraulic analysis was prepared using EPANET2. The model was comprised of 16 nodes representing the location of single and double service assemblies. These nodes were assigned a unit demand and distributed to represent the system's distribution layout. It was assumed that the flow will be evenly distributed throughout the system during peak demand. Thus, the unit demand at each node was based on the modeled flow rate divided by the number of connections represented by each node. The Thurston County elevation maps were used to determine an approximate elevation at each node. A Hazen-Williams friction factor of 150 was used.

3.5.2 Scenarios

Three scenarios were evaluated- the PHD condition, the static condition, and a limiting condition scenario. For the PHD condition, this model was run at a PHD of 128 gpm and pumphouse pressure of 51 psi. For the static condition, this model was run at zero demand and a pumphouse pressure of 65 psi (maximum pressure scenario). For the limiting condition scenario, the demand was increased until either the distribution pressure dropped below 30 psi or the peak velocity exceeded 8 fps. The velocity was the limiting factor.

3.5.3 Model Results

A summary of the model results is shown below. Full tabular results for the model inputs and outputs are in Appendix 10.1

Table 3.5: Summary of Distribution Model Results

Parameter	Normal PHD	Static	Limiting Cond.
Flow Rate (gpm)	128	0	313.32
Pumphouse Pressure (psi)	51	65	51
Minimum System Pressure (psi)	45.82	61.62	37.98
Maximum System Pressure (psi)	63.11	78.08	58.76
Peak Line Velocity (ft/s)	3.27	0	8.0

The system at buildout can meet the minimum pressure requirement of 30 psi at all connections at PHD of 128 gpm.

3.6 Summary of System Deficiencies

As the system has been recently constructed in 2023, there are currently no reported or observed deficiencies.



COUNTY COMMISSIONERS

Carolina Mejia-Barahona
District One

Gary Edwards
District Two

Tye Menser
District Three

**COMMUNITY PLANNING &
ECONOMIC DEVELOPMENT DEPARTMENT**

Joshua Cummings, Director

Creating Solutions for Our Future

August 12, 2021

John Mance
Mance and Son Residential Dev, Inc
5448 78th Ave NE
Olympia, WA 98516

Subject: Shadow Creek Water System, Fire Flow Requirements

Dear John Mance ,

This letter is in response to your inquiry on Thurston County Fire Flow requirements for the Shadow Creek Water System which is located at Parcel # 11922340000.

The proposed water system is outside the urban growth area and is not required to provide fire flow per Buildings and Construction Code (Title 14), as amended by Ordinance No. 15648 on August 7, 2018.

Sincerely,

Bobby May
Fire Code Specialist
Thurston County Community Planning and Economic Development Services

Chapter 4 Water Use Efficiency Program

The Municipal Water Law was passed in 2003 to give municipal water suppliers (MWS) flexibility to retain unused water rights while requiring conservation through the development of the water use efficiency program. A residential municipal water system is any water system that serves 15 or more residential connections. As the Shadow Creek water system will serve 28 residential connections at buildout, the system will be a municipal water supplier that is required to implement a water use efficiency (WUE) program. The WUE program became effective on January 22, 2007 and established certain responsibilities that water suppliers must fulfill. The requirements and deadlines are listed below in Table 4.1.

Table 4.1: Summary of WUE Program Requirements

Requirement	Deadline for MWS under 1,000
Include WUE program in planning documents	Current
Submit first annual WUE report	07/01/2007
Submit service meter installation schedule	Upon connection to the system
Set your own WUE goals	At WSP public meeting
Meet distribution leakage standard (based on 3-year rolling average)	Ongoing
Complete installation of all service meters	2017 or upon connection to the system

The applicable WUE program requirements and guidelines are contained in *Water Use Efficiency Guidebook*, Third Edition, January 2017 (DOH 331-375).

4.1 Source and Service Metering

4.1.1 Source Meters

There are source meters installed on both wells.

4.1.2 Service Meters

All new connections will be metered before connection to the water system.

4.2 Distribution System Leakage

The distribution system has been recently installed and passed pressure testing.

4.3 Water Use Efficiency Program

The Shadow Creek water use efficiency program is outlined under the Thurston PUD WSP Part A.

4.4 Water Right Self-Assessment

The water-right self-assessment form and the corresponding water rights are included below.

Water Right Self-Assessment Form for Water System Plan

Mouse-over any link for more information. Click on any link for more detailed instructions.

<u>Water Right Permit, Certificate, or Claim #</u> <small>*If water right is interruptible, identify limitation in yellow section below</small>	<u>WFI Source #</u> <small>If a source has multiple water rights, list each water right on separate line</small>	<u>Existing Water Rights</u> <small>Qi= Instantaneous Flow Rate Allowed (GPM or CFS) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold</small>				<u>Current Source Production – Most Recent Calendar Year</u> <small>Qi = Max Instantaneous Flow Rate Withdrawn (GPM or CFS) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold</small>				<u>10-Year Forecasted Source Production (determined from WSP)</u> <small>This includes wholesale water sold</small>				<u>20-Year Forecasted Source Production (determined from WSP)</u> <small>This includes wholesale water sold</small>			
		<u>Primary Qi</u> <small>Maximum Rate Allowed</small>	<u>Non-Additive Qi</u> <small>Maximum Rate Allowed</small>	<u>Primary Qa</u> <small>Maximum Volume Allowed</small>	<u>Non-Additive Qa</u> <small>Maximum Volume Allowed</small>	<u>Total Qi</u> <small>Maximum Instantaneous Flow Rate Withdrawn</small>	<u>Current Excess or (Deficiency) Qi</u>	<u>Total Qa</u> <small>Maximum Annual Volume Withdrawn</small>	<u>Current Excess or (Deficiency) Qa</u>	<u>Total Qi</u> <small>Maximum Instantaneous Flow Rate in 10 Years</small>	<u>10-Year Forecasted Excess or (Deficiency) Qi</u>	<u>Total Qa</u> <small>Maximum Annual Volume in 10 Years</small>	<u>10-Year Forecasted Excess or (Deficiency) Qa</u>	<u>Total Qi</u> <small>Maximum Instantaneous Flow Rate in 20 Years</small>	<u>20-Year Forecasted Excess or (Deficiency) Qi</u>	<u>Total Qa</u> <small>Maximum Annual Volume in 20 Years</small>	<u>20-Year Forecasted Excess or (Deficiency) Qa</u>
1 G2-30740	Shadow Creek S03	100 gpm		12.5 ac-ft/yr		60 gpm	40 gpm	0.22 ac-ft/yr*	12.28 ac-ft/yr	60 gpm	40 gpm	12.5 ac-ft/yr	0 ac-ft/yr	60 gpm	40 gpm	12.5 ac-ft/yr	0 ac-ft/yr
2																	
3																	
4																	
5																	
6																	
TOTALS =		100 gpm		12.5 ac-ft/yr		60 gpm	40 gpm	0.22 ac-ft/yr	12.28 ac-ft/yr	60 gpm	40 gpm	12.5 ac-ft/yr	0 ac-ft/yr	60 gpm	40 gpm	12.5 ac-ft/yr	0 ac-ft/yr

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				10-Year Forecasted Purchase				20-Year Forecasted Purchase					
	Current quantity purchased through intertie												Forecasted quantity purchased through intertie				
	<u>Maximum Qi</u> <small>Instantaneous Flow Rate</small>	<u>Maximum Qa</u> <small>Annual Volume</small>		<u>Maximum Qi</u> <small>Instantaneous Flow Rate</small>	<u>Current Excess or (Deficiency) Qi</u>	<u>Maximum Qa</u> <small>Annual Volume</small>	<u>Current Excess or (Deficiency) Qa</u>	<u>Maximum Qi</u> <small>10-Year Forecast</small>	<u>Future Excess or (Deficiency) Qi</u>	<u>Maximum Qa</u> <small>10-Year Forecast</small>	<u>Future Excess or (Deficiency) Qa</u>	<u>Maximum Qi</u> <small>20-Year Forecast</small>	<u>Future Excess or (Deficiency) Qi</u>	<u>Maximum Qa</u> <small>20-Year Forecast</small>	<u>Future Excess or (Deficiency) Qa</u>		
1																	
2																	
3																	
TOTALS =																	

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		

ADDITIONAL COMMENTS:
*As the system has only recently begun build out and adding active connections, the current maximum annual volume is a summation of water usage from 10/4/24 to 3/14/25.



State of Washington AMENDED WATER RIGHT PERMIT

PRIORITY DATE	WATER RIGHT NUMBER
February 19, 2019	G2-30740

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
MANCE & SON RESIDENTIAL DEVELOPERS, INC. 5448 78TH AVE NE OLYMPIA, WA 98516	SHADOW CREEK WATER SYSTEM

Total Quantity Authorized for Withdrawal

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AC-FT/YR)
100	GPM	12.5

Purpose

PURPOSE	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		PERIOD OF USE (mm/dd)
	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	
Multiple domestic supply/Municipal	100	0	GPM	12.5	0	01/01-12/31

PUBLIC WATER SYSTEM INFORMATION

WATER SYSTEM ID	CONNECTIONS
Shadow Creek AEO15H	28 Proposed

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
Thurston	N/A	N/A	13

SOURCE	PARCEL	WELL TAG	TOWNSHIP	RANGE	SECTION	QQ Q	LATITUDE	LONGITUDE
Shadow Creek Well 1	11922340000	BMS049	19N	1W	22	SE SW	47.1115611	-122.7957176
Proposed Well 2	11922340000	BLH562	19N	1W	22	SE SW	47.1116125	-122.7958116

Datum: NAD83/WGS84

Place of Use

PARCELS (NOT LISTED FOR SERVICE AREAS)

11927120000, 11922340000, 11927200000, and 11922320000

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

The southeast quarter of the southwest quarter of Section 22, Township 19 North, Range 1 West, W.M., EXCEPT that portion conveyed to Thurston County for road purposes as recorded March 23, 1955, under Auditor’s File No. 544455, records of Thurston County, Washington.

AND

That portion of the west half of the southwest quarter of Section 22, Township 19 North, Range 1 West, W.M.; delineated as Parcel B on survey recorded May 25, 2017, under Auditor's File No. 4565367.

Proposed Works

Well 1: 6 inches in diameter and completed in the Qc Aquifer at depth of 237 feet.

Proposed well to be added of similar depth and construction.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Started	January 1, 2025	January 1, 2030

Measurement of Water Use

How often must water use be measured?	Monthly
How often must water use data be reported to Ecology?	Annually
What volume should be reported?	Total Annual Volume (acre feet)
What rate should be reported?	Annual Peak Rate of Withdrawal (gpm)

Provisions

Administrative Modification

Concurrent with the issuance of water right permit G2-30740, companion permit G2-30636 will be superseded to reduce the annual allocation to 16 acre-feet per year for the supply of 35 homes, and Shadow Creek Well 1 be removed as an authorized Point of Withdrawals.

Municipal water right status

This water right is being issued as multiple domestic supply for a proposed municipal water system. Once this system serves 15 or more connections, it will be considered a municipal water system as a matter of law. When this occurs, the permit holder can request a superseding permit which reflects the system’s municipal status.

Wells, Well Logs and Well Construction Standards

All wells constructed in the state must meet the construction requirements of WAC 173-160 titled "Minimum Standards for the Construction and Maintenance of Wells" and RCW 18.104 titled "Water Well Construction".

All wells must be tagged with a Department of Ecology unique well identification number. This tag must remain attached to the well. If you are required to submit water measuring reports, reference this tag number.

Installation and maintenance of an access port as described in WAC 173-160- 291(3) is required.

Measurements, Monitoring, Metering and Reporting

An approved measuring device must be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173 which describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition the Department of Ecology for modifications to some of the requirements.

Recorded water use data shall be submitted via the Internet. To set up an Internet reporting account, contact the Southwest Regional Office. If you do not have Internet access, you can still submit hard copies by contacting the Southwest Regional Office for forms to submit your water use data.

Department of Health Requirements

Prior to any new construction or alterations of a public water supply system, the State Board of Health rules require public water supply owners to obtain written approval from the Office of Drinking Water of the Washington State Department of Health. Please contact the Office of Drinking Water at Southwest Drinking Water Operations: 243 Israel Road S.E., PO Box 47823, Tumwater, WA 98504-7823, (360) 236-3030.

Water Use Efficiency

Use of water under this authorization will be contingent upon the water right holder's maintenance of efficient water delivery systems and use of up-to-date water conservation practices consistent with established regulation requirements and facility capabilities.

Proof of Appropriation

The water right holder must file the notice of Proof of Appropriation of water (under which the certificate of water right is issued) when the permanent distribution system has been constructed and the quantity of water required by the project has been put to full beneficial use. The certificate will reflect the extent of the project perfected within the limitations of the superseding permit. Elements of a proof inspection may include, as appropriate, the source(s), system instantaneous capacity, beneficial use(s), annual quantity, place of use, and satisfaction of provisions.

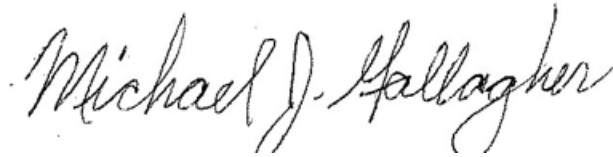
Schedule and Inspections

Department of Ecology personnel, upon presentation of proper credentials, will have access at reasonable times, to the project location, and to inspect at reasonable times, records of water use, wells, diversions, measuring devices and associated distribution systems for compliance with water law.

This Permit Subject to Cancellation

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or to give notice to the Department of Ecology on forms provided by the Department documenting such compliance.

Given under my hand and the seal of this office at Bellevue, Washington this 18th day of May, 2023.



OK/MG

by _____

Michael J. Gallagher, Section Manager

Chapter 5 Source Water Protection

5.1 Wellhead Protection

The wellhead protection program for each source will be created in conjunction with the source approval. A summary of the programs is provided below.

5.1.1 Susceptibility Assessment

Ground Water Contamination Susceptibility Assessment form for the wellfield is included at the end of Chapter 5. The results of the assessment are summarized in this Chapter.

5.1.2 Wellhead Protection Area

A map showing the 6-month, 1-year, 5-year, and 10-year groundwater travel radii is shown below in Figure 5.1. The well protection radii are calculated using the formula found in the susceptibility assessment as provided by the WSDOH.

5.1.3 Contamination Source Inventory

The following are potential sources of contamination within the 10-year travel time radii:

1. Residential Septic Systems
2. Residential Chemical Applications (Pesticides, herbicides, etc)
3. Private Roadways

Since a change in land use and zoning throughout the service area is unlikely, changes in or addition of sources of contamination are unlikely.

5.1.4 Notification of Findings

The following agencies were provided with letters (see the end of the Chapter 5 for a copy of the notification letters, sent 7/22/21) requesting information about any potential sources of contamination within the Wellhead Protection Radii:

Thurston County Health Department
Thurston County Department of Community Development
Emergency Services (911)
Department of Ecology

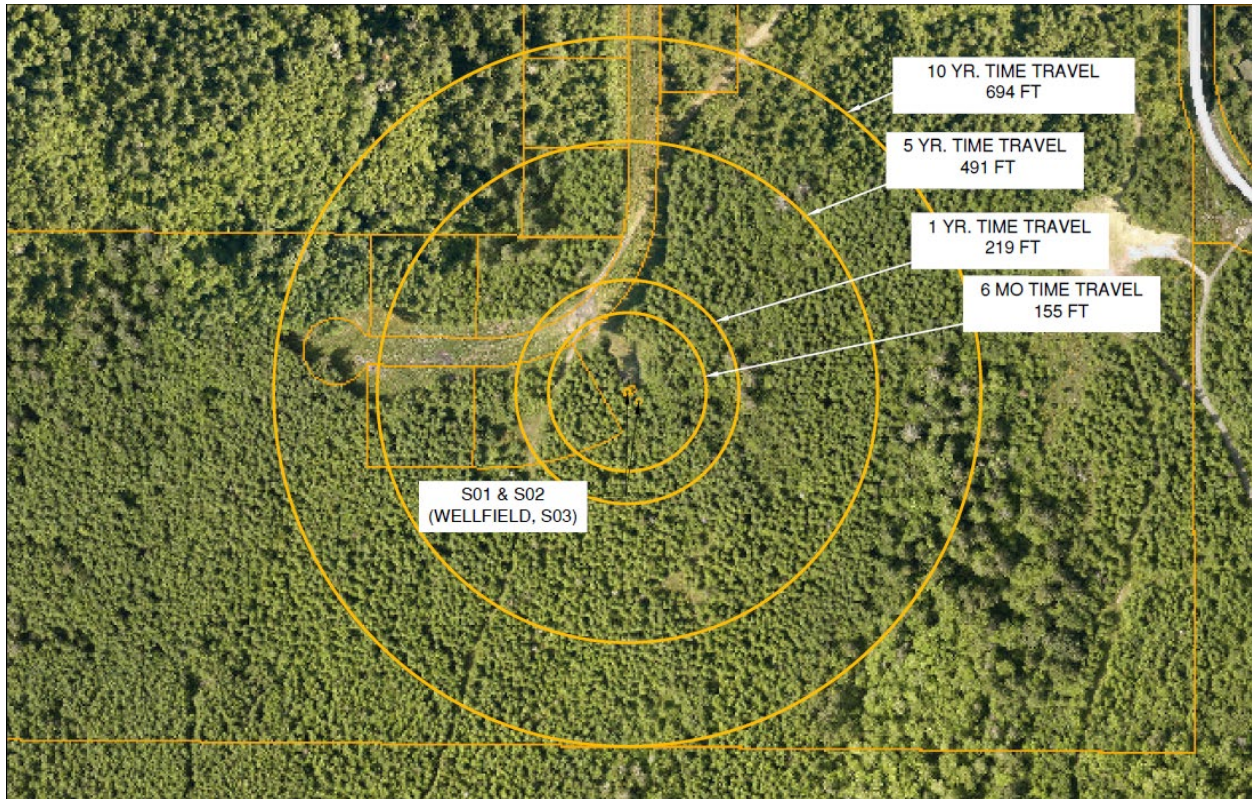


Figure 5.1: Wellhead Protection Areas

5.1.5 Contingency Planning

The system has redundancy given that there are two sources capable of providing the a maximum flow rate of 66 gpm each. In addition, there will be an automatic backup generator capable of powering a minimum of one well and the booster station system.

Based on the depth and chemical analysis, the wells are drawing from the same aquifer. In the extraordinarily unlikely event that aquifer contamination affects a large area, and groundwater is inaccessible to the community, boil water notification could be used on a short-term interim basis while emergency responders act. The possibility of this action being required is extremely remote.

There will be oxidation filtration to reduce the iron and manganese levels below the EPA maximum contamination level (MCL).

5.2 Water Quality Analysis

5.2.1 Asbestos

As the system does not have any asbestos cement pipes, asbestos testing is not required.

5.2.2 Bacteriological Testing

The system will test one sample from the distribution system for coliform bacteria each month. There have been coliform exceedances to date. The Coliform Monitoring Plan is included below.

5.2.3 Inorganic Chemicals (IOC)

Regular IOC samples will be taken at each wellhead per the Water Quality Monitoring Schedule (WQMS). Both iron and manganese exceed the MCL and will be treated through oxidation filtration. The IOC samples were taken on October 15, 2020.

5.2.4 Lead and Copper

The PUD will perform routine lead and copper sampling per the WQMS.

5.2.5 Nitrates

Annual Nitrate testing will be performed at each source. There are no exceedances to date.

5.2.6 Radionuclides

The radionuclides samples will be taken according to the WQMS, the Radium or Alpha particle emission for each well was less than the State Reporting Limit (SRL) of 1 mg/L and 3 mg/L, respectively.

5.2.7 VOCs and SOCs

The sources have been tested for volatile organic compounds (VOCs) and synthetic organic compounds (SOCs) and results were less than the SRL.

**Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.2**

Important Please complete one form for each ground water source (well, well field, spring) used in your system.
Photocopy as necessary.

Part I: System Information

Well Owner:	Thurston PUD	Well Manager:	Thurston PUD
Water System Name:	Shadow Creek	Water System Number:	Pending
County:	Thurston	1/4, 1/4, Sec, T, R:	SE, SW, S27, T19N, R1W
Source Name:	Wellfield 1	WA well ID tag number:	BMS049, BLH562
Source Number:	S03	Population Served:	70
Number of Connections:	28		

Latitude: **47.11156°**

Longitude: **-122.79572°**

How was lat/long determined?

- | | |
|-------------------------------------|-----------------|
| <input checked="" type="checkbox"/> | GPS device |
| <input type="checkbox"/> | survey |
| <input type="checkbox"/> | topographic map |
| <input type="checkbox"/> | other |

Part II: Well Construction and Source Information

1) Date well originally constructed: 6/16/2020 last reconstructed: n/a
6/26/2020

2) Well Driller: **Arcadia Drilling, Inc.**

3) Type of Well:

- | | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Drilled: Air-Rotary (rotary, bored, cable, dug) |
| <input type="checkbox"/> | Other: (spring, lateral collection, driven, jetted, other) |
- Comments:

4) Well Report Available? **Yes** yes/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) Completed Well Depth: 237.0 feet

6) Average pumping rate: 66.0 gpm

Source of information: Pumping test, flow limited to 60 by treatment capacity

If not documented, how was the pumping rate determined?

7) Is this source treated? **Yes** yes/no (disinfection, filtration, carbon filter, airstripper, other)

If so, what type of treatment: **Oxidation Filtration**

purpose of treatment (describe materials to be removed or controlled by treatment):

Removal of iron and manganese

8) If source is chlorinated, is a chlorine residual maintained?

Required Residual Level (in distribution):

<input checked="" type="checkbox"/> yes	yes/no
<input type="checkbox"/> 0.2	ppm

Part III: Hydrogeologic Information

1) Depth to top of open interval: **211.0** ft based on well screens

2) Depth to groundwater (static water level):

100.82 ft

No flowing artesian well/spring

How was the water level determined: Pressure Transducer

3) If the source is a flowing well or spring, what is the confining pressure?

N/A psi

N/A ft

4) If the source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source:

n/a yes/no

5) Wellhead elevation (height above mean sea level): **175.0** ft

how was elevation determined?

topographic map

drilling/well log

altimeter

other

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.)

no (yes/no) Is there evidence of a confining layer in the 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?

Comments: The depth to ground water is approximately 5 ft above the bottom of the lowest restrictive layer, therefore not meeting the definition of a confined aquifer. During the pumping test the well quickly stabilized and recovered. Based on the well being greater than 50 feet deep, the presence of a surface seal and restrictive layer, surface water contamination of the well is not considered a risk.

7) Sanitary setback: **100** ft (If less than 100 feet, describe the site conditions):

8) Wellhead Construction:

in wellhouse

in doghouse

outside

controlled access:

other uses for wellhouse:

9) Surface seal:

18 ft

>18 ft

<18 ft (no DOE approval)

<18 ft (with DOE approval, include documentation)

no surface seal

unknown

10) Annual rainfall:

<10 in/yr
 10-25 in/yr

>25 in/yr

Part IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: **567,019** Cubic Feet (at buildout; 28 homes)

How was this determined?

meter

estimated:

pumping rate: **66.0** gpm

pumping capacity: **66.0** gpm

other:

aquifer/screen **15** ft (based on S02)

2) "Calculated Fixed Radius" estimate of groundwater movement: (see Instruction Packet)

groundwater travel time;	6 mo.	155 ft	$r = [(Q*t)/(\pi*\eta H)]^{0.5}$ where: r = radius (ft) Q = flow (ft ³ /yr) t = time (yr) η = porosity (0.25 assumed) H = screen/aquifer height (ft)
groundwater travel time;	1 yr.	219 ft	
groundwater travel time;	5 yr.	491 ft	
groundwater travel time;	10 yr.	694 ft	
length of screened/open interval:		15.0 ft	

3) Is there a river, lake, pond, stream, or other surface water body within the six month travel boundary?

No yes/no (if yes, identify on a map and describe below)

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the six month time of travel boundary? (if yes, identify on a map and describe below)

No

Part V: Assessment of Water Quality

1) Regional sources of risk to groundwater:

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 mo.	1 yr	5 yr	none / 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 systems with water quality problems				X
population density >1 house/acre				X
residences commonly having septic tanks		X		
wastewater treatment lagoons				X
sites used for land application of waste				X

Identify on a map all of the risks listed above which are located within the six month time of travel boundary. (Please include a map of the wellhead and time of travel areas within this form. Please indicate any of the following.) If other potential sources of groundwater contamination exist within the ten year time of travel circular zone around your supply, please describe:

There may be some residential use of fertilizers, herbicides, and pesticides within the 6 month time of travel and onsite septic systems within the 1 year time of travel boundary.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on the assessment, MCLs are listed in assistance package.)

	MCL/detection	level >MCL?
A. Nitrate:	10 mg/l	no
B. VOCs:	5 ug/l	no
C. EDB:	0.05 ug/l	n/a
D. DBCP:	0.2 ug/l	n/a
E. Other SOC (detectable)		no

If any SOC's in addition to EDB/DBPC were detected, please identify and date. If other SOC tests were performed, but no SOC's detected, list methods here:

Herbicides and Pesticides

F. Bacterial Contamination:

Are any bacteriological test samples available	yes	yes/no
Any bacterial detection from the source within past 3 years:	no	yes/no
Any bacterial detection in the distribution system and attributed to the source within the past 3 years:	no	yes/no

Part VI: Geographic or Hydrologic Factors contributing to a non-Circular Zone of Contribution

The following questions will help identify those groundwater systems which may not be accurately represented by the calculated field 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 ten year time of travel zone of the CFR? (does the largest circle extend over a stream, river, lake, or up a steep hillside, mountain or ridge?)

No yes/no if yes, describe with references to the map produced in Part IV:

2) Aquifer Material

A) Does the drilling, well, or other geologic/engineering report identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

no yes/no

B) Does the drilling, well, or other geologic/engineering report identify that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

yes 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.)

No yes/no

Comments: The well is located in an area with a relatively flat surrounding elevation. There are not any rivers or bodies of water within the 10 year TOT. There is a minor ephemeral wetland area within the 10 year TOT, however it is minor and is likely the result of a lens of perched water and not connected to the Qva aquifer.

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 gpm within:

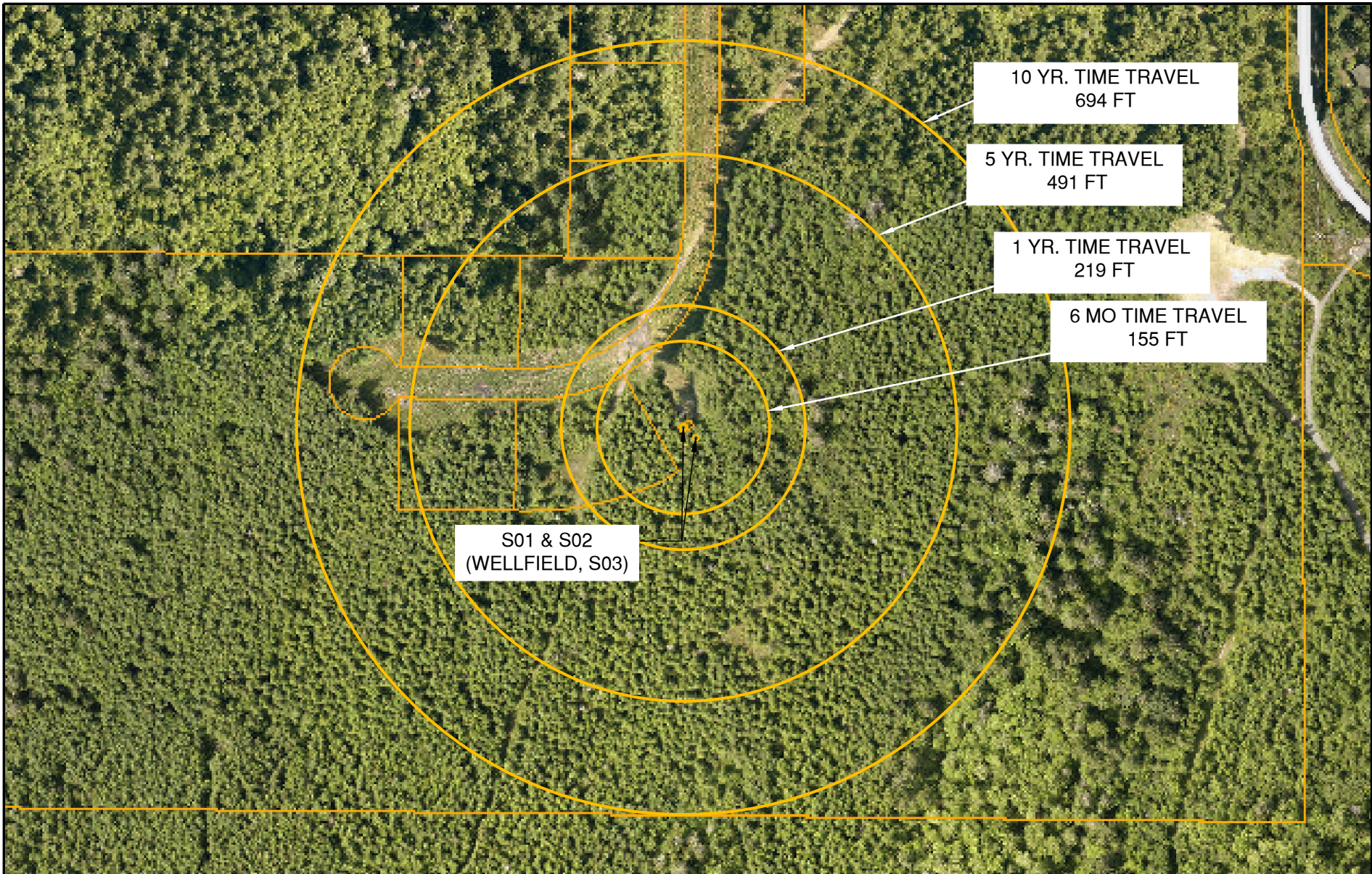
- 6 mo. travel time
- 1 yr. travel time
- 5 yr. travel time
- no 10 year travel time

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within:

- 6 mo. travel time
- 1 yr. travel time
- 5 yr. travel time
- no 10 year travel time

5) Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the contribution zone for this source. Reference them to locations on the map in Part IV.

N/A



S01 & S02
(WELLFIELD, S03)

10 YR. TIME TRAVEL
694 FT

5 YR. TIME TRAVEL
491 FT

1 YR. TIME TRAVEL
219 FT

6 MO TIME TRAVEL
155 FT



THIS IS NOT A SURVEY. PROPERTY LINES AND ELEVATIONS SHOWN ARE BASED UPON THE AVAILABLE INFORMATION AND ARE APPROXIMATE ONLY.

DISTURBANCE OF EXISTING SURVEY MONUMENTS IS A GROSS MISDEMEANOR UNDER RCW 58.04.015

DRAWN BY: Anna Nelson, EIT		SYSTEM SHADOW CREEK WATER SYSTEM		OWNER THURSTON PUD	
CHECKED BY: Doug Piehl, PE		FILE NO. 200701	FILE NAME GW RADII MAP	SHEET NO. 1 OF 1	
REVISION		DATE APRIL 19, 2021		SCALE 1" = 250'	
DESCRIPTION	DATE	NORTHWEST WATER SYSTEMS, INC.			
PRELIMINARY DRAFT TO DOH UPDATED TO INCLUDE NEW FUTURE PLATS	6/29/2021 4/9/2025	DESIGN - CONSULTING - MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958			

RETURN ADDRESS

John Mance

President, Mance & Son
Residential Developers, Inc

5448 78th Ave NE

Olympia, WA 98516

Document Title(s)

Declaration of Covenant for Public Water Supplies

Reference Numbers(s) of related documents

_____ Additional Reference #'s on page

Grantor(s) (Last, First and Middle Initial)

Mance & Son Residential Developers, Inc

_____ Additional grantors on page

Grantee(s) (Last, First and Middle Initial)

Mance & Son Residential Developers, Inc

_____ Additional grantees on page

Legal Description (abbreviated form: i.e. lot, block, plat or section, township, range, quarter/quarter)

Section 27 Township 19 Range 1W Quarter SE SW & N2 NW Survey LT 2
Document 4420926 Described as Follows: THE SOUTHEAST QUARTER OF
THE SOUTHWEST QUARTER OF SECTION 22, TOWNSHIP 19

_____ Additional legal is on page

Assessor's Property Tax Parcel/Account Number

11922340000

_____ Additional parcel #'s on page

The Auditor/Recorder will rely on the information provided on this form. The staff will not read the document to verify the accuracy or completeness of the indexing information provided herein.

Return to:

DECLARATION OF COVENANT FOR PUBLIC WATER SUPPLIES

Know all men by those present that I (we) the undersigned owner(s) in fee simple of the land described herein, hereby declare this covenant and place same on record.

I (we), the grantor(s) herein, am (are) the owner(s) in fee simple of (an interest in) the following real estate situated in:
The SE ¼ of the SW ¼ ; Section 27, Township 19N, Range 01W W.M. in the County of Thurston , in the State of Washington. More specifically,

**Section 27 Township 19 Range 1W Quarter SE SW & N2 NW Survey LT 2 Document 4420926 Described as Follows:
THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 22, TOWNSHIP 19**

on which the grantor(s) owns and operates a well(s) and water works supplying water for public use located on said real estate, to wit:**The SE ¼ of the SW ¼ ; Section 27, Township 19N, Range 01W W.M. in the County of Thurston , in the State of Washington. More specifically,**

**Section 27 Township 19 Range 1W Quarter SE SW & N2 NW Survey LT 2 Document 4420926 Described as Follows:
THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 22, TOWNSHIP 19**

**Well 1 coordinates approximately as follows: and 47.1115611,-122.7957176, more or less.
Well 2 coordinates approximately as follows: and 47.1116125, -122.7958116, more or less.**

and grantor(s) is (are) required to keep the water supplied from said well(s) free from impurities which might be injurious to the public health.

It is the purpose of these grants and covenants to prevent certain practices hereinafter enumerated in the use of said grantor(s) land which might contaminate said water supply.

Exhibit A NOW, THEREFORE, the grantor(s) agree(s) and covenant(s) that said grantor(s), his (her) (Their) heirs, successors and assigns will not construct, maintain, or suffer to be constructed or maintained upon the said land of the grantor(s) and within 100 (one-hundred) feet of the well herein described, so long as the same is operated to furnish water for public consumption, ANY POTENTIAL SOURCE OF CONTAMINATION INCLUDING BUT NOT LIMITED TO: dwellings, outbuildings, cesspools, sewers, privies, septic tanks, drainfields, manure piles, fenced pasture, garbage of any kind or description, any enclosure or structures for the keeping or storage of nonbiodegradable fertilizers, liquid or dry chemicals, herbicides or insecticides as well as any enclosures or structures for the keeping or maintenance of fowl or animals such as barns, chicken houses, rabbit hutches, pigpens, livestock sheds, and further agree(s) not to use, apply, dispose or suffer to be used, applied or disposed, nonbiodegradable fertilizers, any liquid or dry chemicals herbicides or insecticides within the above described protective radius.

These covenants shall run with the land and shall be binding on all parties having or acquiring any right, title, or interest in the land described herein or any part thereof, and shall insure to the benefit of each owner thereof.

WITNESS by my (our) hand on this day 23 day of JULY, 2021.

[Signature] (Seal)

(Seal)
Grantor(s)

State of Washington
County of Thurston

I, the undersigned, a Notary Public in and for the above named County and state, do hereby certify that on this 23 day of July, 2021, personally appeared before me John Manic to me known to be the individual(s) described in and who executed the within instrument, and acknowledge that (s)he (they) signed and sealed the same as his (her) (their) free and voluntary act and deed, for the uses and purposes therein mentioned.

GIVEN under my hand and official seal the day and year last above written.

[Signature]
NOTARY PUBLIC in and for the State of Washington
Residing at Olympia



Notice Letters mailed out in 2021



Planning • Management • Engineering

P.O. Box 123 • Port Orchard, WA 98366 • 1-888-881-0958

July 22, 2021

Thurston County Public Health Department
412 Lilly Rd NE
Olympia, WA 98506

Subject: Shadow Creek Water System Notification of Wellhead Protection Area

Dear Thurston County:

As part of our wellhead protection program and in accordance with state regulations (WAC 246-290-135), the Shadow Creek Water System hereby informs you of the findings of our wellhead protection area delineation.

The enclosed map shows the 1, 5, and 10-year travel boundaries for our wellhead protection areas located in Township 19, Range 2W and includes portions of Sections 7 and 12. Please review the map and correlate it with your land-use planning. Any groundwater contamination that occurs within this wellhead protection area has a potential to reach our wells. It is of importance to us that all reasonable steps are taken to ensure that land use activities within this area do not contaminate our drinking water supply. Please return notification if you are aware of an unidentified potential source of contamination located within the wellhead protection area.

In addition, please note the location of the wellhead in the event of an emergency. Thank you for your cooperation and assistance in helping us ensure safe, clean drinking water. If you have any questions, contact Northwest Water Systems.

Sincerely,

Anna Nelson
Northwest Water Systems
On behalf of the Shadow Creek Water System



Planning • Management • Engineering

P.O. Box 123 • Port Orchard, WA 98366 • 1-888-881-0958

July 22, 2021

Department of Ecology – SW Regional Office
300 Desmond Drive SE
Lacey, WA 98503

Subject: Shadow Creek Water System Notification of Wellhead Protection Area

Dear Department of Ecology:

As part of our wellhead protection program and in accordance with state regulations (WAC 246-290-135), the Shadow Creek Water System hereby informs you of the findings of our wellhead protection area delineation.

The enclosed map shows the 1, 5, and 10-year travel boundaries for our wellhead protection areas located in Township 19, Range 2W and includes portions of Sections 7 and 12. Please review the map and correlate it with your land-use planning. Any groundwater contamination that occurs within this wellhead protection area has a potential to reach our wells. It is of importance to us that all reasonable steps are taken to ensure that land use activities within this area do not contaminate our drinking water supply. Please return notification if you are aware of an unidentified potential source of contamination located within the wellhead protection area.

In addition, please note the location of the wellhead in the event of an emergency. Thank you for your cooperation and assistance in helping us ensure safe, clean drinking water. If you have any questions, contact Northwest Water Systems.

Sincerely,

Anna Nelson
Northwest Water Systems
On behalf of the Shadow Creek Water System



Planning • Management • Engineering

P.O. Box 123 • Port Orchard, WA 98366 • 1-888-881-0958

July 22, 2021

Thurston County Department of Emergency Management
9521 Tilley Rd SW
Olympia, WA 98512

Subject: Shadow Creek Water System Notification of Wellhead Protection Area

Dear Thurston County:

As part of our wellhead protection program and in accordance with state regulations (WAC 246-290-135), the Shadow Creek Water System hereby informs you of the findings of our wellhead protection area delineation.

The enclosed map shows the 1, 5, and 10-year travel boundaries for our wellhead protection areas located in Township 19, Range 2W and includes portions of Sections 7 and 12. Please review the map and correlate it with your land-use planning. Any groundwater contamination that occurs within this wellhead protection area has a potential to reach our wells. It is of importance to us that all reasonable steps are taken to ensure that land use activities within this area do not contaminate our drinking water supply. Please return notification if you are aware of an unidentified potential source of contamination located within the wellhead protection area.

In addition, please note the location of the wellhead in the event of an emergency. Thank you for your cooperation and assistance in helping us ensure safe, clean drinking water. If you have any questions, contact Northwest Water Systems.

Sincerely,

Anna Nelson
Northwest Water Systems
On behalf of the Shadow Creek Water System



Planning • Management • Engineering

P.O. Box 123 • Port Orchard, WA 98366 • 1-888-881-0958

July 22, 2021

Thurston County Community Development
2000 Lakeridge Dr SW
Building 1 Top Floor
Olympia, WA 98502

Subject: Shadow Creek Water System Notification of Wellhead Protection Area

Dear Thurston County:

As part of our wellhead protection program and in accordance with state regulations (WAC 246-290-135), the Shadow Creek Water System hereby informs you of the findings of our wellhead protection area delineation.

The enclosed map shows the 1, 5, and 10-year travel boundaries for our wellhead protection areas located in Township 19, Range 2W and includes portions of Sections 7 and 12. Please review the map and correlate it with your land-use planning. Any groundwater contamination that occurs within this wellhead protection area has a potential to reach our wells. It is of importance to us that all reasonable steps are taken to ensure that land use activities within this area do not contaminate our drinking water supply. Please return notification if you are aware of an unidentified potential source of contamination located within the wellhead protection area.

In addition, please note the location of the wellhead in the event of an emergency. Thank you for your cooperation and assistance in helping us ensure safe, clean drinking water. If you have any questions, contact Northwest Water Systems.

Sincerely,

Anna Nelson
Northwest Water Systems
On behalf of the Shadow Creek Water System

Chapter 6 Operations and Maintenance

6.1 Water System Management and Personnel

See Thurston PUD WSP Part A.

6.2 Operations and Preventative Maintenance

The PUD's routine operation and preventative maintenance schedule for the system infrastructure is outlined in Thurston PUD WSP Part A in Chapter 5, Table 5-2 and further detailed in Appendix M. In addition, their O & M procedures are further detailed in Appendix N.

6.3 Comprehensive Water Quality Monitoring

Water quality sampling will be taken in accordance with the Water Quality Monitoring Schedule (WQMS). Upon system approval, the WQMS will be provided. The coliform monitoring plan is provided in Chapter 5.

6.4 Emergency Response Program

See Thurston PUD WSP Part A.

6.5 Cross Connection Control

See Thurston PUD WSP Part A.

6.6 Record Keeping, Reporting, and Customer Complaint Program

See Thurston PUD WSP Part A.

6.7 Summary of O&M Deficiencies

As the system is new, there are no deficiencies.

Coliform Monitoring Plan for: Shadow Creek Water System

A. System Information

Plan Date: 3/7/2025

Water System Name Shadow Creek	County Thurston	System I.D. Number 95123T
Name of Plan Preparer Alli Whittle	Position Engineer	Daytime Phone 360-876-0958
Sources: DOH Source Number, Source Name, Well Depth, Pumping Capacity	<u>SO1, Well #1, 237 ft, 60 gpm</u> <u>SO2, Well #2, 236ft, 60 gpm</u>	
Storage: List and Describe	<u>4 x 5,000 gal Norwesco poly tanks</u>	
Treatment: Source Number & Process	<u>S01 and S02, oxidation filtration for iron and manganese removal</u>	
Pressure Zones: Number and name	<u>1</u>	
Population by Pressure Zone	<u>70</u>	
Number of Routine Samples Required Monthly by Regulation:	<u>1</u>	
Number of Sample Sites Needed to Represent the Distribution System:	<u>3</u>	
*Request DOH Approval of Triggered Source Monitoring Plan?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

*If approval is requested a fee will be charged for the review.

B. Laboratory Information

Laboratory Name <u>Water Management Laboratories</u>	Office Phone 253-531-3121 After Hours Phone - -
Address <u>1515 80th St E, Tacoma, WA</u> <u>98404</u>	Cell Phone - - Email <u>customerservice@watermanagementlabs.com</u>
Hours of Operation <u>Mon-Fri: 8:00 AM-5:00 PM; Sat: 9:00 AM-12:00 PM; Sun: Closed</u>	
Contact Name _____	

C. Wholesaling of Groundwater

	Yes	No
We are a consecutive system and purchase groundwater from another water system.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If yes, Water System Name: Contact Name: Telephone Numbers Office - - After Hours - -		
We sell groundwater to other public water systems.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If yes, Water System Name: Contact Name: Telephone Numbers Office - - After Hours - -		

D. Routine, Repeat, and Triggered Source Sample Locations*

Location/Address for <u>Routine</u> Sample Sites	Location/Address for <u>Repeat</u> Sample Sites	Groundwater Sources for <u>Triggered</u> Sample Sites**
X1. Lot 19	1-1. Lot 19	S03 (wellfield)
	1-2. Lot 1	S__
	1-3. Lot 20	S__
X2. Lot 22	2-1. Lot 22	S03 (wellfield)
	2-2. Lot 23	S__
	2-3. Lot 24	S__
X3. Lot 10	3-1. Lot 10	S03 (wellfield)
	3-2. Lot 11	S__
	3-3. Lot 12	S__

*NOTE: If you need more than three routine samples to cover the distribution system, attach additional sheets as needed.

** 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 Sample Collector:

E. Reduced Triggered Source Monitoring Justification (add sheets as needed):

--

F. Routine Sample Rotation Schedule

Month	Routine Site(s)	Month	Routine Site(s)
January	X1	July	X1
February	X2	August	X2
March	X3	September	X3
April	X1	October	X1
May	X2	November	X2
June	X3	December	X3

G. Level 1 and Level 2 Assessment Contact Information

Name Kim Gubbe	Office Phone 360-357-8783 ext 125 After Hours Phone - -
Address 1230 Ruddell Rd SE, Lacey WA 98503	Email kgubbe@thurstonpud.org
Name Jim Campbell	Office Phone 360-357-8783 ext. 120 After Hours Phone 360-790-2662

H. *E. coli*-Present Sample Response

Distribution System <i>E. coli</i> 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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We document all water main breaks, construction & repair activities, and low pressure and outage incidents.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We can easily access and review documentation on water main breaks, construction & repair activities, and low pressure and outage incidents.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our Cross-Connection Control Program is up-to-date.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We test all cross-connection control devices annually as required, with easy access to the proper documentation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We routinely inspect all treatment facilities for proper operation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We identified one or more qualified individuals who are able to conduct a Level 2 assessment of our water system.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have procedures in place for disinfecting and flushing the water system if it becomes necessary.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We can activate an emergency intertie with an adjacent water system in an emergency.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a map of our service area boundaries.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have consumers who may not have access to bottled or boiled water.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a sufficient supply of bottled water immediately available to our customers who are unable to boil their water.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
We have messages prepared and translated into different languages to ensure our consumers will understand them.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have the capacity to print and distribute the required number of notices in a short time period.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Policy Direction	Yes	No	N/A	To Do List
We have discussed the issue of <i>E. coli</i> -present sample results with our policy makers.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
If we find <i>E. coli</i> in a routine distribution sample, the policy makers want to wait until repeat test results are available before issuing advice to water system customers.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(Cont.)				

Distribution System <i>E. coli</i> 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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a list of all of our customers' addresses.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a list of customer telephone numbers or access to a Reverse 9-1-1 system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
We have a list of customer email addresses.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
We encourage our customers to remain in contact with us using social media.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have an active website we can quickly update to include important messages.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our customers drive by a single location where we could post an advisory and expect everyone to see it.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We need a news release to supplement our public notification process.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Distribution System <i>E. coli</i> Response Plan
<p>If we have <i>E. coli</i> in our distribution system, we will immediately:</p> <ol style="list-style-type: none"> 1. Call DOH. 2. Collect repeat and triggered source samples per Part D. Collect additional investigative samples as necessary. 3. Investigation: Identify any sanitary defects that allowed coliform to enter the distribution system or a failure or imminent failure of an existing barrier. 4. Discussion: Evaluate what was identified during the assessment that might have allowed the contamination to occur and the corrective action needed to remedy the problem. 5. Corrective action: Record the steps taken to correct the sanitary defect that may have allowed the contamination to occur. 6. Discuss with DOH whether to issue a Health Advisory based on the findings of steps 3-6.

***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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We address any significant deficiencies identified during a sanitary survey.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
We routinely inspect our well site(s).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a good raw water sample tap installed at each source.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
After we complete work on a source, we disinfect the source, flush, and collect an investigative sample.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public Notice	Yes	No	N/A	To Do List
We discussed the requirement for immediate public notice of an <i>E. coli</i> -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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We discussed the requirement for immediate public notice of an <i>E. coli</i> -present source sample result with our wholesale customers and encouraged them to develop a response plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
We have prepared templates and a communications plan that will help us quickly distribute our messages.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

<i>E. coli</i>-Present Triggered Source Sample Response Checklist – All Sources				
Alternate Sources	Yes	No	N/A	To Do List
We can stop using this source and still provide reliable water service to our customers.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have an emergency intertie with a neighboring water system that we can use until corrective action is complete (perhaps for several months).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We can provide bottled water to all or part of the distribution system for an indefinite period.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We can quickly replace our existing source of supply with a more protected new source.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

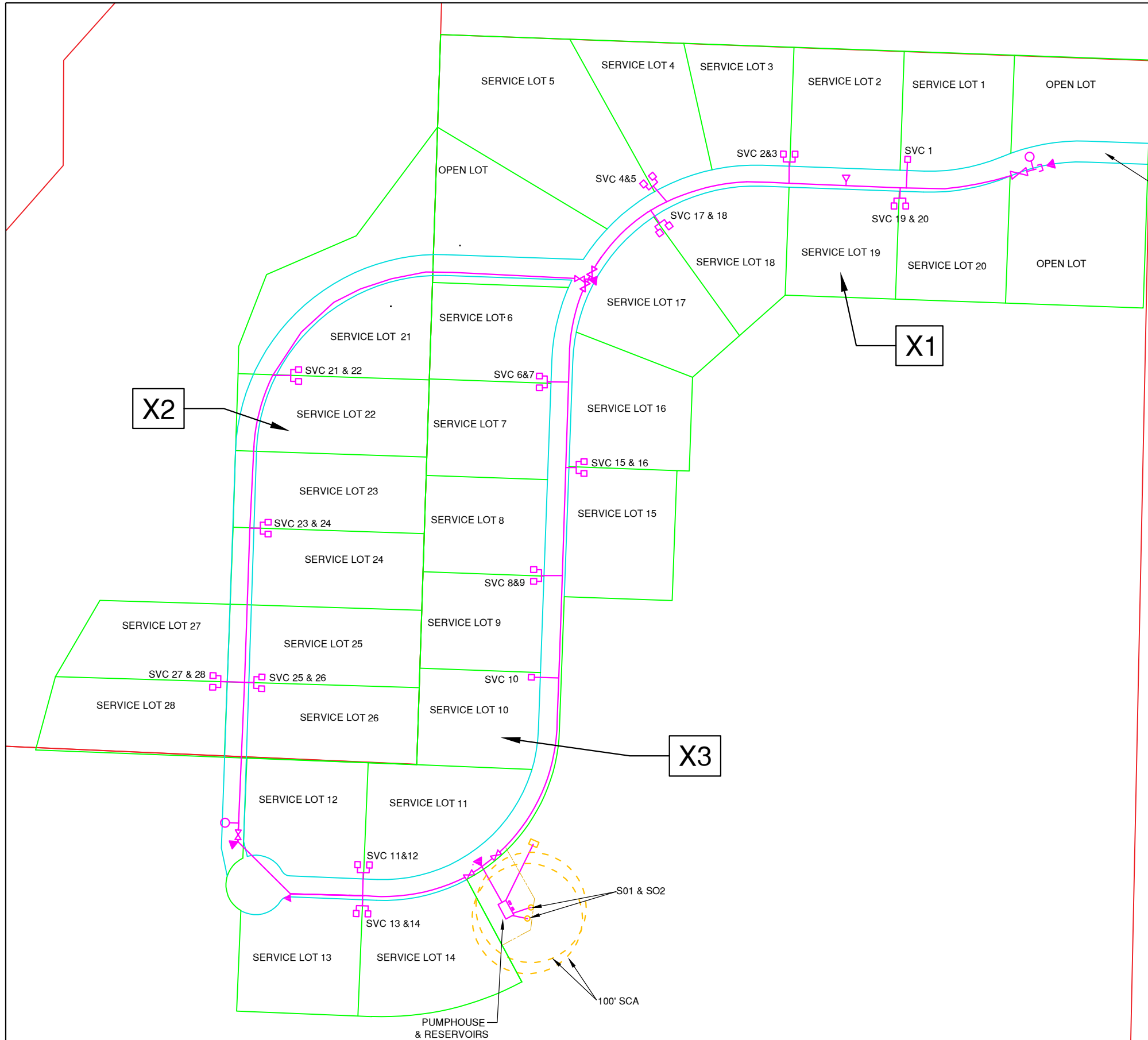
*NOTE: If your system has multiple sources, you may want to complete a separate checklist for each source.

***E. coli*-Present Triggered Source Sample Response Plan – All Sources**

If we have *E. coli* in SO3 water, we will immediately:

1. Call water system Point of Contact.
2. Call DOH
3. Issue the Tier 1 public notice that is required when a source sample is *E. coli*-present
4. Inspect the source and surrounding area for signs of disturbance or changes that could have impacted the well's water quality.
5. In concert with DOH direction, begin working on corrective actions as required under the Groundwater Rule:
Correct any source significant deficiencies that were identified in the most recent sanitary survey, or
Design and install continuous disinfection that meets the 4- log virus removal standard, or
Determine the source of the contamination and eliminate it, or
Obtain a new source in order to discontinue the well.
6. In the unlikely event that DOH does not direct the system to take corrective action, collect 5 additional source samples within 24-hours of receiving the result report for the *E. coli*- present sample.

I. System Map



LEGEND

- SERVICE CONNECTION
- BLOW-OFF
- ▽ GATE VALVE
- ▶ THRUST BLOCK

THIS IS NOT A SURVEY. PROPERTY LINES AND ELEVATIONS SHOWN ARE BASED UPON THE AVAILABLE INFORMATION (THURSTON COUNTY MAP) AND ARE APPROXIMATE ONLY. SITE INFORMATION PROVIDED BY: THE CLIENT

DISTURBANCE OF EXISTING SURVEY MONUMENTS IS A GROSS MISDEMEANOR UNDER RCW 58.04.015

DRAWN BY: ANNA NELSON, EIT CHECKED BY: DOUG PIEHL, PE		SYSTEM SHADOW CREEK WATER SYSTEM	OWNER THURSTON PUD
FILE NO. 200701		FILE NAME SYSTEM MAP	SHEET NO. 1 OF 1
DATE MARCH 6, 2021		SCALE 1" = 200'	
NORTHWEST WATER SYSTEMS, INC.			
DESIGN - CONSULTING - MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958			
DESCRIPTION	DATE		
WELL SITE INSPECTION	05/26/2021		
PRELIMINARY DRAFT TO DOH	06/29/2021		
UPDATE LOCATION AND WETLAND REVISED TO INCLUDE SVCS 21-28 AND TPN11923320000 IN SVC AREA	11/12/2021		
LOOP TIE-IN IN FRONT OF LOT 17	03/15/2023		
AS-BUILT CHANGES FOR LOTS 1-20	07/07/2023		
CONVERT SYSTEM MAP FOR CMP	03/27/2025		

Chapter 7 Distribution Facilities Design and Construction Standards

The consolidated system is requesting a distribution main project exemption as allowed under WAC (246-290-125 (2)). The distribution design and construction standards are outlined in the Thurston PUD WSP Part A. A map of the distribution system is available in Chapter 10.6 and a hydraulic analysis is included in Chapter 10.1.

Chapter 8 Capital Improvement Program

8.1 Prioritization Criteria

Improvements are prioritized according to the following criteria listed from highest to lowest in importance:

1. Public Health Risks
2. Adequate Supply
3. WSDOH Operation and Design Standards
4. Achieving Conservation Goals
5. Regularly Scheduled Improvements
6. Aesthetic and Optional Improvements

8.2 Prioritized List of Improvements

As the system is new, there are no improvements needed at this time.

8.3 Assessment of Improvements

As the system is new, there are no improvements needed at this time.

Chapter 9 Financial Program

See the Thurston PUD Part A for a full financial assessment. A capital improvement assessment of the infrastructure is attached in this section.

**Capital Replacements Worksheet
for the
Shadow Creek Water System**

Date of Capital Replacement Assessment	2021
Reserve Balance	\$0
Minimum Income from New Connection for future Improvements	\$0
Assessment	\$0
Total Available Funding	\$ -
Inflation Rate	3.0%
Savings Account Interest Rate	2.0%
Interest Compoundings per Year	1

Short Term/Long Term Break point: 20 years

Life (yrs) Component Costs FV of Current Reserve
0 \$ - \$ -

Component	Year Installed	Service Life	Age	Life	Unit Price	Units	Replacement Cost	Long Term Future Cost	Depreciated Value	100% Covered	Present Reserve Balance	Current Reserve Future worth	Future Value Remaining Cost	Mid-Term Reserve Payment	Long Term Reserve Payment
Well #1 BMS049, 6-in x 237 ft	2020	85	1	84	\$73,360	1	\$73,360	\$878,590	\$72,497	\$0	\$0	\$0	\$878,590	\$0	\$1,312
Well #2 BLH562, 6-in x 236 ft	2020	85	1	84	\$73,150	1	\$73,150	\$876,071	\$72,289	\$0	\$0	\$0	\$876,071	\$0	\$1,308
Well #1&2 Pumps -Goulds 65GS50	2020	25	1	24	\$9,500	2	\$19,000	\$38,623	\$18,240	\$0	\$0	\$0	\$38,623	\$0	\$910
Aquivar VFD (well pump)	2021	30	0	30	\$4,500	2	\$9,000	\$21,845	\$0	\$0	\$0	\$0	\$21,845	\$0	\$355
Aquivar VFD (booster pump)	2021	30	0	30	\$4,500	3	\$13,500	\$32,768	\$0	\$0	\$0	\$0	\$32,768	\$0	\$532
Booster Pumps-Goulds HSC30	2021	25	0	25	\$6,350	3	\$19,050	\$39,886	\$0	\$0	\$0	\$0	\$39,886	\$0	\$880
Norwesco (4 x 3,000 gallons)	2021	50	0	50	\$3,500	4	\$14,000	\$61,375	\$0	\$0	\$0	\$0	\$61,375	\$0	\$363
Pumphouse	2021	50	0	50	\$20,000	1	\$20,000	\$87,678	\$0	\$0	\$0	\$0	\$87,678	\$0	\$518
Pro Ox Treatment Unit (7500c)	2021	30	0	30	\$6,350	3	\$19,050	\$46,239	\$0	\$0	\$0	\$0	\$46,239	\$0	\$751
Mix Master Baffling Tank (120 gal)	2021	30	0	30	\$1,950	1	\$1,950	\$4,733	\$0	\$0	\$0	\$0	\$4,733	\$0	\$77
Stenner Injection Pump 84MPH17	2021	10	0	10	\$520	1	\$520	\$699	\$0	\$0	\$0	\$0	\$699	\$61	\$0
Pro Chem (50 gallon) Solution Tank	2021	30	0	30	\$390	1	\$390	\$947	\$0	\$0	\$0	\$0	\$947	\$0	\$15
4" C900 PVC	2021	80	0	80	\$60	2550	\$153,000	\$1,628,056	\$0	\$0	\$0	\$0	\$1,628,056	\$0	\$2,824
Source Meter	2021	30	0	30	\$1,500	2	\$3,000	\$7,282	\$0	\$0	\$0	\$0	\$7,282	\$0	\$118
Service Meter (10 connections)	2021	10	0	10	\$500	10	\$5,000	\$6,720	\$0	\$0	\$0	\$0	\$6,720	\$586	\$0
Service Laterals	2021	50	0	50	\$1,500	7	\$10,500	\$46,031	\$0	\$0	\$0	\$0	\$46,031	\$0	\$272
4" Gate Valve	2021	40	0	40	\$1,200	4	\$4,800	\$15,658	\$0	\$0	\$0	\$0	\$15,658	\$0	\$149
Well X-trol Bladder Tank (81 gal)	2021	10	0	10	\$800	1	\$800	\$1,075	\$0	\$0	\$0	\$0	\$1,075	\$94	\$0
Well X-trol Bladder Tank (14 gal)	2021	10	0	10	\$500	1	\$500	\$672	\$0	\$0	\$0	\$0	\$672	\$59	\$0
Pressure Relief Valve (Kunkle)	2021	30	0	30	\$600	1	\$600	\$1,456	\$0	\$0	\$0	\$0	\$1,456	\$0	\$24
Pressure Relief Valve (Boshart)	2021	30	0	30	\$100	2	\$200	\$485	\$0	\$0	\$0	\$0	\$485	\$0	\$8
Check Valves	2021	30	0	30	\$200	1	\$200	\$485	\$0	\$0	\$0	\$0	\$485	\$0	\$8
2" Blow-off assemblies	2021	30	0	30	\$2,000	2	\$4,000	\$9,709	\$0	\$0	\$0	\$0	\$9,709	\$0	\$158
Generator	2021	50	0	50	\$15,000	1	\$15,000	\$65,759	\$0	\$0	\$0	\$0	\$65,759	\$0	\$389
													CIP Reserve Payment	\$800	\$10,968
													Total Annual Payments		\$11,768
													Annual Payment Normalized to be Indexed to Inflation Annually		\$11,768

Chapter 10 Appendices and Supporting Documents

- 10.1 Hydraulic Analysis**
- 10.2 Well Logs and Pumping Equipment**
- 10.3 Water Quality**
- 10.4 WSP Adoption Notice and Minutes**
- 10.5 Local Government Consistency**
- 10.6 Construction Maps and Drawings**

Hydraulic Analysis Description and Node Map

Description

The system hydraulic analysis was prepared using EPANET2. The model is comprised of 16 nodes representing the location of single and double service assemblies. These nodes were assigned a unit demand and distributed to represent planned distribution layout. It is assumed flow will be evenly distributed throughout the system during peak demand. Thus, unit demand at each node is based on the modeled flow rate divided by the number of connections represented by each node. Thurston County elevation maps were used to determine an approximate elevation at each node (see tabular results below). A Hazen-Williams friction factor of 150 was used.

Scenarios

Three scenarios were evaluated- PHD condition, static condition, and a limiting condition scenario. Modelling of the PHD condition was run at 128 gpm and pumphouse pressure of 51 psi based on combined booster pump capacity at that flow. The static condition model reflects zero demand and a pumphouse pressure of 65 psi (maximum pressure scenario). In the limiting condition scenario, demand was increased until either the distribution pressure dropped below 30 psi or the peak velocity reached 8 fps. The velocity was the limiting factor.

Model Results

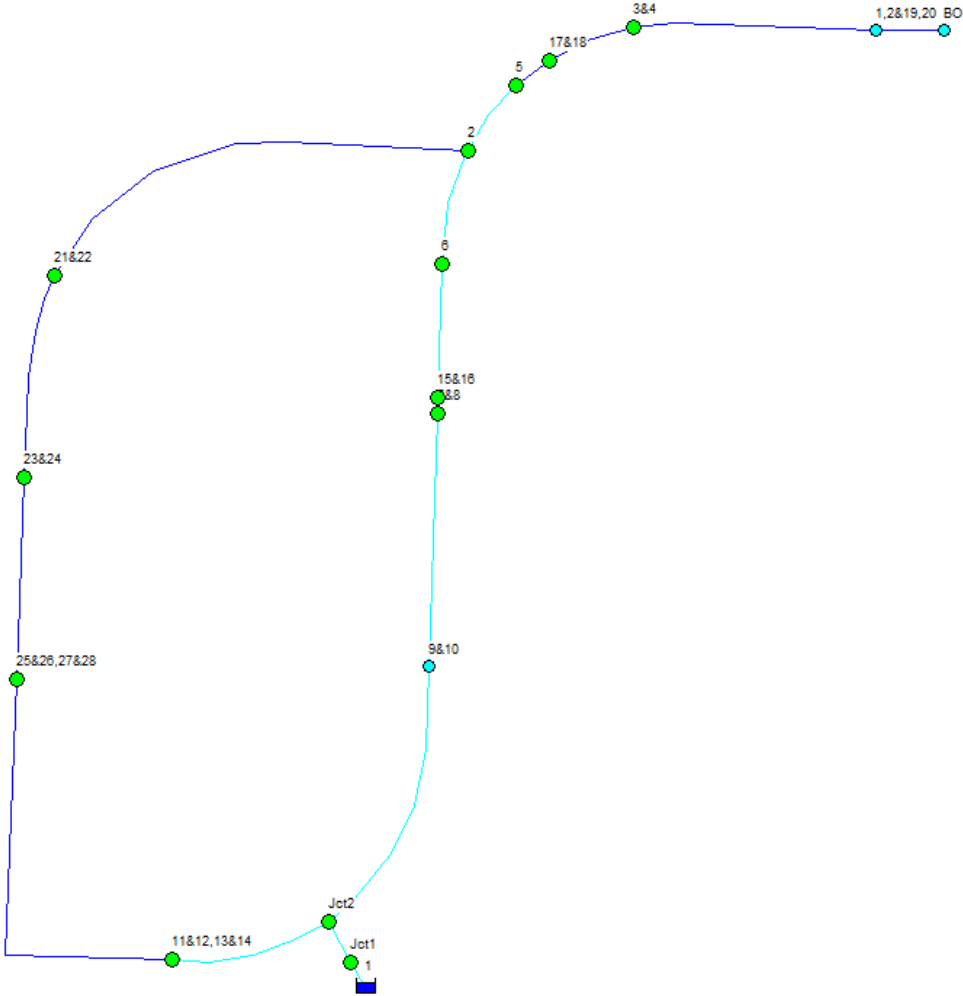
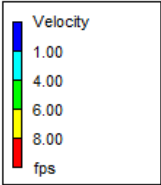
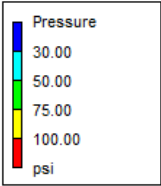
A summary of the model results is shown below.

Parameter	Normal PHD	Static	Limiting Cond.
Flow Rate (gpm)	128	0	313.32
Pumphouse Pressure (psi)	51	65	51
Minimum System Pressure (psi)	45.82	61.62	37.98
Maximum System Pressure (psi)	63.11	78.08	58.76
Peak Line Velocity (ft/s)	3.27	0	8.00

Tabular results for the model inputs and outputs are shown below.

Hydraulic Analysis Description and Node Map

PHD Condition



PHD Operating Condition

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Pressure psi
Resvr 1	292	-127.99	0.00
Junc 1,2&19,20	182	18.28	45.82
Junc BO	180	0.00	46.69
Junc 9&10	176	9.14	49.15
Junc 15&16	172	9.14	50.48
Junc Jct2	174	0.00	50.57
Junc Jct1	174	0.00	51.03
Junc 3&4	170	9.14	51.05
Junc 17&18	170	9.14	51.08
Junc 7&8	170	9.14	51.36
Junc 5	166	4.57	52.84
Junc 6	166	4.57	52.97
Junc 11&12,13&14	167	18.28	53.42
Junc 2	166	0.00	53.57
Junc 23&24	157	9.14	57.48
Junc 25&26,27&28	155	18.28	58.38
Junc 21&22	144	9.14	63.11

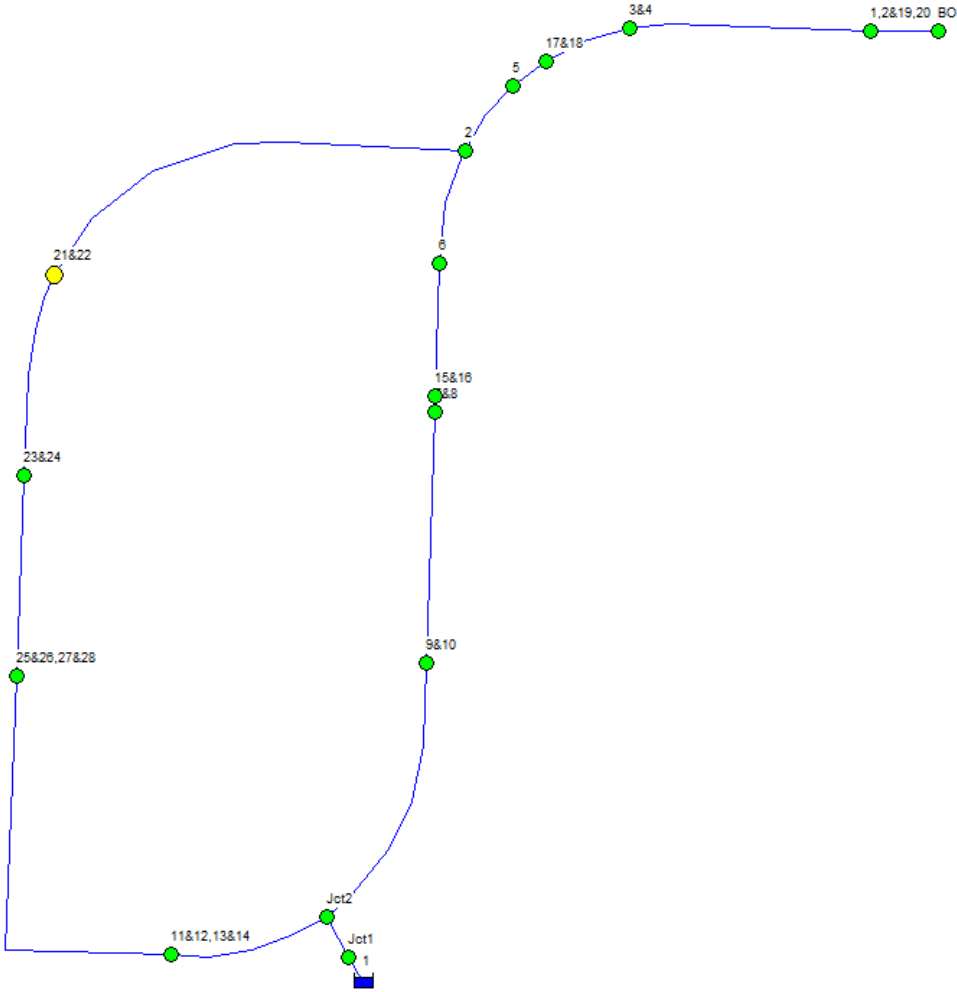
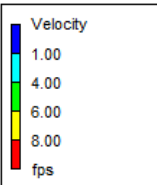
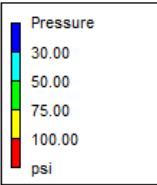
PHD Operating Condition

Network Table - Links

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 14	0.00	0.00	0.00
Pipe 16	0.00	0.00	0.00
Pipe 15	9.14	0.23	0.07
Pipe 11	18.28	0.47	0.25
Pipe 7	18.28	0.47	0.25
Pipe 3	27.43	0.70	0.53
Pipe 10	36.57	0.93	0.89
Pipe 9	36.57	0.93	0.90
Pipe 2	41.14	1.05	1.11
Pipe 6	45.71	1.17	1.35
Pipe 1	54.85	1.40	1.90
Pipe 5	54.85	1.40	1.90
Pipe 4	63.99	1.63	2.52
Pipe 8	73.14	1.87	3.23
Pipe 12	-127.99	3.27	9.11
Pipe 13	127.99	3.27	9.11

Hydraulic Analysis Description and Node Map

Static Condition



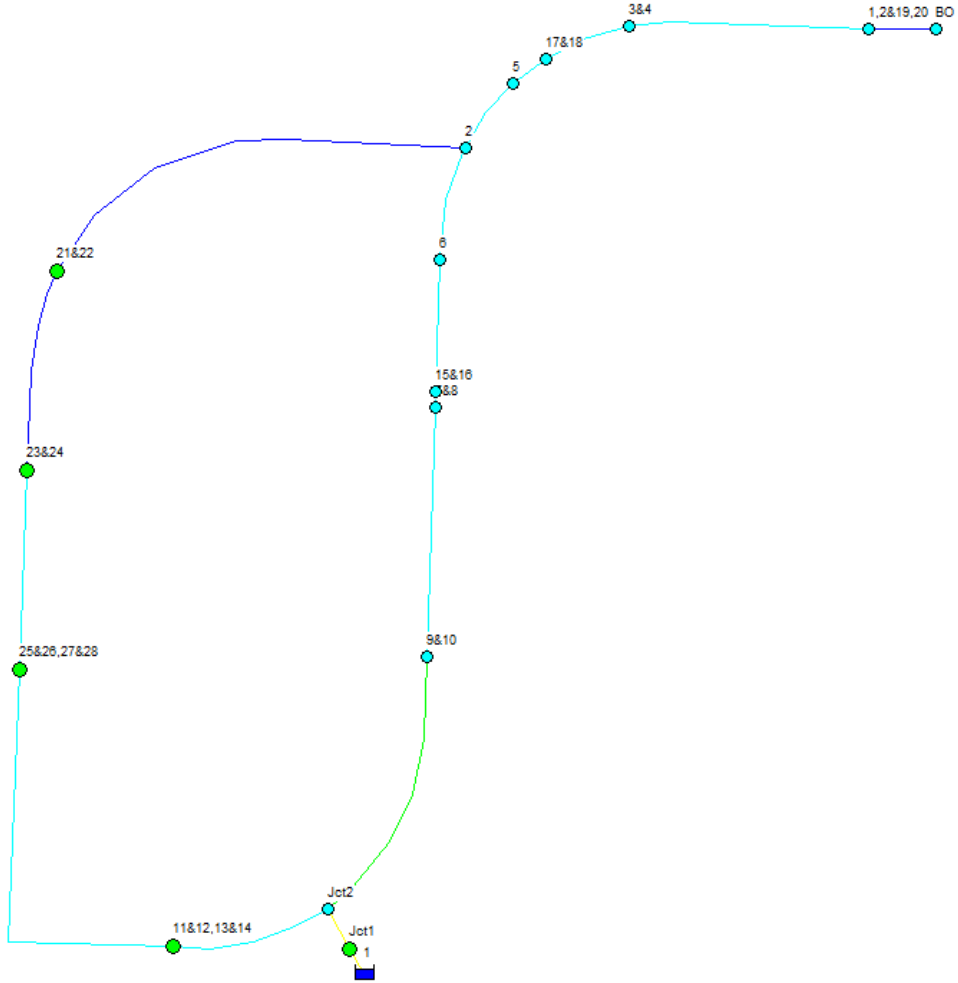
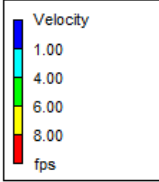
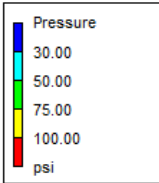
Static Condition

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Pressure psi
Junc 21&22	144	0.00	78.08
Junc 25&26,27&28	155	0.00	73.31
Junc 23&24	157	0.00	72.45
Junc 5	166	0.00	68.55
Junc 6	166	0.00	68.55
Junc 2	166	0.00	68.55
Junc 11&12,13&14	167	0.00	68.11
Junc 3&4	170	0.00	66.81
Junc 7&8	170	0.00	66.81
Junc 17&18	170	0.00	66.81
Junc 15&16	172	0.00	65.95
Junc Jct2	174	0.00	65.08
Junc Jct1	174	0.00	65.08
Junc 9&10	176	0.00	64.22
Junc BO	180	0.00	62.48
Junc 1,2&19,20	182	0.00	61.62
Resvr 1	324.2	0.00	0.00

Hydraulic Analysis Description and Node Map

Limiting Condition



Limiting Condition

Network Table - Nodes

Node ID	Elevation ft	Demand GPM	Pressure psi
Resvr 1	292	-313.32	0.00
Junc 1,2&19,20	182	44.76	37.98
Junc BO	180	0.00	38.85
Junc 3&4	170	22.38	43.37
Junc 17&18	170	22.38	43.52
Junc 15&16	172	22.38	44.04
Junc 9&10	176	22.38	44.40
Junc 7&8	170	22.38	45.00
Junc 5	166	11.19	45.37
Junc 6	166	11.19	46.07
Junc Jct2	174	0.00	48.19
Junc 2	166	0.00	49.23
Junc 11&12,13&14	167	44.76	50.24
Junc Jct1	174	0.00	50.63
Junc 23&24	157	22.38	53.17
Junc 25&26,27&28	155	44.76	54.19
Junc 21&22	144	22.38	58.76

Limiting Condition

Network Table - Links

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft
Pipe 14	0.00	0.00	0.00
Pipe 16	0.00	0.00	0.00
Pipe 15	22.38	0.57	0.36
Pipe 7	44.76	1.14	1.30
Pipe 11	44.76	1.14	1.30
Pipe 3	67.14	1.71	2.76
Pipe 9	89.52	2.29	4.70
Pipe 10	89.52	2.29	4.70
Pipe 2	100.71	2.57	5.84
Pipe 6	111.90	2.86	7.10
Pipe 5	134.28	3.43	9.95
Pipe 1	134.28	3.43	9.95
Pipe 4	156.66	4.00	13.24
Pipe 8	179.04	4.57	16.96
Pipe 12	-313.32	8.00	47.80
Pipe 13	313.32	8.00	47.80

Appendix 10.2

Well Logs and Pumping Equipment¹

¹ Additional equipment and construction specifications available in Project Report

WATER WELL REPORT



Type of Work:

Construction
 Decommission \leftrightarrow Original installation NOI No. _____

Proposed Use: Domestic Industrial Municipal
 Dewatering Irrigation Test Well Other _____

Construction Type: New well Alteration Deepening Other _____
Method: Driven Jetted Cable Tool
 Dug Air- Mud-Rotary

Dimensions: Diameter of boring 6 in., to 236 ft.
 Depth of completed well 236 ft.

Construction Details:

Casing	Liner	Diameter	From	To	Wall Thickness	Steel	PVC	Welded	Thread
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>6</u> in.	<u>0</u>	<u>209</u>	<u>.025</u> in.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	_____ in.	_____	_____	_____ in.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	_____ in.	_____	_____	_____ in.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	_____ in.	_____	_____	_____ in.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Perforations: Yes No Type of perforator used _____
 No. of perforations _____ Size of perforations _____ in. by _____ in.
 Perforated from _____ ft. to _____ ft. below ground surface

Screens: Yes No K-Packer \leftrightarrow Depth 207 ft.
 Manufacturer's Name Alloy Machine Works
 Type Stainless Slotted Model No. _____
 Diameter 5 Slot size .008 in. from 221 ft. to 226 ft.
 Diameter 5 Slot size .010 in. from 211 ft. to 221 ft.

Sand/Filter pack: Yes No Size of pack material _____ in.
 Materials placed from _____ ft. to _____ ft.

Surface Seal: Yes No To what depth? 20 ft.
 Material used in seal Bentonite Chips
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

Pump: Manufacturer's Name _____ Type: _____
 H.P. _____ Pump intake depth: _____ ft. Designed flow rate: _____ gpm

Water Levels: Land-surface elevation above mean sea level 169 ft.
 Stick-up of top of well casing 2 ft. above ground surface
 Static water level 96 ft. below top of well casing Date 6-26-2020
 Artesian pressure _____ lbs. per square inch Date _____
 Artesian water is controlled by _____ (cap, valve, etc.)

Well Tests:
 Was a pumping test performed? No Yes \leftrightarrow by whom? _____
 Yield _____ gpm with _____ ft. drawdown after _____ hrs.
 Yield _____ gpm with _____ ft. drawdown after _____ hrs.
 Yield _____ gpm with _____ ft. drawdown after _____ hrs.
 Recovery data (time = zero when pump is turned off - water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Date of pumping test _____
 Bailer test _____ gpm with _____ ft. drawdown after _____ hrs.
 Air test 50 gpm with stem set at 180 ft. for 1 hrs. } Date 6-26-2020
 Artesian flow _____ gpm
 Temperature of water 50 °F Was a chemical analysis made? Yes No

Notice of Intent No. WE38876

Unique Ecology Well ID Tag No. BLH562

Site Well Name (if more than one well): _____

Water Right Permit/Certificate No. G2-30636

Property Owner Name Mance & Son Residential Developers Inc

Well Street Address Well #2 Shadow Creek Water System

City Olympia County Thurston

Tax Parcel No. 11922340000

Was a variance approved for this well? Yes No

If yes, what was the variance for? _____

Location (see instructions on page 2): WWM or EWM

SE $\frac{1}{4}$ - $\frac{1}{4}$ of the SW $\frac{1}{4}$; Section 27 Township 19N Range 1W

Latitude (Example: 47.12345) 47.1116125

Longitude (Example: -120.12345) -122.7958116

Driller's Log/Construction or Decommission Procedure
 Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each layer penetrated, with at least one entry for each change of information. Use additional sheets if necessary.

Material	From	To
Brown gravelly fine to medium sand	0	7
Black gravel with fine gray sand	7	17
Brown fine to coarse sandy gravel, tight	17	
siltbound, dry		68
Brown gravelly brown clay, dry	68	73
Brown gravelly fine sand, tight, dry	73	107
Brown medium to coarse sand, some gravel, wet	107	119
Brown medium sand, heaving, water bearing	119	145
Brown medium sand, heaving, occasional	145	
gravel, water		167
Gray fine sand, silty, burnt wood, heaving	167	196
Gray silty clay with fine sand, tight	196	205
Black medium clean sand, heaving, water bearing	205	226
Gray clay silt, tight, dry	226	236

Start Date 6-26-2020 Completed Date 6-26-2020

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 Trainee PE - Print Name Roger Phythian
 Signature _____
 License No. 2053
 IF TRAINEE: Sponsor's License No. _____
 Sponsor's Signature _____

Drilling Company Arcadia Drilling Inc.
 Address PO Box 1790
 City, State, Zip Shelton, WA 98584
 Contractor's
 Registration No. ARCADDI098K1 Date 7-9-2020

WATER END DATA

Series	Model	Required HP	Stages	Water End	
				Length (in)	Weight (lbs)
35GS	35GS10	1	6	14.2	8
	35GS15	1.5	8	16.6	9
	35GS20	2	10	19.1	10
	35GS30	3	14	24.0	13
	35GS50	5	23	36.4	20
	35GS75	7.5	36	53.0	28
	35GS100	10	46	65.2	34
45GS	45GS15	1.5	5	12.9	8
	45GS20	2	7	15.4	9
	45GS30	3	10	19.0	10
	45GS50	5	17	27.7	15
	45GS75	7.5	25	38.9	21
	45GS100	10	34	50.6	27
65GS	65GS15	1.5	6	19.1	10
	65GS20	2	7	21.2	11
	65GS30	3	10	27.4	12
	65GS50	5	16	41.2	18
	65GS75	7.5	26	62.3	35
	65GS100	10	33	76.8	42
85GS	85GS30	3	8	29.4	13
	85GS50	5	14	42.8	18
	85GS75	7.5	21	63.8	35
	85GS100	10	27	79.9	41

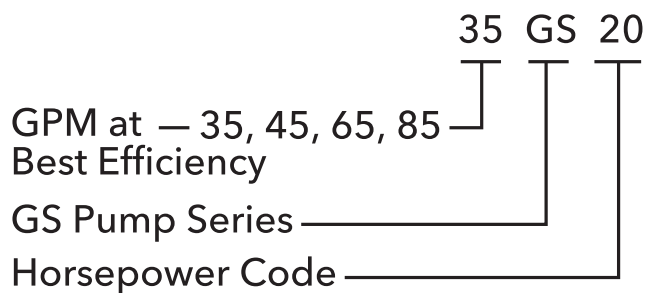
SPECIFICATIONS

Model	Flow Range GPM	Horse-Power Range	Best Efficiency GPM	Discharge Connection	Minimum Well Size	Rotation
35GS	10-50	1.0 - 10	35	2"	4"	CCW
45GS	20 - 65	1.5 - 10	45	2"	4"	CCW
65GS	30 - 80	1.5 - 10	65	2"	4"	CCW
85GS	40 - 120	3.0 - 10	85	2"	4"	CCW

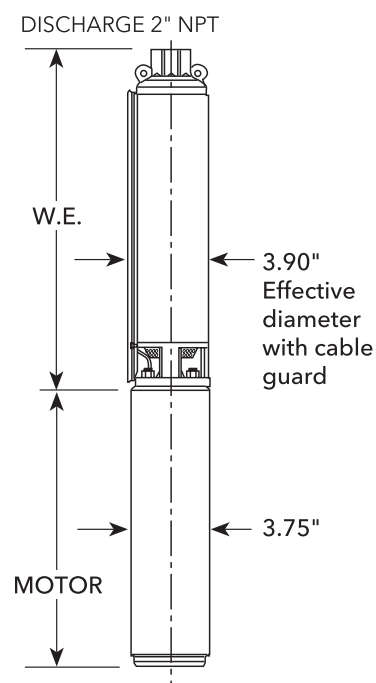
"GS" SERIES MATERIALS OF CONSTRUCTION

Part Name	Material
Discharge Head	AISI 303 SS
Check Valve Poppet	AISI 303 SS
Check Valve Seal	BUNA, FDA Compliant
Check Valve Seat	AISI 304 SS
Check Valve Retaining Ring	AISI 302 SS
Bearing Spider - Upper	Glass filled engineered composite
Bearing	Proprietary Engineered Polymer
Klipring	AISI 301 SS
Diffuser	Glass filled engineered composite
Impeller	Glass filled engineered composite
Bowl	AISI 304 SS
Intermediate Sleeve*	AISI 304 SS, Powder Metal
Intermediate Shaft Coupling*	AISI 304 SS, Powder Metal
Intermediate Bearing Spider*	Glass filled engineered composite
Intermediate Bearing Spider*	AISI 303 SS
Shim	AISI 304 SS
Screws - Cable Guard	AISI 304 SS
Motor Adapter	AISI 303 SS
Casing	AISI 304 SS
Shaft	17-4 PH Stainless Steel
Coupling	AISI 304 SS, Powder Metal
Cable Guard	AISI 304 SS
Suction Screen	AISI 304 SS

NOMENCLATURE - SOLD AS WATER ENDS ONLY



10 = 1	50 = 5
15 = 1½	75 = 7½
20 = 2	100 = 10
30 = 3	



CENTRIPRO 4" SINGLE-PHASE MOTORS

Order No.	Type	HP	Volts	Length in. (mm)	Weight lb. (kg.)
M10422	2-wire PSC	1	230	13.3 (337)	24.5 (11.1)
M15422		1.5		14.9 (378)	28.9 (13.1)
M10412	3-wire	1	230	11.7 (297)	23.1 (10.5)
M15412		1.5		13.6 (345)	27.4 (12.4)
M20412		2		15.1 (383)	31.0 (14.1)
M30412		3		18.3 (466)	40.0 (18.1)
M50412		5		27.7 (703)	70.0 (31.8)

CENTRIPRO 4" THREE-PHASE MOTORS

Order No.	HP	Volts	Length in. (mm)	Weight lb. (kg.)
M10430	1	200	11.7 (297)	22 (10.4)
M15430	1.5		11.7 (297)	22 (10.4)
M20430	2		13.8 (351)	28 (12.7)
M30430	3		15.3 (389)	32 (14.5)
M50430	5		21.7 (550)	55 (24.9)
M75430	7.5		27.7 (703)	70 (31.8)
M10432	1	230	11.7 (297)	23 (10.4)
M15432	1.5		11.7 (297)	23 (10.4)
M20432	2		13.8 (351)	28 (12.7)
M30432	3		15.3 (389)	32 (14.5)
M50432	5		21.7 (550)	55 (24.9)
M75432	7.5		27.7 (703)	70 (31.8)
M10434	1	460	11.7 (297)	23 (10.4)
M15434	1.5		11.7 (297)	23 (10.4)
M20434	2		13.8 (351)	28 (12.7)
M30434	3		15.3 (389)	32 (14.5)
M50434	5		21.7 (550)	55 (24.9)
M75434	7.5		27.7 (703)	70 (31.8)
M100434	10		-	-
M15437	1.5	575	11.7 (297)	23 (10.4)
M20437	2		15.3 (389)	32 (14.5)
M30437	3		15.3 (389)	32 (14.5)
M50437	5		27.7 (703)	70 (31.8)
M75437	7.5		27.7 (703)	70 (31.8)

NEMA MOTOR

- Corrosion resistant stainless steel construction.
- Built-in surge arrestor is provided on single phase motors through 5 HP.
- Stainless steel splined shaft.
- Hermetically sealed windings.
- Replaceable motor lead assembly.
- NEMA mounting dimensions.
- Control box is required with 3 wire single phase units.
- Three phase units require a magnetic starter with three leg Class 10 overload protection.

AGENCY LISTINGS



CentriPro Motor - tested to UL778 and CAN 22.2 by CSA International (Canadian Standards Association)



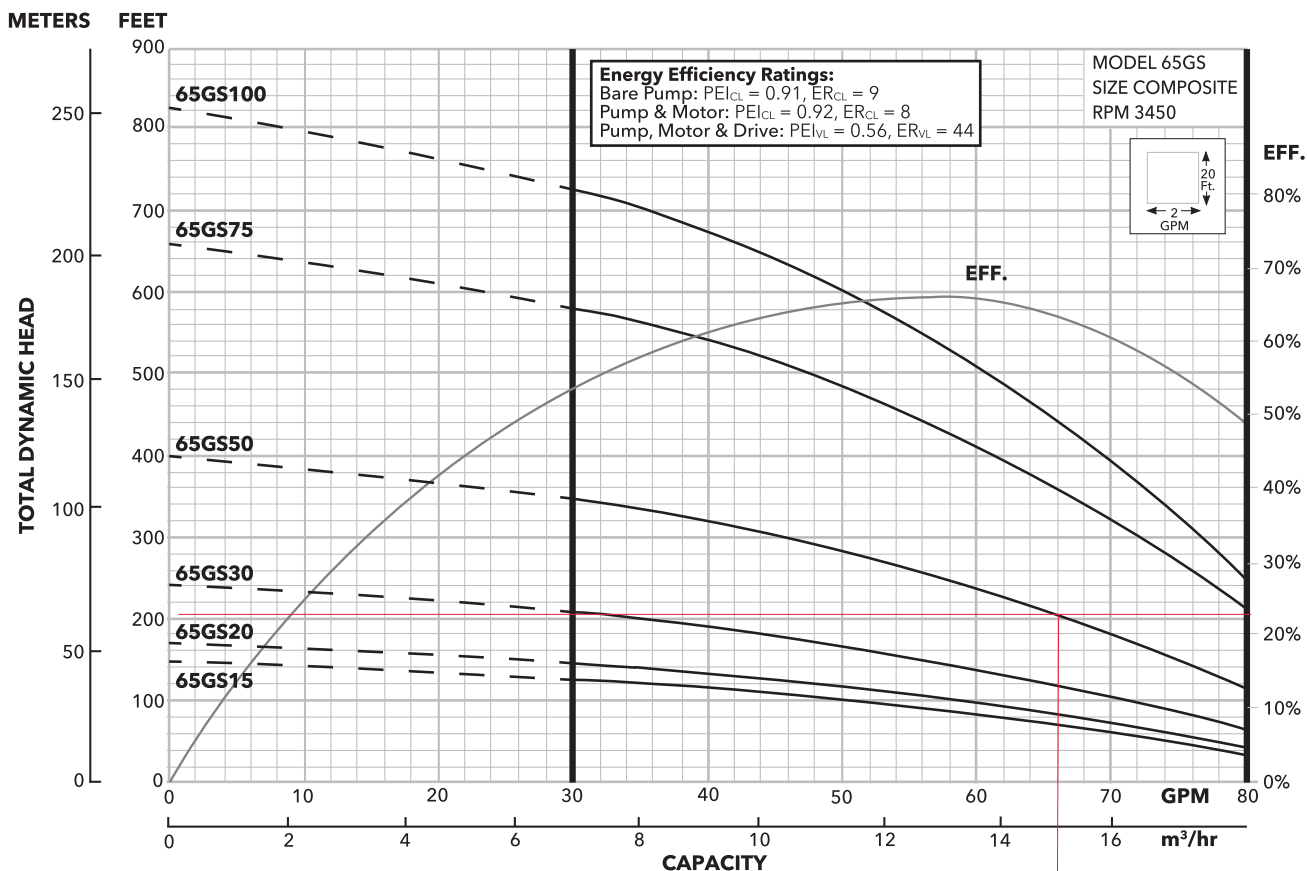
CentriPro Motor - Certified to NSF/ANSI 61, Annex G, Drinking Water System Components 4P49



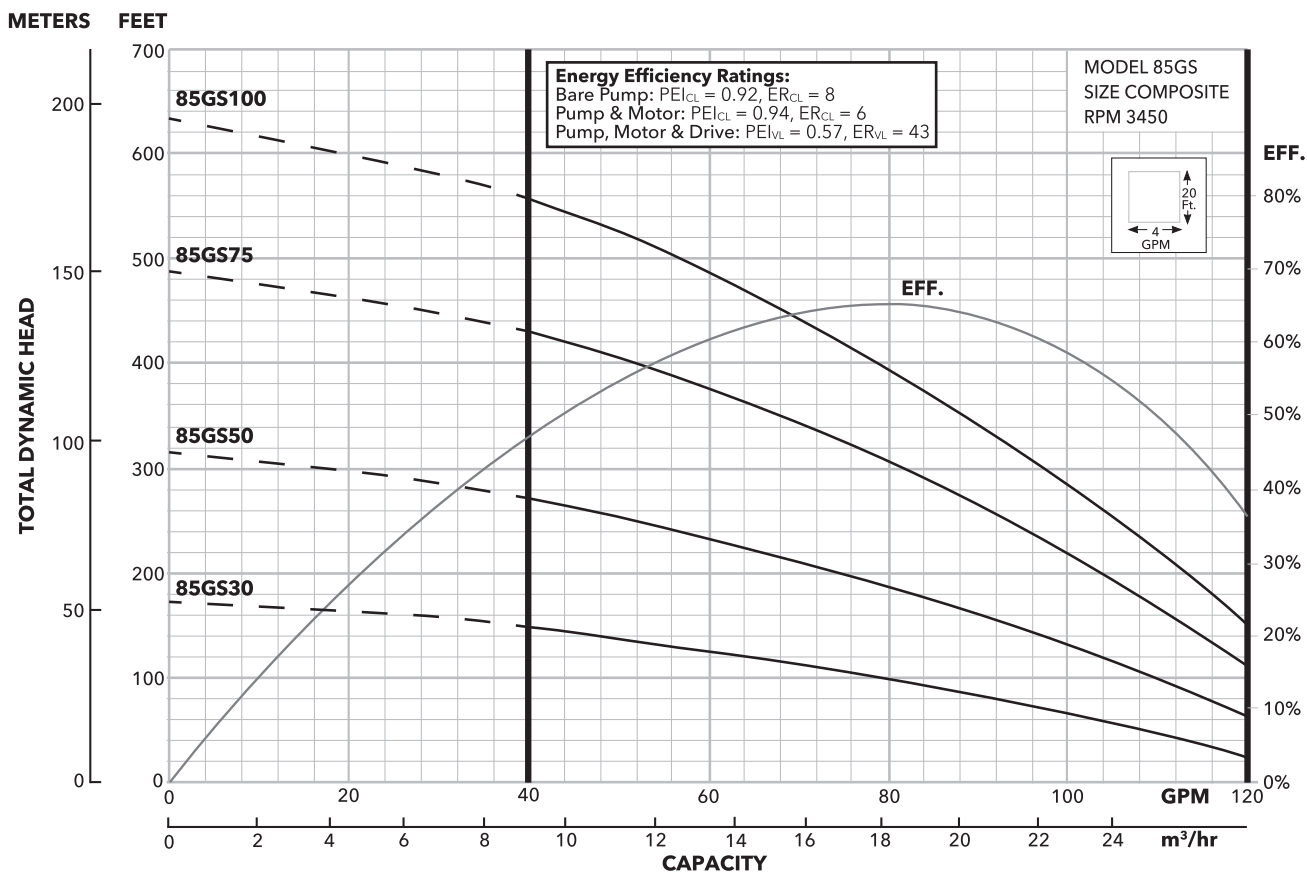
NSF/ANSI 372 - Drinking Water System Components - Lead Content

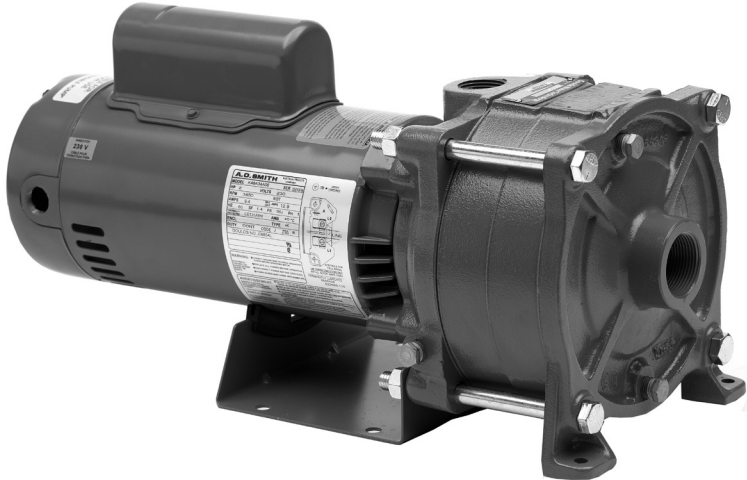
CLASS 6853 01 - Low Lead Content Certification Program -- Plumbing Products

Model 65GS



Model 85GS





HSC

MULTI-STAGE CENTRIFUGAL PUMP

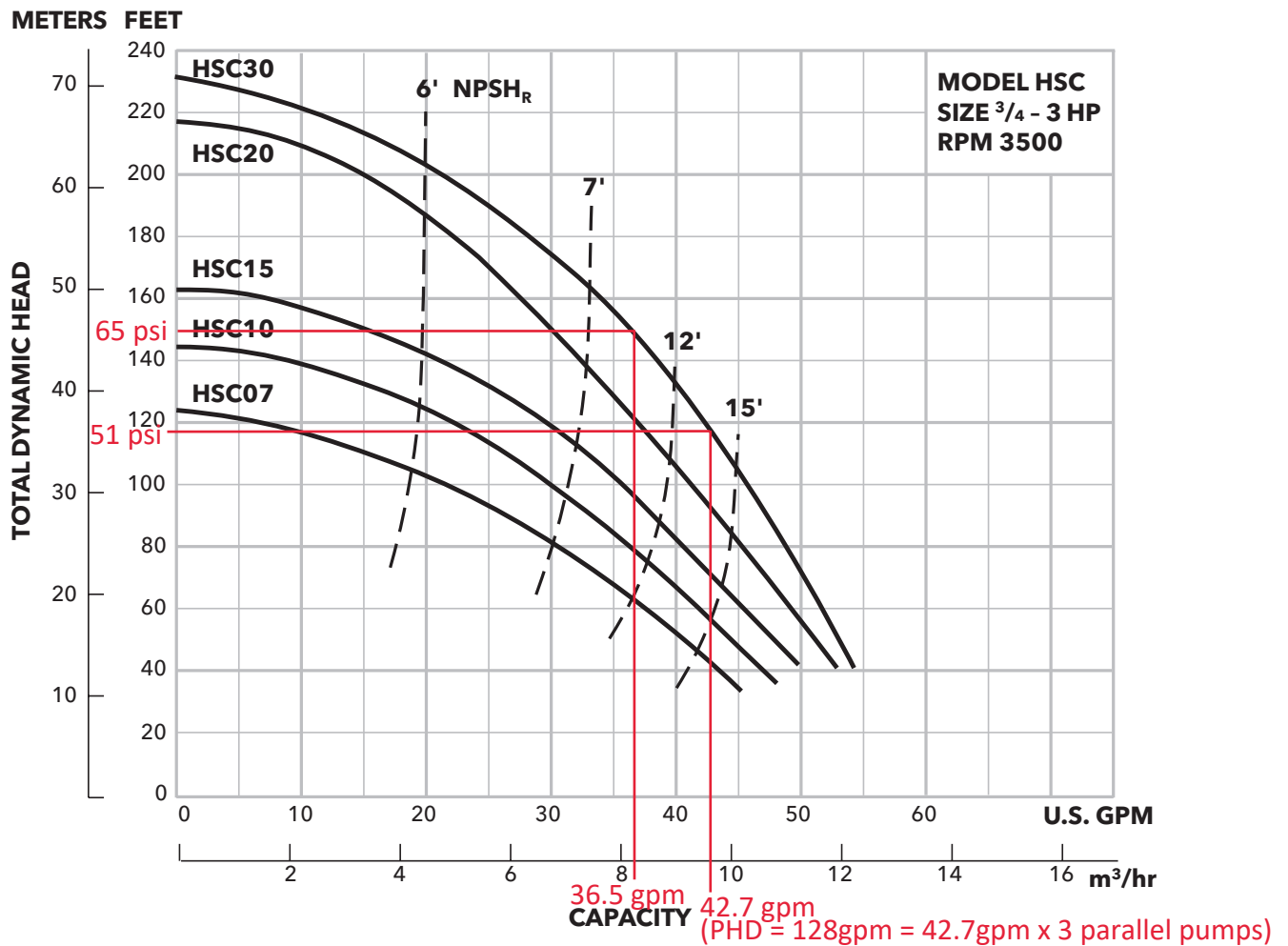


DIMENSIONS AND WEIGHTS

Model	HP	Length	Width	Height	Weight (lbs.)
HSC07	¾	15	8	9	53
HSC10	1	16	8	9	58
HSC15	1½	17	8	9	72
HSC20	2	19.7	8	9	75
HSC30	3	19.1	8	9	85

(All dimensions are in inches and weight in lbs. Do not use for construction purposes.)

PERFORMANCE CURVE



TO CONVERT FEET OF WATER TO PSI - DIVIDE FEET BY 2.31

Appendix 10.3
Water Quality Results

7123



WATER MANAGEMENT LABORATORIES INC.

1515 80th St E, Tacoma, WA 98404

COLIFORM BACTERIA ANALYSIS FORM

Date Sample Collected 10 / 15 / 20 Month Day Year	Time Sample Collected 4:30 <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM	County Thurston
--	---	---------------------------

Type of Water System (check only one box)

Group A Group B Other _____

Group A and Group B Systems – Provide from Water Facilities Inventory (WFI):

ID# _____

System Name: **Shadow Creek**

Contact Person: **Kevin Odgaard / Doug Pichl**

Day Phone: (360) 876-0958 Cell Phone: ()

Email: _____ Eve. Phone: ()

Send results to: (Print full name, address and zip code)

Northwest Water Systems

PO Box 123

Port Orchard, WA 98366

SAMPLE INFORMATION

Sample collected by (name): **Doug Pichl**

Specific location where sample collected: **Well 1 / BMS049**

Special instructions or comments:

Type of Sample (select only one type of sample from types 1 through 5 below)

<p>1. <input type="checkbox"/> Routine Distribution Sample (A/P)</p> <p>Chlorinated: Yes _____ No _____</p> <p>Chlorine Residual: Total _____ Free _____</p>	<p>2. <input type="checkbox"/> Repeat Sample (A/P)</p> <p>(from distribution system after unsat. routine)</p> <p>Unsatisfactory routine lab number: _____</p> <p>Unsatisfactory routine collect date: _____/_____/_____</p> <p>Chlorinated: Yes _____ No _____</p> <p>Chlorine Residual: Total _____ Free _____</p>
<p>3. Ground Water Rule Source Sample</p> <p>S </p> <p><input type="checkbox"/> Triggered (A/P)</p> <p><input type="checkbox"/> Assessment (A/P)</p>	

4. **Surface or GWI Raw Source Water Sample (Enumeration)**

E. coli Fecal Filtered Yes _____ No _____

S | | |

5. Sample Collected for Information Only:

LAB USE ONLY	DRINKING WATER RESULTS	LAB USE ONLY
<input type="checkbox"/> Unsatisfactory Total Coliform Present and		<input type="checkbox"/> Satisfactory
<input type="checkbox"/> <i>E.coli</i> present <input type="checkbox"/> <i>E.coli</i> absent		

Bacterial Density Results: Total Coliform **< 1** /100ml. *E.coli* _____ /100ml.

Fecal Coliform _____ /100ml. HPC _____ /1 ml.

Replacement Sample Required: TNTC Sample too old

Sample Volume Damaged Container _____

Date/Time Received: 10-16-2012 12:30 AM	Lab Reference Number SM 9223 B MMO QT
Receipt Temp C°: PM	Method Code: SM 9223 B
Date Reported to DOH 10-17-20	Lab Use Only: AN3639R
DOH Lab-Sample# 089 71267	



1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

October 22, 2020

Northwest Water Systems
PO Box 123
Port Orchard, WA 98366
Attn: Douglas Piehl

Dear Sir:

Results of analysis of one engineering water sample taken by you on 10-15-2020 at 4:30 p.m. and received on 10-16-2020 at 12:30 p.m. are as follows:

Sample Identification: Shadow Creek, Well 1 BMS049

Test

Results

Microscopic Exam	1. Iron Bacteria (430/L) <i>Gallionella ferruginea</i> 2. Sulfur Bacteria (< 1*/ L)
Nitrate Reducing Bacteria (per 100 mLs)	11

* < is less than

Lab Number: 08971269

Sample was analyzed according to Standard Methods for the Examination of Water and Wastewater, 22nd Edition and Biochemical Tests for the Identification of Medical Bacteria, 2nd Edition/J.D. McFadden.

Chain of custody record is enclosed.

Sincerely,

Diane DuMond
Microbiologist

DD:ami
Enclosure

71269

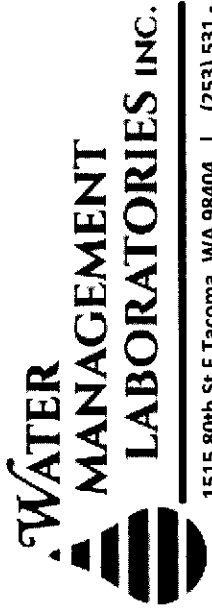


71269



71269





WATER MANAGEMENT LABORATORIES INC.

Chain of Custody

1515 80th St E Tacoma, WA 98404 | (253) 531 - 3121 | customerservice@watermanagementlabs.com

Lab Use		Preserved?	Yes	No	Seal?	Yes	No
Dept:		Micro	Inorg	Org	Intact?	Yes	No
Test(s) Requested							

Sample #	# of Bottles	Sample Type			Date Sampled	Time Sampled	Sampled By	Sample Identification	NITRATE	MICRO EXAM	Fe S	71269
		Water	Waste	Other								
1	1	X			10-15-20	4:30pm	DOUG PIEHL	SHADOW CREEK WELL 1	X			
2	1	X			↓	↓	BMS 049		X			
3												
4												
5												
6												
7												
8												
9												
10												

Remarks:

Report to: DOUG PIEHL
 Phone #: 360-876-0958 X 110
 Email:

Company Name: NORTHWEST WATER SYSTEMS
 Company Address: PO BOX 123
 PORT ORCHARD, WA 98366

Printed Name		Signature		Company		Date / Time	
Relinquished by:		Diane DuMond		WML		10-16-20 12:30pm	
Received by:		Diane DuMond					
Relinquished by:							
Received by:							



1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Chemistry - Report of Analysis

Date Collected: 10-15-2020	System Group Type: (circle one) A B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06976	County: Thurston
Sample Location: Wellhead	Source Number(s): (list all sources if blended or composited) S01
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-16-2020 Date Reported: 11-10-2020 Supervisor Initials: <i>RL</i>
Sample Composition: (check appropriate box) <input checked="" type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123 Port Orchard WA 98366	Comments: Sample exceeds 15 minute holding time for pH measurement.

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULT	SDRL	TRIGGER	MCL	UNITS	EXCEED MCL?	DATE ANALYZED	METHOD/ INITIALS
0004	Arsenic	--	0.0017	0.001	0.010	0.010	mg/L	No	10-27-2020	200.8/MV
0005	Barium	--	<0.10	0.1	2	2	mg/L	No	10-23-2020	200.8/MV
0006	Cadmium	--	<0.0010	0.001	0.005	0.005	mg/L	No	10-23-2020	200.8/MV
0007	Chromium	--	<0.0070	0.007	0.1	0.1	mg/L	No	10-23-2020	200.8/MV
0011	Mercury	--	<0.00020	0.0002	0.002	0.002	mg/L	No	10-23-2020	200.8/MV
0012	Selenium	--	<0.0020	0.002	0.05	0.05	mg/L	No	10-23-2020	200.8/MV
0110	Beryllium	--	<0.00030	0.0003	0.004	0.004	mg/L	No	10-23-2020	200.8/MV
0111	Nickel	--	<0.0050	0.005	--	--	mg/L	--	10-23-2020	200.8/MV
0112	Antimony	--	<0.0030	0.003	0.006	0.006	mg/L	No	10-23-2020	200.8/MV
0113	Thallium	--	<0.0010	0.001	0.002	0.002	mg/L	No	10-23-2020	200.8/MV
0116	Free Cyanide	--	<0.05	0.05	0.2	0.2	mg/L	No	10-23-2020	4500CNF/JA
0019	Fluoride	--	<0.20	0.2	2.0	4.0	mg/L	No	10-16-2020	300.0/JA
0114	Nitrite - N	--	<0.10	0.1	0.5	1.0	mg/L	No	10-16-2020	300.0/JA
0020	Nitrate - N	--	<0.20	0.5	5.0	10.0	mg/L	No	10-16-2020	300.0/JA

Lab Number / Sample Number: 089 / 06976

DOH#	ANALYTE	DATA QUALIFIER	RESULT	SDRL	TRIGGER	MCL	UNITS	EXCEED MCL?	DATE ANALYZED	METHOD/ INITIALS
0161	Total Nitrate/Nitrite - N	--	<0.40	0.5	5.0	10.0	mg/L	No	10-16-2020	300.0/JA
0008	Iron	--	0.66	0.1	--	0.3	mg/L	Yes	10-30-2020	3111B/MV
0010	Manganese	--	0.102	0.01	--	0.05	mg/L	Yes	10-23-2020	200.8/MV
0013	Silver	--	<0.01	0.1	--	0.1	mg/L	No	10-23-2020	200.8/MV
0021	Chloride	--	2.8	20	--	250	mg/L	No	10-16-2020	300.0/JA
0022	Sulfate	--	8.1	50	--	250	mg/L	No	10-16-2020	300.0/JA
0024	Zinc	--	<0.20	0.2	--	5	mg/L	No	10-23-2020	200.8/MV
0014	Sodium	--	5.0	5	--	--	mg/L	--	10-23-2020	3111B/JMB
0015	Hardness	--	61.0	10	--	--	mg/L	--	10-20-2020	2340C/EW
0016	Conductivity	--	130.8	70	--	700	µmhos/cm	No	10-16-2020	2510B/EW
0017	Turbidity	--	0.67	0.1	--	--	NTU	--	10-16-2020	2130B/EW
0018	Color	--	10.0	15	--	15	color units	No	10-16-2020	2120B/EW
0009	Lead	--	<0.0010	0.001	--	--	mg/L	--	10-23-2020	200.8/MV
0023	Copper	--	<0.020	0.02	--	--	mg/L	--	10-23-2020	200.8/MV
0403	Alkalinity as CaCO ₃	--	60.3	--	--	--	mg/L	--	10-22-2020	2320B/MV
--	pH	--	7.1	--	--	--	units	--	10-16-2020	4500-H+B/EW
--	Silica	--	40.8	1.0	--	--	mg/L	--	10-28-2020	4500SiO ₂ C/MV
--	Total Dissolved Solids	--	99.0	100	--	500	mg/L	No	10-28-2020	2540C/EW
--	Ammonia Nitrogen	--	<0.050	0.050	--	--	mg/L	--	11-03-2020	4500NH ₃ F/JA
0420	Bromide	--	<0.020	0.020	--	--	mg/L	--	10-20-2020	300.1/MV
--	Dissolved Organic Carbon	--	0.32	0.2	--	--	mg/L	--	10-17-2020	5310C/JA
0421	Total Organic Carbon	--	0.33	0.7	--	--	mg/L	--	10-20-2020	5310C/JA

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

-- No existing value.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

mg/L: milligrams per liter or parts per million.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS

Volatile Organic Compounds Report of Analysis

Date Collected: 10-15-2020	System Group Type: (circle one) (A) B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06976	County: Thurston
Sample Location: Wellhead	Source Number(s): (list all sources if blended or composited) S01
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-16-2020 Date Analyzed: 10-19-2020 Date Reported: 11-10-2020 Supervisor Initials: <i>RL</i>
Sample Composition: (check appropriate box) <input checked="" type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123, Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0045	Vinyl chloride	--	ND	0.5	0.5	2	µg/L	No	524.2/RL
0046	1,1- Dichloroethylene	--	ND	0.5	0.5	7	µg/L	No	524.2/RL
0047	1,1,1 Trichloroethane	--	ND	0.5	0.5	200	µg/L	No	524.2/RL
0048	Carbon tetrachloride	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0049	Benzene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0050	1,2 Dichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0051	Trichloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0052	Para-dichlorobenzene	--	ND	0.5	0.5	75	µg/L	No	524.2/RL
0056	Dichloromethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0057	trans-1,2-Dichloroethylene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0060	cis- 1,2-Dichloroethylene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0063	1,2- Dichloropropane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0066	Toluene	--	ND	0.5	0.5	1000	µg/L	No	524.2/RL
0067	1,1,2-Trichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0068	Tetrachloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0071	Monochlorobenzene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0073	Ethylbenzene	--	ND	0.5	0.5	700	µg/L	No	524.2/RL
0076	Styrene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0084	Ortho-Dichlorobenzene	--	ND	0.5	0.5	600	µg/L	No	524.2/RL
0095	1,2,4- Trichlorobenzene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0160	Total Xylenes	--	ND	0.5	0.5	10000	µg/L	No	524.2/RL
0074	m/p Xylenes (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0075	o- Xylene (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0027	Chloroform	--	ND	0.5	--	--	µg/L	--	524.2/RL

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0028	Bromodichloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0029	Dibromochloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0030	Bromoform	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0031	Total Trihalomethanes	--	ND	--	--	80	µg/L	No	524.2/RL
0053	Chloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0054	Bromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0058	1,1 Dichloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0072	1,1,1,2-Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0078	Bromobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0079	1,2,3- Trichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0081	O-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0085	Trichlorofluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0086	Bromochloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0089	1,3,5- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0091	1,2,4- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0092	sec- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0093	p- Isopropyltoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0094	n- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0096	Naphthalene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0104	Dichlorodifluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0154	1,3 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0062	1,1 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0064	Dibromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0070	1,3- Dichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0080	1,1,2,2 Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0082	P-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0083	m- Dichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0087	Isopropylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0088	n- Propylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0090	tert- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0097	Hexachlorobutadiene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0098	1,2,3 Trichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0427	EDB (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0428	DBCP (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
N/A	MTBE	--	ND	0.5	0.5	--	µg/L	--	524.2/RL

Lab Number / Sample Number: 089 / 06976

Volatile Organic Compounds (cont)

LAB COMMENTS

* **Confirmation:**Include the original lab number, sample number, and collection date of original sample in either comment section.

Analysis for EDB and DBCP is screening only. Detections of EDB and DBCP are confirmed using the fumigant test panel.

--No existing value.

µg/L:micrograms per liter or parts per billion.

ANALYTE:The name of an analyte being tested for.

DATA QUALIFIER:A symbol or letter to denote additional information about the result.

DOH#:Department assigned analyte number.

EXCEED MCL:(Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS:Analytical method used. / Initials of the analyst that performed the analysis.

RESULT:The laboratory reported result.

SDRL:(State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER:The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.



WATER MANAGEMENT LABORATORIES INC.

1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Insecticides/Carbamate Report of Analysis

Date Collected: 10-15-2020	System Group Type: (circle one) (A) B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06976	County: Thurston
Sample Location: Wellhead	Source Number(s): (list all sources if blended or composited) S01
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-16-2020 Date Analyzed: 10-19-2020 Date Reported: 11-10-2020 Supervisor Initials: <i>RC</i>
Sample Composition: (check appropriate box) <input checked="" type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123, Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0146	Carbofuran	--	ND	0.9	0.9	40	µg/L	No	531.2/MV
0148	Oxamyl (Vydate)	--	ND	2	2	200	µg/L	No	531.2/MV
0142	Aldicarb	--	ND	0.5	0.5	3	µg/L	No	531.2/MV
0143	Aldicarb sulfone	--	ND	0.8	0.8	2	µg/L	No	531.2/MV
0144	Aldicarb sulfoxide	--	ND	0.5	0.5	4	µg/L	No	531.2/MV
0145	Carbaryl	--	ND	2	2	--	µg/L	--	531.2/MV
0147	Methomyl	--	ND	4	4	--	µg/L	--	531.2/MV

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.
 -- No existing value.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS:

Herbicides Report of Analysis

Date Collected: 10-15-2020	System Group Type: (circle one) (A) B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06976	County: Thurston
Sample Location: Wellhead	Source Number(s): (list all sources if blended or composited) S01
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-16-2020 Date Analyzed: 10-27-2020 Date Reported: 11-10-2020 Supervisor Initials: <i>RC</i>
Sample Composition: (check appropriate box) <input checked="" type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123, Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0137	Dalapon	--	ND	1	1	200	µg/L	No	515.1/JA
0037	2,4-D	--	ND	0.1	0.1	70	µg/L	No	515.1/JA
0038	2,4,5-TP (Silvex)	--	ND	0.2	0.2	50	µg/L	No	515.1/JA
0134	Pentachlorophenol	--	ND	0.04	0.04	1	µg/L	No	515.1/JA
0139	Dinoseb	--	ND	0.2	0.2	7	µg/L	No	515.1/JA
0140	Picloram	--	ND	0.1	0.1	500	µg/L	No	515.1/JA
0138	Dicamba	--	ND	0.2	0.2	--	µg/L	--	515.1/JA
0135	2,4 DB	--	ND	1	1	--	µg/L	--	515.1/JA
0136	2,4,5 T	--	ND	0.4	0.4	--	µg/L	--	515.1/JA
0220	Bentazon	--	ND	0.5	0.5	--	µg/L	--	515.1/JA
0221	Dichlorprop	--	ND	0.5	0.5	--	µg/L	--	515.1/JA
0223	Acifluorfen	--	ND	2	2	--	µg/L	--	515.1/JA
0225	DCPA (Acid Metabolites)	--	ND	0.1	0.1	--	µg/L	--	515.1/JA
0226	3,5-Dichlorobenzoic Acid	--	ND	0.5	0.5	--	µg/L	--	515.1/JA

Lab Number / Sample Number: 089 / 06976

Herbicides (cont)

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS:

Pesticides Report of Analysis

Date Collected: 10-15-2020	System Group Type: (circle one) (A) B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06976	County: Thurston
Sample Location: Wellhead	Source Number(s): (list all sources if blended or composited) S01
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-16-2020 Date Analyzed: 10-23-2020 Date Reported: 11-10-2020 Supervisor Initials: <i>RL</i>
Sample Composition: (check appropriate box) <input checked="" type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123, Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0033	Endrin	--	ND	0.01	0.01	2	µg/L	No	525.2/EW
0034	Lindane (BHC-gamma)	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0035	Methoxychlor	--	ND	0.1	0.1	40	µg/L	No	525.2/EW
0036	Toxaphene	--	ND	1	1	3.0	µg/L	No	508.1/EW
0117	Alachlor	--	ND	0.2	0.2	2	µg/L	No	525.2/EW
0119	Atrazine	--	ND	0.1	0.1	3	µg/L	No	525.2/EW
0120	Benzo(a)pyrene	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0122	Chlordane (total)	--	ND	0.2	0.2	2	µg/L	No	508.1/EW
0124	Di(2-ethylhexyl)adipate	--	ND	0.6	0.6	400	µg/L	No	525.2/EW
0125	Di(2-ethylhexyl)phthalate	--	ND	0.6	0.6	6	µg/L	No	525.2/EW
0126	Heptachlor	--	ND	0.04	0.04	0.4	µg/L	No	525.2/EW
0127	Heptachlor epoxide	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0128	Hexachlorobenzene	--	ND	0.1	0.1	1	µg/L	No	525.2/EW
0129	Hexachlorocyclopentadiene	--	ND	0.1	0.1	50	µg/L	No	525.2/EW
0133	Simazine	--	ND	0.07	0.07	4	µg/L	No	525.2/EW
0118	Aldrin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0121	Butachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0123	Dieldrin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0130	Metolachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0131	Metribuzin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0132	Propachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0254	Fluorene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0173	Arochlor 1221'	--	ND	20	20	--	µg/L	--	508.1/EW
0174	Arochlor 1232'	--	ND	0.5	0.5	--	µg/L	--	508.1/EW

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0175	Arochlor 1242'	--	ND	0.3	0.3	--	µg/L	--	508.1/EW
0176	Arochlor 1248'	--	ND	0.1	0.1	--	µg/L	--	508.1/EW
0177	Arochlor 1254'	--	ND	0.1	0.1	--	µg/L	--	508.1/EW
0178	Arochlor 1260'	--	ND	0.2	0.2	--	µg/L	--	508.1/EW
0179	Bromacil	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0180	Arochlor 1016'	--	ND	0.08	0.08	--	µg/L	--	508.1/EW
0190	Terbacil	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0208	EPTC	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0218	Molinate	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0232	4,4 DDD	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0233	4,4 DDE	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0234	4,4 DDT	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0243	Trifluralin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0244	Acenaphthylene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0246	Anthracene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0247	Benzo(a)anthracene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0248	Benzo(b)fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0250	Benzo(k)fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0251	Chrysene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0253	Fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0256	Phenanthrene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0257	Pyrene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0258	Benzyl butyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0259	Di-n-butyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0260	Diethyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0261	Dimethyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW

Lab Number / Sample Number: 089 / 06976

Pesticides (cont)

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

If Arochlors are detected using 505, 508, or 508.1, sample must be reanalyzed using Method 508A to quantify PCBs (as decachlorobiphenyl).

-- No existing value.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS:



WATER MANAGEMENT LABORATORIES INC.

1515 80th St E, Tacoma, WA 98404

COLIFORM BACTERIA ANALYSIS FORM

Date Sample Collected

Time Sample Collected

County

10 / 12 / 2020
Month Day Year

12 : 00
 AM
 PM

Thurston

Type of Water System (check only one box)

Group A Group B Other _____

Group A and Group B Systems – Provide from Water Facilities Inventory (WFI):

ID# pending

System Name: Shadow Creek

Contact Person: Kevin Odegard

Day Phone: (360) 876-0958

Cell Phone: ()

Email:

Eve. Phone: ()

Send results to: (Print full name, address and zip code)

Northwest Water Systems

PO Box 123

Port Orchard, WA

98366

SAMPLE INFORMATION

Sample collected by (name):

Doug Piehl

Specific location where sample collected:

Special instructions or comments:

well tap

R4H562

Type of Sample (select only one type of sample from types 1 through 5 below)

1. Routine Distribution Sample (A/P)

Chlorinated: Yes _____ No _____

Chlorine Residual: Total _____ Free _____

2. Repeat Sample (A/P)

(from distribution system after unsat. routine)

Unsatisfactory routine lab number: _____

3. Ground Water Rule Source Sample

S

Unsatisfactory routine collect date: _____/_____/_____

Chlorinated: Yes _____ No _____

Chlorine Residual: Total _____ Free _____

Triggered (A/P)

Assessment (A/P)

4. Surface or GWI Raw Source Water Sample (Enumeration)

E. coli Fecal

Filtered Yes _____ No _____

S

5. Sample Collected for Information Only:

investigative

LAB USE ONLY

DRINKING WATER RESULTS

LAB USE ONLY

Unsatisfactory Total Coliform Present and

Satisfactory

E. coli present E. coli absent

Bacterial Density Results: Total Coliform < 1 /100ml. E. coli _____ /100ml.

Fecal Coliform _____ /100ml. HPC _____ /1 ml.

Replacement Sample Required: TNTC Sample too old

Sample Volume Damaged Container _____

Date/Time Received:

Lab Reference Number

10-13-20 12:00 PM

SM 9223D MMO QT

Receipt Temp C°:

Method Code:

Date Reported to DOH

Lab Use Only:

DOH Lab-Sample#

089

70846

AN3639R



1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

October 21, 2020

Northwest Water Systems
PO Box 123
Port Orchard, WA 98366
Attn: Douglas Piehl

Dear Sir:

Results of analysis of one engineering water sample taken by you on 10-12-2020 at 12:00 p.m. and received on 10-13-2020 at 12:00 p.m. are as follows:

Sample Identification: Shadow Creek, Well BLH562

<u>Test</u>	<u>Results</u>
Microscopic Exam	1. Iron Bacteria (14,500/L) <i>Gallionella ferruginea</i> 2. Sulfur Bacteria (< 1*/ L)
Nitrogen Reducing Bacteria (per 100 mLs)	64

* < is less than

Lab Number: 08970847

Sample was analyzed according to Standard Methods for the Examination of Water and Wastewater, 22nd Edition and Biochemical Tests for the Identification of Medical Bacteria, 2nd Edition/J.D. McFadden.

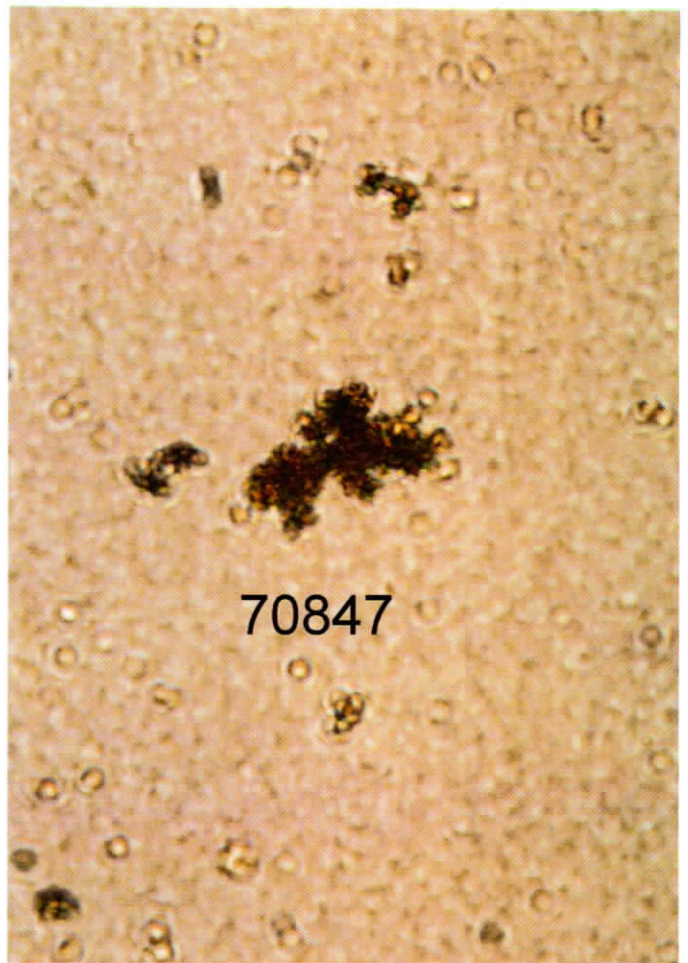
Chain of custody record is enclosed.

Sincerely,

A handwritten signature in cursive script, appearing to read "Diane DuMond".

Diane DuMond
Microbiologist

DD:ndh
Enclosure



WATER MANAGEMENT LABORATORIES, INC.
 1515 80TH STREET EAST, TACOMA, WA 98404
 PHONE (253) 531-3121 FAX (253) 531-5287

CHAIN OF CUSTODY

LAB USE SAMPLE #	TYPE OF SAMPLE		DATE TAKEN	TIME TAKEN	TAKEN BY (NAME)	SAMPLE IDENTIFICATION	TEST REQUESTED						LAB USE PRESERVED	
	WATER	WASTE					OTHER							
1	X				Dang Phien	Shadow Creek WELL BLH562	X							YES NO
2	X					Herbicides	X							SEAL YES NO
3	X					Pesticides								INTACT YES NO
4	X					IOC								
5	X					radionuclides								
6	X					carbarnates								
7	X					VOC								
8	X					bacteria								DEPARTMENTS BACT INORG ORG
9	X					micro exam								
						NO3 Reducing bacteria ?								
						70846								
						70847								

REPORT TO: Douglas Fiehl

Company Name: Northwest Water Systems

Address: P.O. Box 123, Port Orchard, WA 98366

Phone: (360) 876-0958 Fax: (360) 876-4196

RELINQUISHED BY: _____ DATE: _____

RECEIVED BY: [Signature] DATE: 10-15-2020 TIME: 11:35am

RECEIVED FOR ANALYSIS BY: [Signature] DATE: 10-13-20 TIME: 12:00 PM

TOTAL # OF CONTAINERS 16

REMARKS / REJECT REASON: _____



1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Herbicides
Report of Analysis

Date Collected: 10-12-2020	System Group Type: (circle one) A B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06855	County: Thurston
Sample Location: Well Tap - BLH562	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-13-2020 Date Analyzed: 10-27-2020 Date Reported: 10-30-2020 Supervisor Initials: <i>RL</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123, Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0137	Dalapon	--	ND	1	1	200	µg/L	No	515.1/JA
0037	2,4-D	--	ND	0.1	0.1	70	µg/L	No	515.1/JA
0038	2,4,5-TP (Silvex)	--	ND	0.2	0.2	50	µg/L	No	515.1/JA
0134	Pentachlorophenol	--	ND	0.04	0.04	1	µg/L	No	515.1/JA
0139	Dinoseb	--	ND	0.2	0.2	7	µg/L	No	515.1/JA
0140	Picloram	--	ND	0.1	0.1	500	µg/L	No	515.1/JA
0138	Dicamba	--	ND	0.2	0.2	--	µg/L	--	515.1/JA
0135	2,4 DB	--	ND	1	1	--	µg/L	--	515.1/JA
0136	2,4,5 T	--	ND	0.4	0.4	--	µg/L	--	515.1/JA
0220	Bentazon	--	ND	0.5	0.5	--	µg/L	--	515.1/JA
0221	Dichlorprop	--	ND	0.5	0.5	--	µg/L	--	515.1/JA
0223	Acifluorfen	--	ND	2	2	--	µg/L	--	515.1/JA
0225	DCPA (Acid Metabolites)	--	ND	0.1	0.1	--	µg/L	--	515.1/JA
0226	3,5-Dichlorobenzoic Acid	--	ND	0.5	0.5	--	µg/L	--	515.1/JA

Lab Number / Sample Number: 089 / 06855

Herbicides (cont)

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS:



1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Pesticides
Report of Analysis

Date Collected: 10-12-2020	System Group Type: (circle one) A B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06855	County: Thurston
Sample Location: Well Tap - BLH562	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-13-2020 Date Analyzed: 10-23-2020 Date Reported: 10-30-2020 Supervisor Initials: <i>ML</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123, Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0033	Endrin	--	ND	0.01	0.01	2	µg/L	No	525.2/EW
0034	Lindane (BHC-gamma)	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0035	Methoxychlor	--	ND	0.1	0.1	40	µg/L	No	525.2/EW
0036	Toxaphene	--	ND	1	1	3.0	µg/L	No	508.1/EW
0117	Alachlor	--	ND	0.2	0.2	2	µg/L	No	525.2/EW
0119	Atrazine	--	ND	0.1	0.1	3	µg/L	No	525.2/EW
0120	Benzo(a)pyrene	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0122	Chlordane (total)	--	ND	0.2	0.2	2	µg/L	No	508.1/EW
0124	Di(2-ethylhexyl)adipate	--	ND	0.6	0.6	400	µg/L	No	525.2/EW
0125	Di(2-ethylhexyl)phthalate	--	ND	0.6	0.6	6	µg/L	No	525.2/EW
0126	Heptachlor	--	ND	0.04	0.04	0.4	µg/L	No	525.2/EW
0127	Heptachlor epoxide	--	ND	0.02	0.02	0.2	µg/L	No	525.2/EW
0128	Hexachlorobenzene	--	ND	0.1	0.1	1	µg/L	No	525.2/EW
0129	Hexachlorocyclopentadiene	--	ND	0.1	0.1	50	µg/L	No	525.2/EW
0133	Simazine	--	ND	0.07	0.07	4	µg/L	No	525.2/EW
0118	Aldrin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0121	Butachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0123	Dieldrin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0130	Metolachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0131	Metribuzin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0132	Propachlor	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0254	Fluorene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0173	Arochlor 1221'	--	ND	20	20	--	µg/L	--	508.1/EW
0174	Arochlor 1232'	--	ND	0.5	0.5	--	µg/L	--	508.1/EW

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0175	Arochlor 1242'	--	ND	0.3	0.3	--	µg/L	--	508.1/EW
0176	Arochlor 1248'	--	ND	0.1	0.1	--	µg/L	--	508.1/EW
0177	Arochlor 1254'	--	ND	0.1	0.1	--	µg/L	--	508.1/EW
0178	Arochlor 1260'	--	ND	0.2	0.2	--	µg/L	--	508.1/EW
0179	Bromacil	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0180	Arochlor 1016'	--	ND	0.08	0.08	--	µg/L	--	508.1/EW
0190	Terbacil	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0208	EPTC	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0218	Molinate	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0232	4,4 DDD	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0233	4,4 DDE	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0234	4,4 DDT	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0243	Trifluralin	--	ND	0.1	0.1	--	µg/L	--	525.2/EW
0244	Acenaphthylene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0246	Anthracene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0247	Benzo(a)anthracene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0248	Benzo(b)fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0250	Benzo(k)fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0251	Chrysene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0253	Fluoranthene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0256	Phenanthrene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0257	Pyrene	--	ND	0.2	0.2	--	µg/L	--	525.2/EW
0258	Benzyl butyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0259	Di-n-butyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0260	Diethyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW
0261	Dimethyl phthalate	--	ND	1.0	1.0	--	µg/L	--	525.2/EW

Lab Number / Sample Number: 089 / 06855

Pesticides (cont)

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

If Arochlors are detected using 505, 508, or 508.1, sample must be reanalyzed using Method 508A to quantify PCBs (as decachlorobiphenyl).

-- No existing value.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS:



1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Chemistry - Report of Analysis

Date Collected: 10-12-2020	System Group Type: (circle one) A B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06855	County: Thurston
Sample Location: Well Tap - BLH562	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-13-2020 Date Reported: 10-30-2020 Supervisor Initials: <i>RC</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123 Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULT	SDRL	TRIGGER	MCL	UNITS	EXCEED MCL?	DATE ANALYZED	METHOD/ INITIALS
0004	Arsenic	--	0.0025	0.001	0.010	0.010	mg/L	No	10-15-2020	200.8/MV
0005	Barium	--	<0.10	0.1	2	2	mg/L	No	10-15-2020	200.8/MV
0006	Cadmium	--	<0.0010	0.001	0.005	0.005	mg/L	No	10-15-2020	200.8/MV
0007	Chromium	--	<0.0070	0.007	0.1	0.1	mg/L	No	10-15-2020	200.8/MV
0011	Mercury	--	<0.00020	0.0002	0.002	0.002	mg/L	No	10-15-2020	200.8/MV
0012	Selenium	--	<0.0020	0.002	0.05	0.05	mg/L	No	10-15-2020	200.8/MV
0110	Beryllium	--	<0.00030	0.0003	0.004	0.004	mg/L	No	10-15-2020	200.8/MV
0111	Nickel	--	<0.0050	0.005	--	--	mg/L	--	10-15-2020	200.8/MV
0112	Antimony	--	<0.0030	0.003	0.006	0.006	mg/L	No	10-15-2020	200.8/MV
0113	Thallium	--	<0.0010	0.001	0.002	0.002	mg/L	No	10-15-2020	200.8/MV
0116	Free Cyanide	--	<0.05	0.05	0.2	0.2	mg/L	No	10-15-2020	4500CNF/JA
0019	Fluoride	--	<0.20	0.2	2.0	4.0	mg/L	No	10-13-2020	300.0/JA
0114	Nitrite - N	--	<0.10	0.1	0.5	1.0	mg/L	No	10-13-2020	300.0/JA
0020	Nitrate - N	--	<0.20	0.5	5.0	10.0	mg/L	No	10-13-2020	300.0/JA

Lab Number / Sample Number: 089 / 06855

DOH#	ANALYTE	DATA QUALIFIER	RESULT	SDRL	TRIGGER	MCL	UNITS	EXCEED MCL?	DATE ANALYZED	METHOD/ INITIALS
0161	Total Nitrate/Nitrite - N	--	<0.40	0.5	5.0	10.0	mg/L	No	10-13-2020	300.0/JA
0008	Iron	--	0.69	0.1	--	0.3	mg/L	Yes	10-16-2020	3111B/MV
0010	Manganese	--	0.110	0.01	--	0.05	mg/L	Yes	10-15-2020	200.8/MV
0013	Silver	--	<0.01	0.1	--	0.1	mg/L	No	10-15-2020	200.8/MV
0021	Chloride	--	2.9	20	--	250	mg/L	No	10-13-2020	300.0/JA
0022	Sulfate	--	7.9	50	--	250	mg/L	No	10-13-2020	300.0/JA
0024	Zinc	--	<0.20	0.2	--	5	mg/L	No	10-15-2020	200.8/MV
0014	Sodium	--	5.5	5	--	--	mg/L	--	10-15-2020	3111B/JMB
0015	Hardness	--	60.0	10	--	--	mg/L	--	10-14-2020	2340C/EW
0016	Conductivity	--	116.1	70	--	700	µmhos/cm	No	10-13-2020	2510B/MV
0017	Turbidity	--	2.22	0.1	--	--	NTU	--	10-13-2020	2130B/MV
0018	Color	--	10.0	15	--	15	color units	No	10-13-2020	2120B/MV
0009	Lead	--	<0.0010	0.001	--	--	mg/L	--	10-15-2020	200.8/MV
0023	Copper	--	<0.020	0.02	--	--	mg/L	--	10-15-2020	200.8/MV

NOTES:

* Confirmation: Include the original lab number, sample number, and collection date of original sample in either comment section.

-- No existing value.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

mg/L: milligrams per liter or parts per million.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS

Insecticides/Carbamate Report of Analysis

Date Collected: 10-12-2020	System Group Type: (circle one) A B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06855	County: Thurston
Sample Location: Well Tap - BLH562	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-13-2020 Date Analyzed: 10-19-2020 Date Reported: 10-30-2020 Supervisor Initials: <i>RC</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123, Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0146	Carbofuran	--	ND	0.9	0.9	40	µg/L	No	531.2/MV
0148	Oxamyl (Vydate)	--	ND	2	2	200	µg/L	No	531.2/MV
0142	Aldicarb	--	ND	0.5	0.5	3	µg/L	No	531.2/MV
0143	Aldicarb sulfone	--	ND	0.8	0.8	2	µg/L	No	531.2/MV
0144	Aldicarb sulfoxide	--	ND	0.5	0.5	4	µg/L	No	531.2/MV
0145	Carbaryl	--	ND	2	2	--	µg/L	--	531.2/MV
0147	Methomyl	--	ND	4	4	--	µg/L	--	531.2/MV

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

-- No existing value.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS:



1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Volatile Organic Compounds
Report of Analysis

Date Collected: 10-12-2020	System Group Type: (circle one) A B Other
Water System ID Number: N/A	System Name: Shadow Creek
Lab Number / Sample Number: 089 / 06855	County: Thurston
Sample Location: Well Tap - BLH562	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) <input type="checkbox"/> RC - Routine/Compliance (satisfies monitoring requirements) <input type="checkbox"/> C - Confirmation (confirmation of chemical result)* <input checked="" type="checkbox"/> I - Investigative (does not satisfy monitoring requirements) <input type="checkbox"/> O - Other (specify - does not satisfy monitoring requirements)	Date Received: 10-13-2020 Date Analyzed: 10-15-2020 Date Reported: 10-30-2020 Supervisor Initials: <i>RL</i>
Sample Composition: (check appropriate box) <input type="checkbox"/> S - Single Source <input type="checkbox"/> B - Blended (list source numbers in "Source Number" field) <input type="checkbox"/> C - Composite (list source numbers in "Source Number" field) <input type="checkbox"/> D - Distribution Sample	Sample Type: (check one) <input checked="" type="checkbox"/> Pre-treatment/Untreated (Raw) <input type="checkbox"/> Post-treatment (Finished) <input type="checkbox"/> Unknown or Other Sample Collected by: Doug Piehl Phone Number: 360-876-0958
Send Report & Bill to: Northwest Water Systems, Inc PO Box 123, Port Orchard WA 98366	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0045	Vinyl chloride	--	ND	0.5	0.5	2	µg/L	No	524.2/RL
0046	1,1- Dichloroethylene	--	ND	0.5	0.5	7	µg/L	No	524.2/RL
0047	1,1,1 Trichloroethane	--	ND	0.5	0.5	200	µg/L	No	524.2/RL
0048	Carbon tetrachloride	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0049	Benzene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0050	1,2 Dichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0051	Trichloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0052	Para-dichlorobenzene	--	ND	0.5	0.5	75	µg/L	No	524.2/RL
0056	Dichloromethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0057	trans-1,2-Dichloroethylene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0060	cis- 1,2-Dichloroethylene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0063	1,2- Dichloropropane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0066	Toluene	--	ND	0.5	0.5	1000	µg/L	No	524.2/RL
0067	1,1,2-Trichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0068	Tetrachloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0071	Monochlorobenzene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0073	Ethylbenzene	--	ND	0.5	0.5	700	µg/L	No	524.2/RL
0076	Styrene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0084	Ortho-Dichlorobenzene	--	ND	0.5	0.5	600	µg/L	No	524.2/RL
0095	1,2,4- Trichlorobenzene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0160	Total Xylenes	--	ND	0.5	0.5	10000	µg/L	No	524.2/RL
0074	m/p Xylenes (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0075	o- Xylene (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0027	Chloroform	--	ND	0.5	--	--	µg/L	--	524.2/RL

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0028	Bromodichloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0029	Dibromochloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0030	Bromoform	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0031	Total Trihalomethanes	--	ND	--	--	80	µg/L	No	524.2/RL
0053	Chloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0054	Bromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0058	1,1 Dichloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0072	1,1,1,2-Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0078	Bromobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0079	1,2,3- Trichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0081	O-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0085	Trichlorofluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0086	Bromochloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0089	1,3,5- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0091	1,2,4- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0092	sec- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0093	p- Isopropyltoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0094	n- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0096	Naphthalene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0104	Dichlorodifluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0154	1,3 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0062	1,1 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0064	Dibromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0070	1,3- Dichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0080	1,1,2,2 Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0082	P-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0083	m- Dichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0087	Isopropylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0088	n- Propylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0090	tert- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0097	Hexachlorobutadiene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0098	1,2,3 Trichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0427	EDB (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0428	DBCP (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
N/A	MTBE	--	ND	0.5	0.5	--	µg/L	--	524.2/RL

Lab Number / Sample Number: 089 / 06855

Volatile Organic Compounds (cont)

LAB COMMENTS

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

Analysis for EDB and DBCP is screening only. Detections of EDB and DBCP are confirmed using the fumigant test panel.

--No existing value.

µg/L: micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote additional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

Appendix 10.4
WSP Adoption Notice and Minutes

Appendix 10.5
Local Government Consistency

Local Government Consistency Determination Form

Water System Name: Shadow Creek Water System PWS ID: AE015H

Planning/Engineering Document Title: Water System Plan Plan Date: April 2025

Local Government with Jurisdiction Conducting Review: Thurston

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

Local Government Consistency Statement	For use by water system	For use by local government
	Identify the page(s) in submittal	Yes or Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the service area.	Section 1.4.4	
b) The <u>growth projection</u> used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	Section 2.7	
c) For <u>cities and towns that provide water service</u> ; All water service area policies of the city or town described in the plan conform to all relevant <u>utility service extension ordinances</u> .	N/A	
d) <u>Service area policies</u> for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	Section 1.4 & 1.5	
e) <u>Other relevant elements</u> related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.	Section 1.3	

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

Signature

Date

Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

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

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

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

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

- A) Documenting Consistency:** The planning or engineering document must include the following when applicable.
- a) A copy of the adopted **land use/zoning** map corresponding to the service area. The uses provided in the WSP should be consistent with the adopted land use/zoning map. Include any other portions of comprehensive plans or development regulations that relate to water supply planning.
 - b) A copy of the **growth projections** that correspond to the service area. If the local population growth projections are not used, explain in detail why the chosen projections more accurately describe the expected growth rate. Explain how it is consistent with the adopted land use.
 - c) Include water service area policies and show that they are consistent with the **utility service extension ordinances** within the city or town boundaries. *This applies to cities and towns only.*
 - d) All **service area policies** for how new water service will be provided to new customers.
 - e) **Other relevant elements** the Department of Health determines are related to water supply planning. See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.
- B) Documenting an Inconsistency:** Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and explain how to resolve the inconsistency.
- C) Documenting a Lack of Local Review for Consistency:** Where the local government with jurisdiction did not provide a consistency review, document efforts made and the amount of time provided to the local government for review. Please include: name of contact, date, and efforts made (letters, phone calls, and emails). To self-certify, please contact the DOH Planner.

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).



Building Development Center

2000 Lakeridge Dr. SW, Olympia, WA 98502

(360)786-5490 / (360)754-2939 (Fax)

TDD Line (360) 754-2933

Email: permit@co.thurston.wa.us

www.thurstoncountybdc.com

Creating Solutions for Our Future

MASTER APPLICATION

This application must accompany a project specific supplemental application.

STAFF USE ONLY	DATE STAMP
<p>LABEL</p> <p>NOTE: ALL APPLICATIONS AND SITE PLANS MUST BE COMPLETED IN BLACK OR BLUE INK <u>ONLY</u></p>	
<p>Gopher Soils <input type="checkbox"/> YES <input type="checkbox"/> NO Prairie Soils <input type="checkbox"/> YES <input type="checkbox"/> NO</p>	<p>Intake By: _____</p>

PROJECT DESCRIPTION _____

PROPERTY INFORMATION

1. **Tax Parcel Number(s)** 73700100001 ; _____ ; _____

2. **Subdivision Name** Shadow Creek **Lot #** _____

3. **Property Address** not available **City** _____ **Zip Code** _____

4. **Directions to Property** (from Thurston County Courthouse)
 From I-5N take exist 111, left on Marvin Rd, left on 56th, continue onto Pudget Beach Rd, site on left

PROPERTY ACCESS

5. **Property Access** Existing Proposed

6. **Access Type** Private Driveway Shared Driveway Private Road Public Road

7. **Property Access Issues** (locked gate, gate code, dogs or other animals) No Yes locked gate
 Point of contact will be contacted for gate code prior to site visit. Gate codes written on this form are public information. Property owner is responsible for providing gate code and securing animals prior to site visit.

WATER/SEPTIC

8. **Water Supply** Existing Proposed

9. **Water Supply Type** Single Family Two Party Well Group A Group B
WATER SYSTEM NAME Shadow Creek Water System

10. **Waste Water Sewage Disposal** Existing Proposed

11. **Sewage Disposal System Type** Individual Septic System Community System Sewer
NAME OF PUBLIC SYSTEM _____

BILLING OF INVOICES

The fee charged at the time of application covers base hours listed on the fee schedule. When base hours by a Department are used, a monthly billing invoice is generated at the hourly rate listed on the fee schedule. Should review of the project exceed the base hours allotted, billing invoices shall be mailed to: Owner Applicant Point of Contact

PROPERTY OWNER (additional property owner sheet can be obtained online at www.thurstoncountybdc.com)

Property Owner Name _____

Mailing Address _____ City _____ State _____ Zip Code _____

Phone (_____) _____ Cell (_____) _____ Fax (_____) _____

EMAIL _____

Communication from staff provided by Email? YES NO

Property Owner Signature* _____ Date _____

APPLICANT

Applicant Name _____

Mailing Address _____ City _____ State _____ Zip Code _____

Phone (_____) _____ Cell (_____) _____ Fax (_____) _____

EMAIL _____

Communication from staff provided by Email? YES NO

Signature* _____ Date _____

POINT OF CONTACT (Person receiving all County correspondence)

Name _____

Mailing Address _____ City _____ State _____ Zip Code _____

Phone (_____) _____ Cell (_____) _____ Fax (_____) _____

EMAIL _____

Communication from staff provided by Email? YES NO

Signature* _____ Date _____

***DISCLAIMER**

Application is hereby made for a permit(s) to authorize the activities described herein. I certify that I am familiar with the information contained in the application package and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. I hereby grant to the agencies to which this application is made or forwarded, the right to enter the above-described location to inspect the proposed, in-progress or completed work. I agree to start work only after all necessary permits/approvals have been received.



OTHER ADMINISTRATIVE ACTIONS

Supplemental Application

Staff Use Only	
Label	Date Stamp / Staff Initials

1. Application Type (select only one)

CRITICAL AREA DETERMINATIONS (CAD)

OPTION A: To receive a determination for all critical areas. No zoning or land use items are evaluated.

Critical Area Determination - Property size 5 acres or less

Critical Area Determination - Property size over 5 acres

An additional fee is required for properties receiving county gopher field screening. This additional fee is added to your project and must be paid prior to approval. This fee is not added to review a completed consultant's report.

OPTION B: To receive County gopher inspections and determinations for Gophers, Prairie plants, Oaks and Mima mounds. No other critical areas, zoning, or land use items are evaluated.

Gopher/Prairie Determination only- Property size 5 acres or less

Gopher/Prairie Determination only- Property size over 5 acres

OPTION C: To submit a completed gopher consultant report and receive determinations for Gophers, Prairie plants, Oaks and Mima mounds. No other critical areas, zoning, or land use items are evaluated.

Gopher/Prairie Determination only- County review of consultant's report

CRITICAL AREA REVIEW PERMITS (CARP)

For projects requiring buffer mitigation or impacting critical areas or buffers:

Hazard Tree Removal (few)

Hazard Tree Removal (many)

Critical Area Review Permit - Property size 5 acres or less

Critical Area Review Permit - Property size over 5 acres

OTHER ADMINISTRATIVE ACTIONS

Other Administrative Action - Low	
<input type="checkbox"/> Zoning Verification	<input type="checkbox"/> RCW Boundary Line Dispute Review
<input type="checkbox"/> Small Temporary Use	<input type="checkbox"/> Other
Other Administrative Action - Minor	
<input type="checkbox"/> Code Interpretation	<input checked="" type="checkbox"/> Administrative Water System Review
<input type="checkbox"/> Temporary Use Minor	<input type="checkbox"/> Other
Other Administrative Action - Major	
<input type="checkbox"/> Temporary Use Major	<input type="checkbox"/> Other
Miscellaneous Planning Activities	
<input type="checkbox"/> Hulk Hauler / Scrap Metal / Salvage Yard	<input type="checkbox"/> Business License

Thurston County Building Development Center Community Planning & Economic Development
 2000 Lakeridge Drive SW, Olympia, WA 98502 PH 360-786-5490 FAX 360-754-2939 TDY-TDD 711 or 1-800-833-6388
www.thurstoncountybdc.com

PAGE 2 – OTHER ADMINISTRATIVE ACTIONS

2. Application and Site Plan Submittal Checklist – All items required at the time of application must be submitted to be a complete application. Incomplete applications will not be accepted.

APPLICATION REQUIREMENTS	SITE PLAN SUBMITTAL REQUIREMENTS
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Master Application <input type="checkbox"/> Site Plan Meeting Site Plan Submittal Requirements <input checked="" type="checkbox"/> Special reports, if applicable. Examples: wetland delineation, geotechnical report, topographic survey, gopher consultant report, mitigation plan, or others. <i>Submittal of special reports can be original paper documents and copy of report provided on a thumb drive.</i> <input checked="" type="checkbox"/> Application Fee – Refer to the Land Use Application fee schedule available online at www.thurstoncountybdc.com 	<p>The site plan shall be legible when scanned and drawn to a standard engineer scale on 11" x 17" or 8 ½" x 11" paper. Colored site plans or aerial photographs are not accepted. The site plan shall include the following items:</p> <ul style="list-style-type: none"> <input type="checkbox"/> All property boundaries and dimensions <input type="checkbox"/> North arrow, map scale, and site address <input type="checkbox"/> Location of all existing and proposed structures <input type="checkbox"/> All existing and proposed vehicular and pedestrian ingress and egress to and from the property, such as driveways, streets and fire access roads. Road names and existing county and state right-of-way shall be identified on the site plan. <input type="checkbox"/> All existing and proposed utility structures and lines, such as on-site septic tanks, drainfields and reserve areas, water lines, wells and springs. <input type="checkbox"/> Location of all surveyed or delineated critical areas and/or buffers affecting the site, both on-site and on adjacent properties, including but not limited to shorelines, wetlands, streams, flood zones, high groundwater, steep slopes, special habitats and riparian or marine shoreline management zones.

3. Additional Resources

The Thurston County Building Development Center contains three separate County departments co-located for your convenience at the Thurston County Courthouse. The address and contact information are listed below. Office hours are Monday – Friday 8:00 AM – 4:00 PM. Please arrive before 3:30 if submitting an application.

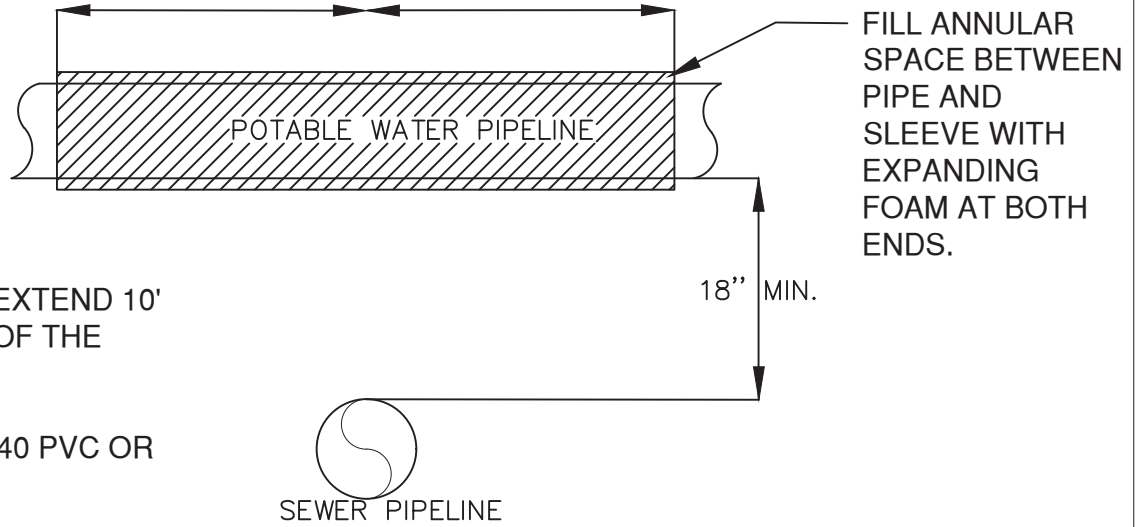
Application forms, development codes, permit status, and historic permit documents can be viewed online at www.thurstoncountybdc.com.

Updated 1/20/2021

Appendix 10.6
Construction Maps and Drawings

SEWER CROSSING DETAIL

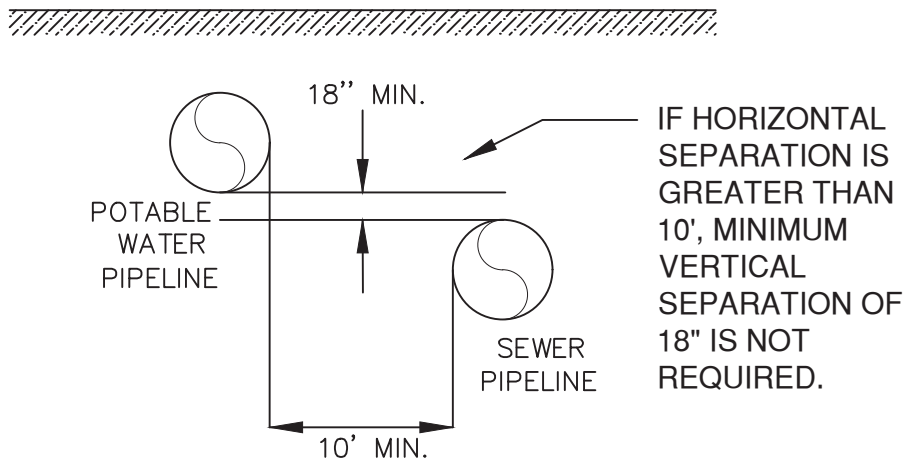
PERPENDICULAR SEPARATION
 SLEEVED 10' MIN. SLEEVED 10' MIN.



PIPE SLEEVE SHALL EXTEND 10' BEYOND EACH SIDE OF THE CROSSING.

PIPE SLEEVE IS SCH 40 PVC OR BETTER.

PARALLEL SEPARATION



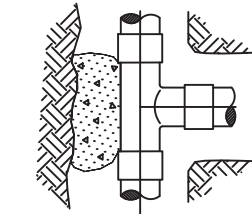
PERPENDICULAR SEPARATION SHOULD BE AS CLOSE TO 90 DEGREES AS POSSIBLE.

IF THE VERTICAL SEPARATION IS LESS THAN 18", OR THE SEWER LINE MUST CROSS UNDER THE POTABLE WATER LINE, THE POTABLE LINE MUST BE CASED AS ABOVE.

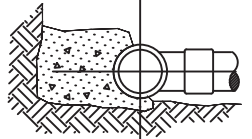
IF HORIZONTAL DISTANCE IS LESS THAN 10', SEWER MAY BE LAID IN SEPARATE TRENCH. CHECK WITH LOCAL GOVERNMENT STANDARDS FOR CONSISTENCY.

IF OUTSIDE CONFIGURATION AS SHOWN, CONTACT ENGINEER FOR APPROVAL.

TITLE			SEWER CROSSING DETAIL		
FILE NO.	DETAILS	FILE NAME	SEWER	SHEET NO.	OF
DATE	2016	SCALE	NO SCALE		
NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958					

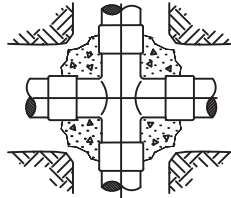


TOP VIEW

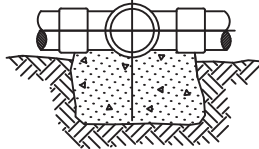


SIDE VIEW

TEE

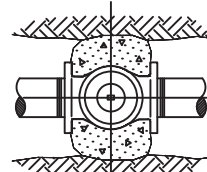


TOP VIEW

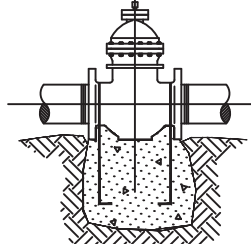


SIDE VIEW

CROSS

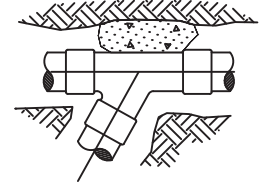


TOP VIEW

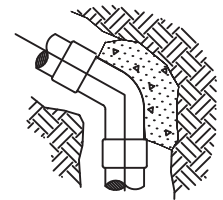


* SIDE VIEW

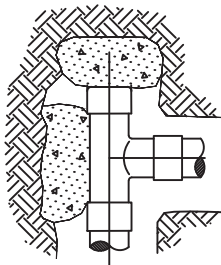
GATE VALVE



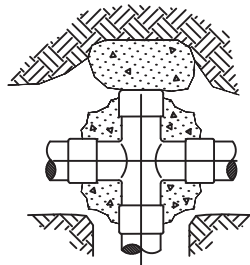
WYE



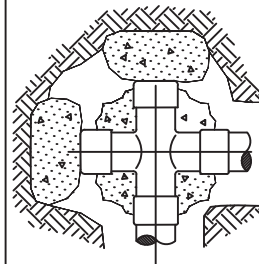
HORIZ. BEND



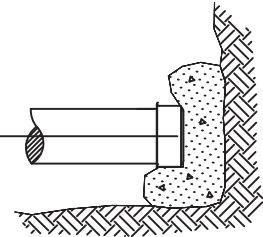
TEE WITH
PLUG



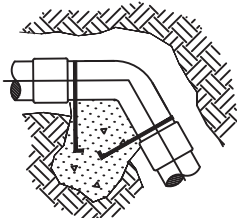
CROSS WITH
PLUG



CROSS WITH
PLUGS



PLUG OR CAP



45° - 90°
VERTICAL BEND

NOTES:

1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. PLASTIC BARRIER SHALL BE PLACED BETWEEN ALL THRUST BLOCKS & FITTINGS.
3. ANCHOR REBAR SHALL BE #5 ON 12" DIA. AND LESS WITH 30" IMBEDMENT, #5 ON 16"-24" DIAMETER WITH 36" IMBEDMENT.
4. PLUGS TO BE MINIMUM OF 5' FROM TEE, WYE, CROSS ON VALVE.

* IF IN THE OPINION OF THE ENGINEER THE VALVE IS ON A SLOPE AND/OR THE COVER ON THE PIPE WOULD APPLY UPWARD THRUST, THEN THRUST BLOCKING WILL BE REQUIRED.

RESTRAINT BLOCKING

FILE NO.	DETAILS	FILE NAME	THRUST	SHEET NO.
DATE	12/30/99	SCALE	NO SCALE	
NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958				

THRUST LOADS

THRUST AT FITTINGS IN POUNDS AT 200 POUNDS PER SQUARE INCH OF WATER PRESSURE

PIPE DIAMETER	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	DEAD END OR TEE
4"	3,600	2,000	1,000	500	2,600
6"	8,000	4,400	2,300	1,200	5,700
8"	14,300	7,700	4,000	2,000	10,100
10"	22,300	12,100	6,200	3,100	15,800
12"	32,000	17,400	8,900	4,500	22,700
14"	43,600	23,600	12,100	6,100	30,800
16"	57,000	30,800	15,700	7,900	40,300

NOTES:

1. BLOCKING SHALL BE CEMENT CONCRETE CLASS "B" POURED IN PLACE AGAINST UNDISTURBED EARTH. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH PLASTIC OR SIMILAR MATERIAL.
2. TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (S.F.):
 EXAMPLE: 12" - 90° BEND IN SAND AND GRAVEL
 $32,000 \text{ LBS} \div 3000 \text{ LB/S.F.} = 10.7 \text{ S.F. OF AREA}$
3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZE, PRESSURES AND SOIL CONDITIONS.
4. BLOCKING SHALL BE ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

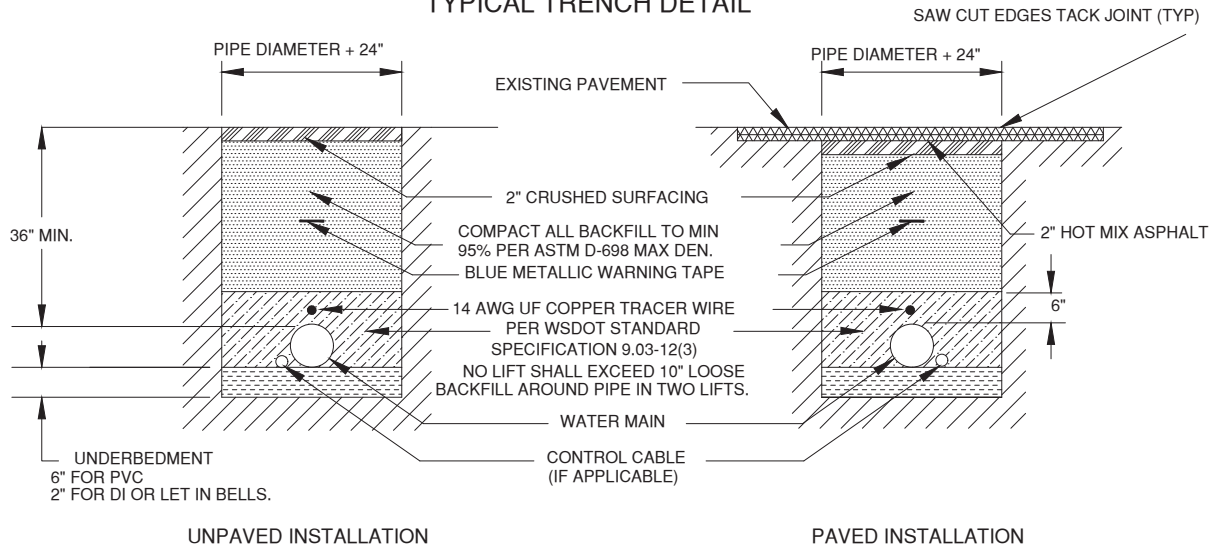
SAFE SOIL BEARING LOADS

FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET

SOIL	POUNDS PER SQUARE FOOT
MUCK, PEAT	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

RESTRAINT BLOCKING			
FILE NO.	DETAILS	FILE NAME	SHEET NO.
		THRUST	
DATE	12/30/99	SCALE	NO SCALE
NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958			

TYPICAL TRENCH DETAIL



WATER MAINS SHALL BE NSF61 CERTIFIED. WATER MAINS LESS THAN 4-IN NOMINAL DIAMETER SHALL BE SCHED. 40 PVC OR BETTER; WATER MAINS 4-IN NOMINAL DIAMETER AND GREATER SHALL BE DR18 C900 PVC OR BETTER. IT IS REQUIRED FOR THE CONTRACTOR TO CALL FOR UTILITY LOCATES BEFORE DIGGING, PER RCW. TRACER WIRE SHALL BE TAPED TO WATER MAIN. DISTRIBUTION SYSTEM SHALL BE PRESSURE TESTED BY DESIGNER'S SPECIFICATIONS PRIOR TO BACKFILLING. ANY TRENCH OVER 4 FT IN DEPTH SHALL HAVE CAVE IN PROTECTION AS REQUIRED IN CHAPTER 49.17 RCW

WATER MAIN DISINFECTION

STERILIZATION OF THE WATER MAINS SHALL BE ACCOMPLISHED BY THE SYSTEM INSTALLER IN ACCORDANCE WITH THE REQUIREMENTS OF THE HEALTH DISTRICT AND THE WASHINGTON STATE DEPARTMENT OF HEALTH.

DURING CONSTRUCTION, CALCIUM HYPOCHLORITE GRANULES SHALL BE PLACED AT THE UPSTREAM END OF EACH LENGTH OF PIPE LAID SUCH THAT, UPON FILLING THE MAIN, THE INITIAL CONCENTRATION OF CHLORINE WILL BE 50 MG/L. THIS EQUATES TO 1/4 TEASPOON OF 65% HIGH TEST CALCIUM HYPOCHLORITE PER 20 FT OF 2" PIPE, 1 TEASPOON/20FT OF 4" PIPE, 2 TEASPOONS/20FT OF 6" PIPE, AND 4 TEASPOONS/20FT OF 8" PIPE.

WHEN INSTALLATION IS COMPLETE, THE MAINS SHALL BE FILLED SLOWLY WITH WATER SUCH THAT THE MAXIMUM VELOCITY OF FLOW SHALL BE LESS THAN 1 FPS. ALL AIR POCKETS SHALL BE BLED FROM THE SYSTEM DURING THE FILLING PROCESS, AND ALL VALVES SHALL BE OPERATED. FOLLOWING A 24-HOUR SOAKING PERIOD, THE SYSTEM SHALL BE FLUSHED UNTIL NO TRACE OF CHLORINE REMAINS.

ALTERNATIVELY, PROVISIONS MAY BE MADE IN THE CONSTRUCTION OF THE SYSTEM TO ALLOW FOR EFFICIENT INTRODUCTION OF CHLORINE INTO THE MAINS FOLLOWING CONSTRUCTION TO A CONCENTRATION OF 50 MG/L.

A REPRESENTATIVE OF NORTHWEST WATER SYSTEMS, INC. MUST BE ON-SITE DURING THE INITIAL FLUSHING OF THE SYSTEM AND DURING THE FLUSHING OF THE MAINS AFTER THE SOAKING PERIOD. FOLLOWING THE FLUSHING, A BACTERIOLOGICAL SAMPLE WILL BE TAKEN AND SUBMITTED FOR TESTING. THE SYSTEM MUST PASS BACTERIOLOGICAL TESTING BEFORE IT CAN BE PLACED INTO SERVICE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT NORTHWEST WATER SYSTEMS, INC. 24 HOURS PRIOR TO INITIAL FILLING OF THE SYSTEM.

HYDROSTATIC TESTING

ALL WATER MAIN INSTALLATIONS SHALL BE INSPECTED AND APPROVED BY NORTHWEST WATER SYSTEMS, INC. NO NEW PIPE OR PIPE EXTENSIONS SHALL BE PUT INTO SERVICE OR CONNECTED TO AN EXISTING WATER SYSTEM WITHOUT A STATE DEPARTMENT OF HEALTH APPROVED BACKFLOW PREVENTER INSTALLED IN THE CONNECTING LINE.

ALL WATER MAIN AND EQUIPMENT INSTALLATIONS SHALL BE HYDROSTATIC AND LEAK TESTED. SUCH TESTING SHALL BE WITNESSED BY NORTHWEST WATER SYSTEMS, INC. ALL WATER MAIN JOINTS MUST BE EXPOSED TO VIEW AND BACKFILL MATERIAL MUST BE ON-SITE AT THE TIME OF THE TEST. ALL THRUST BLOCKING, IF REQUIRED, SHALL BE POURED-IN-PLACE OF TYPE 1 PORTLAND CEMENT. BLOCKING SHALL CURE AT LEAST SEVEN DAYS BEFORE TESTING. THE PRESSURE GAUGE USED IN THE PERFORMANCE OF SUCH TESTS SHALL HAVE MINIMUM DIVISIONS OF 5 PSI.

THE MAINS SHALL BE FILLED SLOWLY (NOT MORE THAN 2 FPS WATER VELOCITY IF USING 50PPM CHLORINATED WATER, 1FPS IF POWDERED CHLORINE WAS ADDED TO EACH PIPE) AND TRAPPED AIR COMPLETELY VENTED THROUGH AIR VENTS OR SERVICES.

AFTER COMPLETELY FILLING THE PIPE WITH WATER IT SHALL BE SUBJECTED TO A HYDROSTATIC TEST PROCEDURE AS FOLLOWS:

FOR PVC AND DUCTILE IRON PIPE TEST PRESSURE SHALL BE 200 PSI, UNLESS THE ENGINEER DETERMINES BASED ON SITE CONDITIONS THAT A LOWER PRESSURE IS APPROPRIATE. PRESSURE SHALL NOT IN ANY CASE BE LESS THAN 150% OF THE WORKING PRESSURE AT THE LOWEST ELEVATION POINT OF THE SEGMENT TESTED. COMPONENTS NOT COMPATIBLE WITH THE TEST OVERPRESSURE (PRESSURE RELIEF VALVES, HYDROPNEUMATIC TANKS, ETC.) MAY BE ISOLATED FROM THE SECTION UNDER TEST. THE TEST PRESSURE SHALL BE APPLIED BY PUMPING AND THE PRESSURE MAINTAINED FOR TWO HOURS. PRESSURE LOSS MAY NOT EXCEED 5 PSI ONCE THE PIPE HAS BEEN FILLED WITH WATER AND AIR EXPELLED; ADDITIONAL PUMPING MAY BE PERFORMED AS REQUIRED TO MAINTAIN THE TEST PRESSURE. LEAKAGE IS DEFINED BY THE VOLUME OF WATER REQUIRED TO MAINTAIN PRESSURE. ALLOWABLE LEAKAGE CAN BE CALCULATED PER AWWA C600-93 AS:

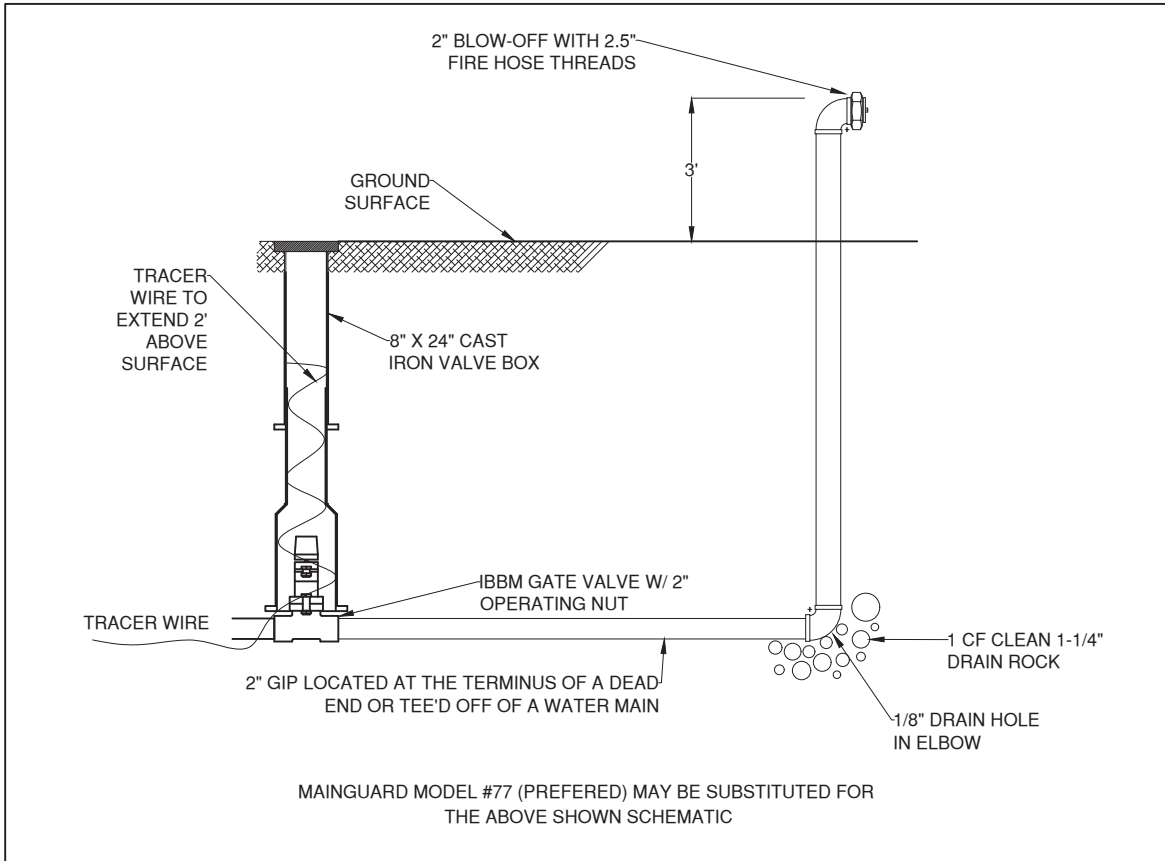
$$L = S \cdot D^3 [\text{SQRT}(P)] / 133,200$$

WHERE L IS THE ALLOWABLE LEAKAGE IN GALLONS PER HOUR, S IS THE LENGTH OF PIPE IN FEET, D IS THE NOMINAL DIAMETER OF THE PIPE IN INCHES, AND P IS THE AVERAGE TEST PRESSURE (PSI).

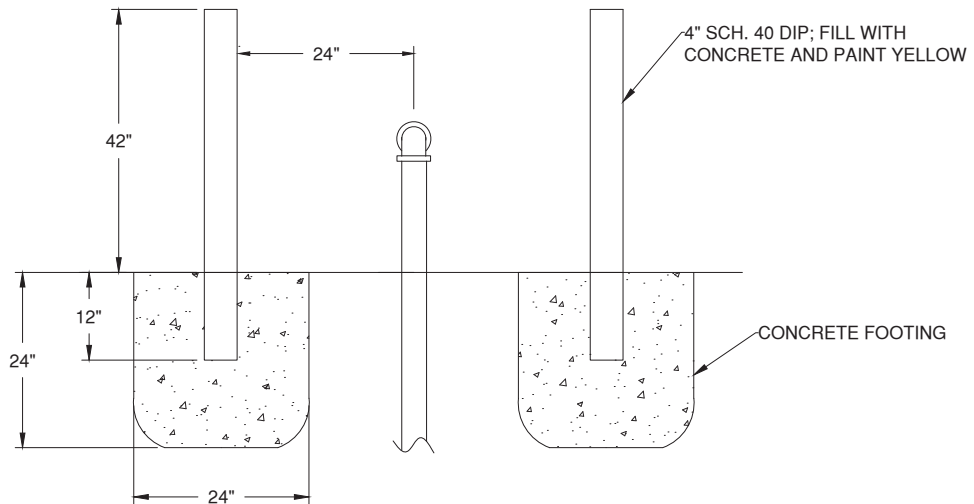
FOR HDPE PIPING, THE MODIFIED PRESSURE REBOUND METHOD SHALL BE USED PER ASTM F2164. HDPE SHALL BE TESTED AT THE LESSER OF 150% OF DESIGN WORKING PRESSURE, OR THE PRESSURE RATING OF THE LOWEST PRESSURE RATED COMPONENT EXPOSED TO TEST PRESSURE. THE TEST SECTION SHALL BE PRESSURIZED FOR 2 HOURS TO ALLOW FOR EXPANSION; PRESSURE SHALL THEN BE REDUCED BY 10 PSI AND OBSERVED FOR 1 HOUR; SUCCESSFUL TESTING REQUIRES LESS THAN 5% VARIATION IN PRESSURE. HDPE SHALL NOT BE SUBJECT TO PRESSURES ABOVE DESIGN PRESSURE FOR MORE THAN 8 CONTINUOUS HOURS; AFTER DEPRESSURIZING, A MINIMUM 8 HOURS SHALL BE ALLOWED FOR RELAXATION PRIOR TO RETESTING.

DURING THE TEST, THE SECTION BEING TESTED SHALL BE INSPECTED FOR LEAKAGE. NO WATER SYSTEM FACILITY SHALL BE PLACED IN SERVICE WITHOUT A PROPER CERTIFICATE OF COMPLETION EXECUTED BY THE DESIGNER.

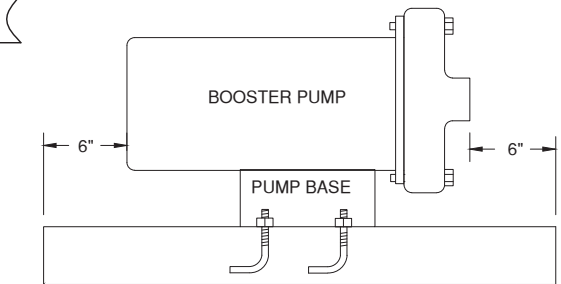
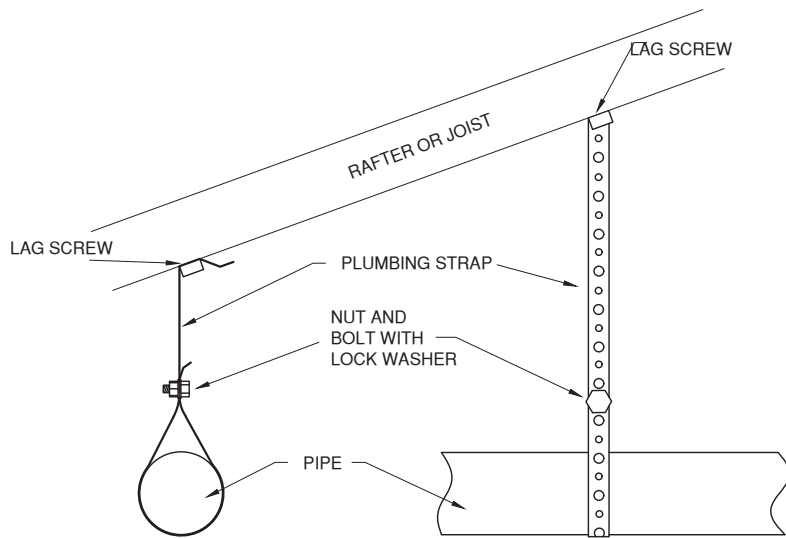
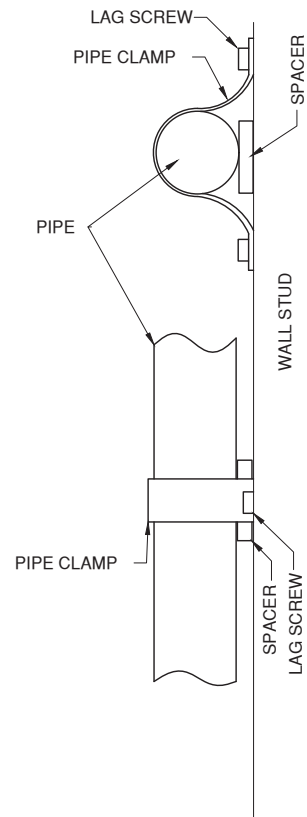
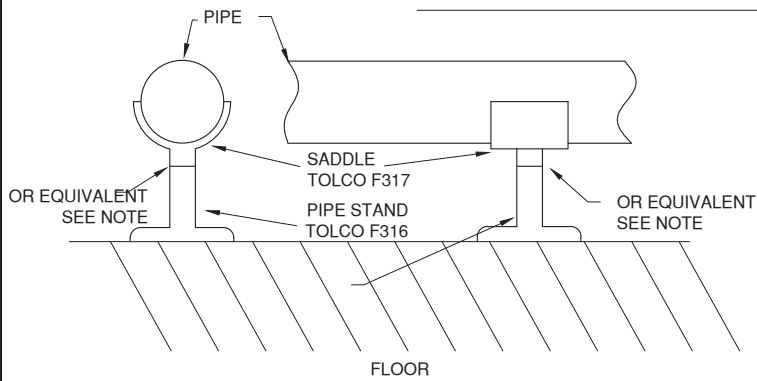
2" BLOWOFF STANDARD DETAIL



PROTECT ABOVE GROUND PORTION OF BLOW-OFF WITH STANDARD 4" BOLLARDS



ANCHORING DETAILS



NOTES:

PIPE SUPPORTS SHALL BE SPACED AT A MINIMUM OF EVERY FOUR FEET

BOOSTER PUMPS AND CHEMICAL FEED PUMPS SHALL BE SECURED USING MASONRY OR WOOD LAGS AS APPROPRIATE AND PUMP BRACKETS SUPPLIED BY THE MANUFACTURER

ALL PIPE SUPPORTS SHALL SUPPORT THE WEIGHT OF THE PIPE AND WATER. SUPPORTS SHALL BE CONFIGURED IN SUCH A WAY AS TO PROTECT THE PIPES FROM PHYSICAL DAMAGE.

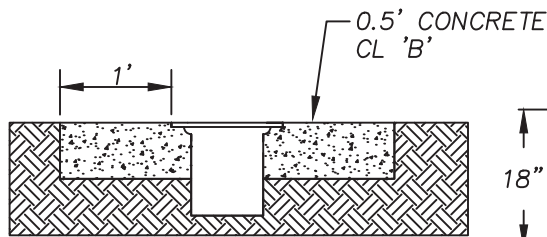
ALL SUPPORTS SHALL BE CONSTRUCTED OF MATERIAL THAT RESISTS CORROSION.

EQUIVALENT SUPPORTS (MASONRY BLOCKS, PIPE RACKS, COMPRESSION CLAMPS, U-CHANNEL, ETC.) MAY BE USED AS SUPPORTS AND ANCHORS AS LONG AS THEY FOLLOW GENERALLY ACCEPTED INDUSTRY STANDARDS AND WSDOH GUIDELINES.

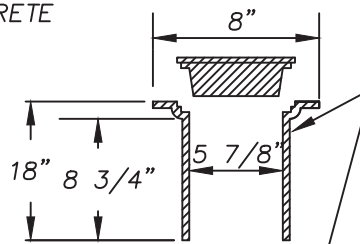
POURED CONCRETE BASE WITH 1/2"-ANCHOR BOLTS (4 MINIMUM). BASE HEIGHT 3.5" EXTENDING A MINIMUM OF 6" PAST LENGTH AND WIDTH OF PUMP

DRILLED HOLES AND CONCRETE ANCHOR LAGS INSTALLED INTO PUMPHOUSE FLOOR MAY BE SUBSTITUTED FOR CONCRETE BASE

DRAWING			ANCHORING DETAILS		
FILE NO.	DETAILS	FILE NAME	ANCHORING	SHEET NO.	
DATE	APRIL 30, 2007		SCALE	NTS	
NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958					

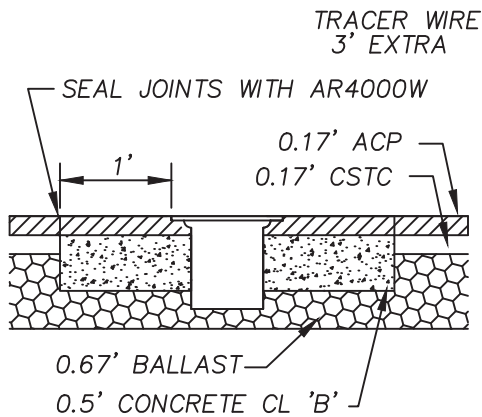


OUTSIDE PAVED AREA

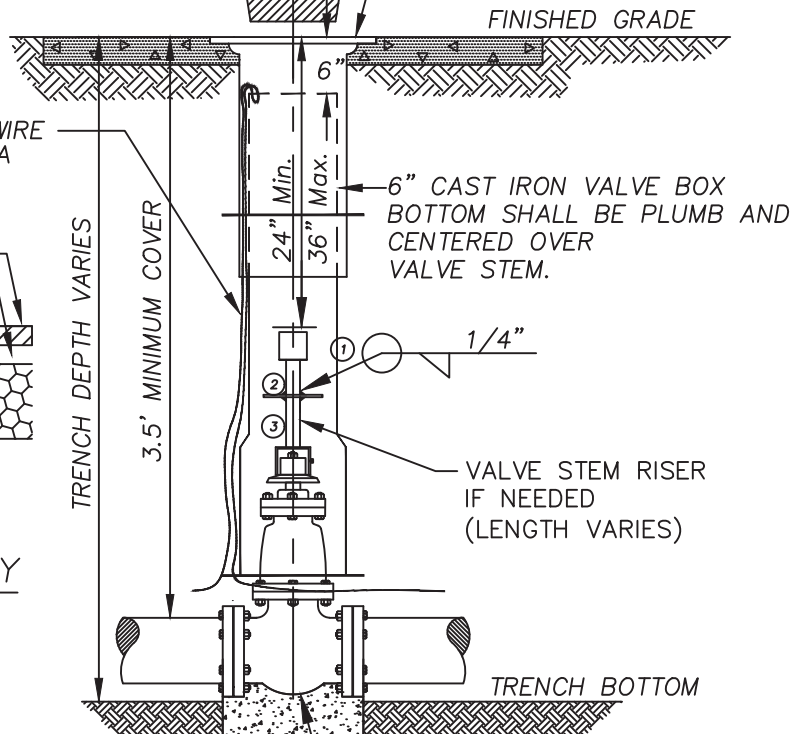


SECTION

RICH #940 VALVE BOX VALVE BOX SHALL BE INSTALLED SUCH THAT THE LUGS LINE UP WITH THE DIRECTION OF THE PIPE. THE LIDS SHALL BE ANTI KICK OUT.



INSIDE PAVED ROADWAY



NOTE:

ALL VALVES SHALL HAVE 14 GAUGE COATED COPPER TRACER WIRE TIED OFF AT VALVE BODY, EXTENDING TO THREE FEET ABOVE TOP OF VALVE BOX BOTTOM BETWEEN VALVE BOX BOTTOM AND VALVE BOX LID.

AWWA GATE VALVE GATE VALVE SHOWN—SIMILAR INSTALLATION REQUIRED FOR BUTTERFLY VALVES.

VALVE STEM EXTENSION LEGEND

- ① VALVE OPERATING NUT OR 1 7/8" X 1 7/8" X 2" HIGH GRADE STEEL WELDED TO GUIDE PLATE.
- ② 3/16" THICK X 5 1/5" DIA STEEL GUIDE PLATE WELDED TO RISER SHAFT.
- ③ 2"X2"X 3/16" SQUARE STRUCTURAL STEEL TUBING TO FIT OPERATING NUT. LENGTH AS REQUIRED.

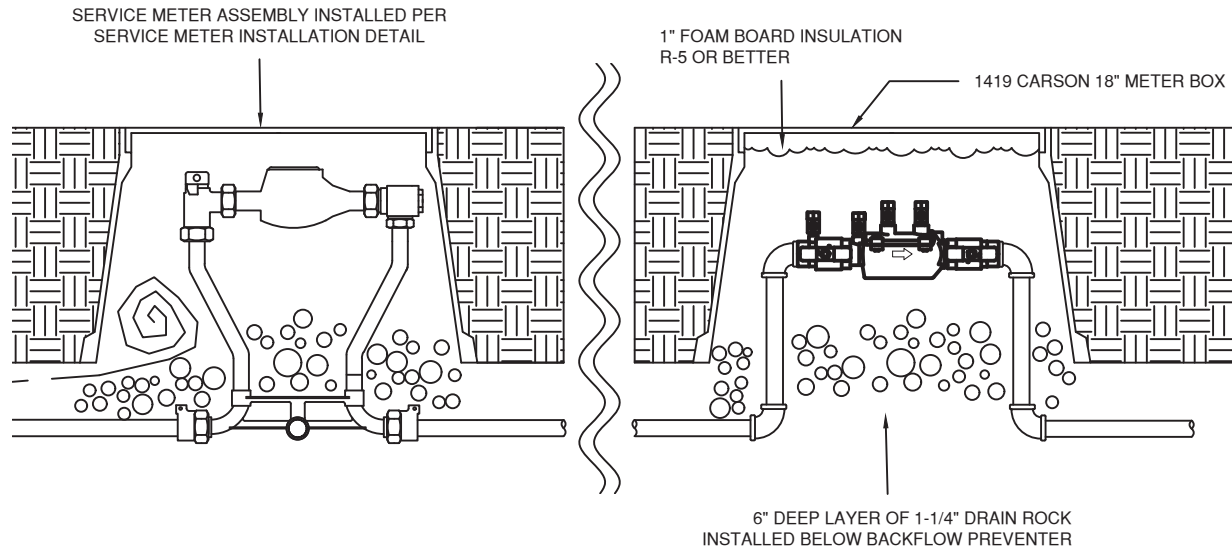
EQUIVALENT MATERIALS AND EQUIPMENT MAY BE SUBSTITUTED WITH ENGINEER'S APPROVAL

NOTE:

WELD ALL AROUND, AS SPECIFIED ABOVE

TITLE			GATE VALVE STANDARD DETAIL		
FILE NO.	DETAILS	FILE NAME	GVALVE	SHEET NO.	OF
DATE	2007		SCALE	NO SCALE	
NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958					

BACKFLOW PREVENTION ASSEMBLY INSTALLATION DETAIL



STANDARDS

BACKFLOW PREVENTER SHALL BE INSTALLED BY QUALIFIED, LICENSED PERSONNEL. INSTALLER SHALL CONFIRM THAT THE CORRECT DEVICE HAS BEEN SELECTED.

DOUBLE CHECK VALVE ASSEMBLY (DCVA) FROM 3/4" TO 2" SHALL BE WILKINS MODEL 350 XL OR EQUAL, CONSULT ENGINEER FOR OTHER SIZES.

A REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) SHALL NOT BE INSTALLED IN THIS MANNER, CONSULT APPROVED CROSS CONNECTION CONTROL SPECIALIST FOR INSTALLATION STANDARDS AND DETAILS.

INSTALL VALVE AT LEAST 12 INCHES ABOVE SURROUNDING FLOOD LEVEL

NO STANDING WATER IS PERMITTED WITHIN THE VALVE BOX. DRAINAGE SHALL BE PROVIDED IF NECESSARY.

POSITION VALVE WITHIN BOX TO PROVIDE ADEQUATE SPACE AROUND THE INSTALLED UNIT SO THAT TEST COCKS WILL BE ACCESSIBLE FOR TESTING AND SERVICES.

INSTALLER SHALL CONFIRM ACCESSIBILITY OF IDENTIFICATION TAGS AND SERIAL NUMBERS.

INSTALLATION INSTRUCTIONS

BEFORE INSTALLATION, FLUSH THE LINE THOROUGHLY TO REMOVE ALL DEBRIS, CHIPS AND OTHER FOREIGN MATTER.

CONNECT DCVA WITH BOTH VALVES CLOSED.

SLOWLY OPEN THE INLET SHUT-OFF VALVE UNTIL THE BACKFLOW PREVENTER IS COMPLETELY PRESSURIZED

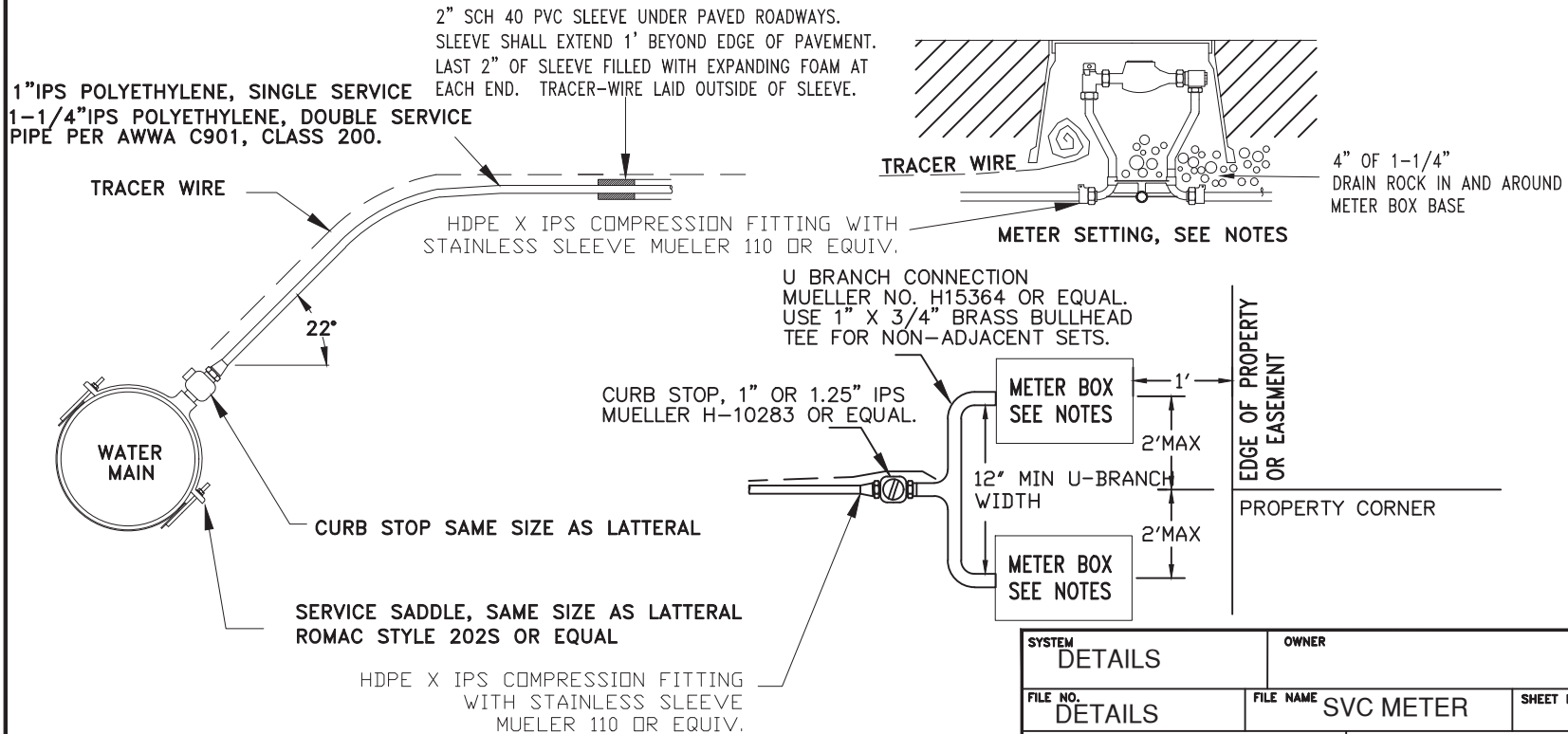
WHEN THE UNIT HAS BEEN PRESSURIZED, VENT ANY TRAPPED AIR BY SLIGHTLY OPENING EACH OF THE OUR TEST COCKS.

SLOWLY OPEN THE DOWNSTREAM SHUT-OFF VALVE. THE DCVA IS NOW IN SERVICE.

AFTER THE DCVA HAS BEEN PROPERLY INSTALLED, TEST THE DEVICE. IF THE DEVICE FAILS THE TEST, REMOVE THE FIRST AND SECOND CHECK VALVES AND THOROUGHLY FLUSH THE DEVICE. CLEAN RUBBER SEATS OF ALL DEBRIS AND PLACE THE UNIT BACK IN SERVICE.

DETAIL			BACKFLOW PREVENTER INSTALLATION		
FILE NO.	DETAILS	FILE NAME	BACKFLOW	SHEET NO.	
DATE	DECEMBER 12, 2013	SCALE	NTS		
NORTHWEST WATER SYSTEMS, INC. DESIGN - CONSULTING - MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958					

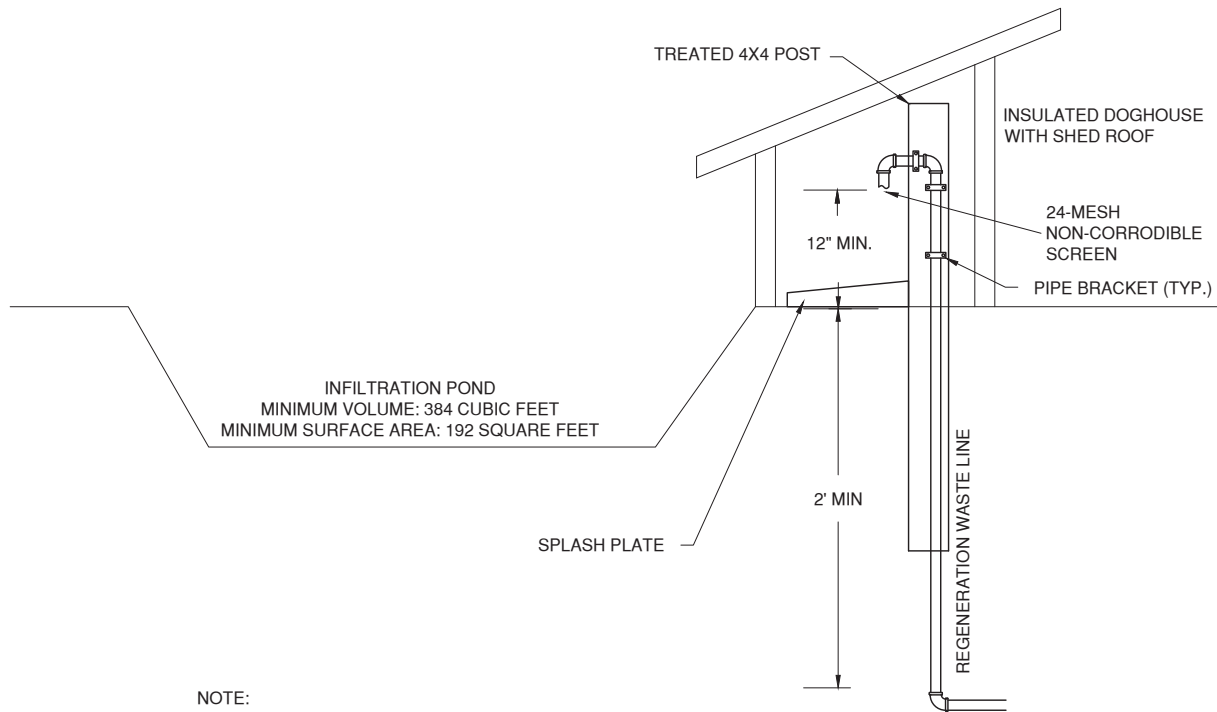
1. METER CONFORMING TO AWWA C700, FROST PROOF MODEL WITH MAGNETICALLY DRIVEN REGISTER & STRAIGHT READING REGISTERS MEASURING IN CU. FT. BADGER M25, OR EQUAL.
2. METER SETTING - 12" COPPER METER SETTER INCLUDING METER VALVE WITH LOCKWING AND OUTLET CHECK VALVE. MUELLER OR EQUAL.
3. METER BOX - PARKING STRIP INSTALLATION
PRECAST CONCRETE AND STEEL LID, FOG TITE METER SEAL CO 1D OR EQUAL.
4. METER BOX - OFF ROAD INSTALLATION
PLASTIC BOX WITH READER LID COVER, CARSON 1419-15 OR EQUAL.
5. INSTALL METER IN EASEMENT RIGHT OF WAY ADJACENT TO PROPERTY LINE.
6. SET METER HORIZONTALLY IN BOTH AXES WITH METER PORTS 5-7" BELOW GRADE.
7. SET METER BOX WITH LID AT GRADE (IN TRAFFIC) OR 2" ABOVE GRADE (NON-TRAFFIC) LEVEL AND READER PORT CENTERED OVER METER DIAL.
8. INSTALL COPPER TRACER WIRE IN TRENCH BESIDE POLYETHYLENE PIPE. PROVIDE 36" EXCESS LENGTH ON METER BOX. ELECTRICALLY BOND THE END OF TRACER WIRE TO MAIN LINE TRACER WIRE USING SPLIT NUT CONNECTION.
9. INSTALL PRESSURE REGULATOR WHERE PRESSURE EXCEEDS 80 PSI (recommended) AND 100 PSI (REQUIRED). 3/4" WILKENS 70SC OR EQUAL.
10. SCH 80 PVC TEE MAY BE SUBSTITUTED FOR SADDLE ON 2" WATER MAIN
11. ALL EQUIPMENT SHALL CONFORM TO THE REDUCTION OF LEAD IN DRINKING WATER ACT



SERVICE CONNECTION DETAIL

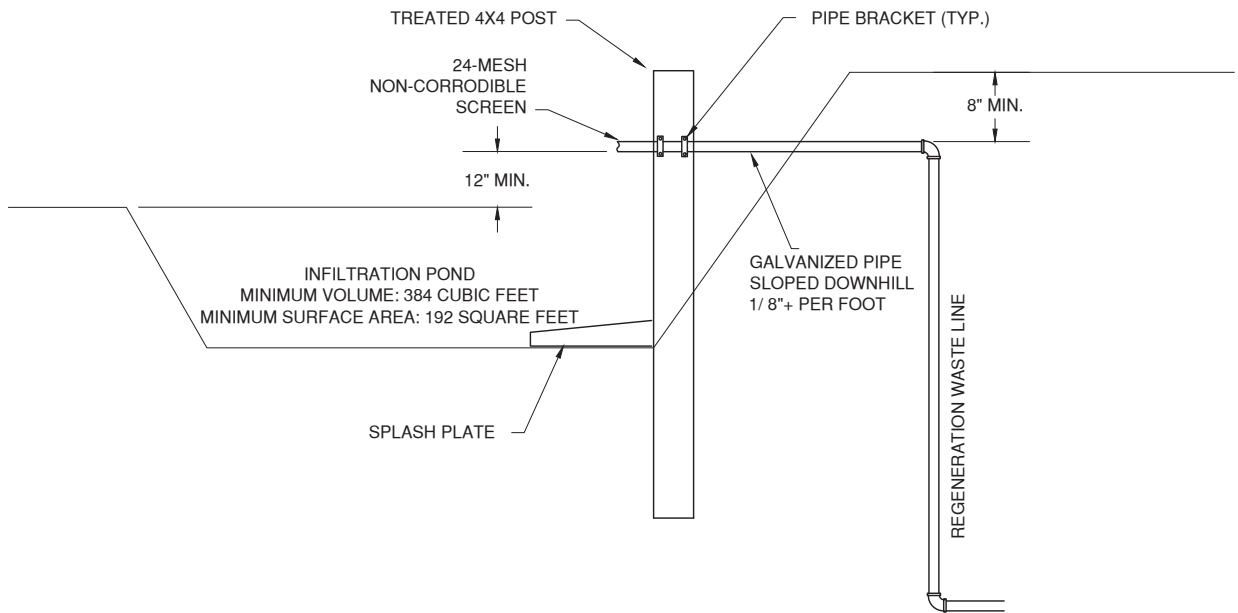
SYSTEM DETAILS		OWNER	
FILE NO. DETAILS	FILE NAME SVC METER	SHEET NO.	
DATE JUNE 19, 2014	SCALE NTS		
NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958			

REGENERATION WASTE AIR GAP DETAIL



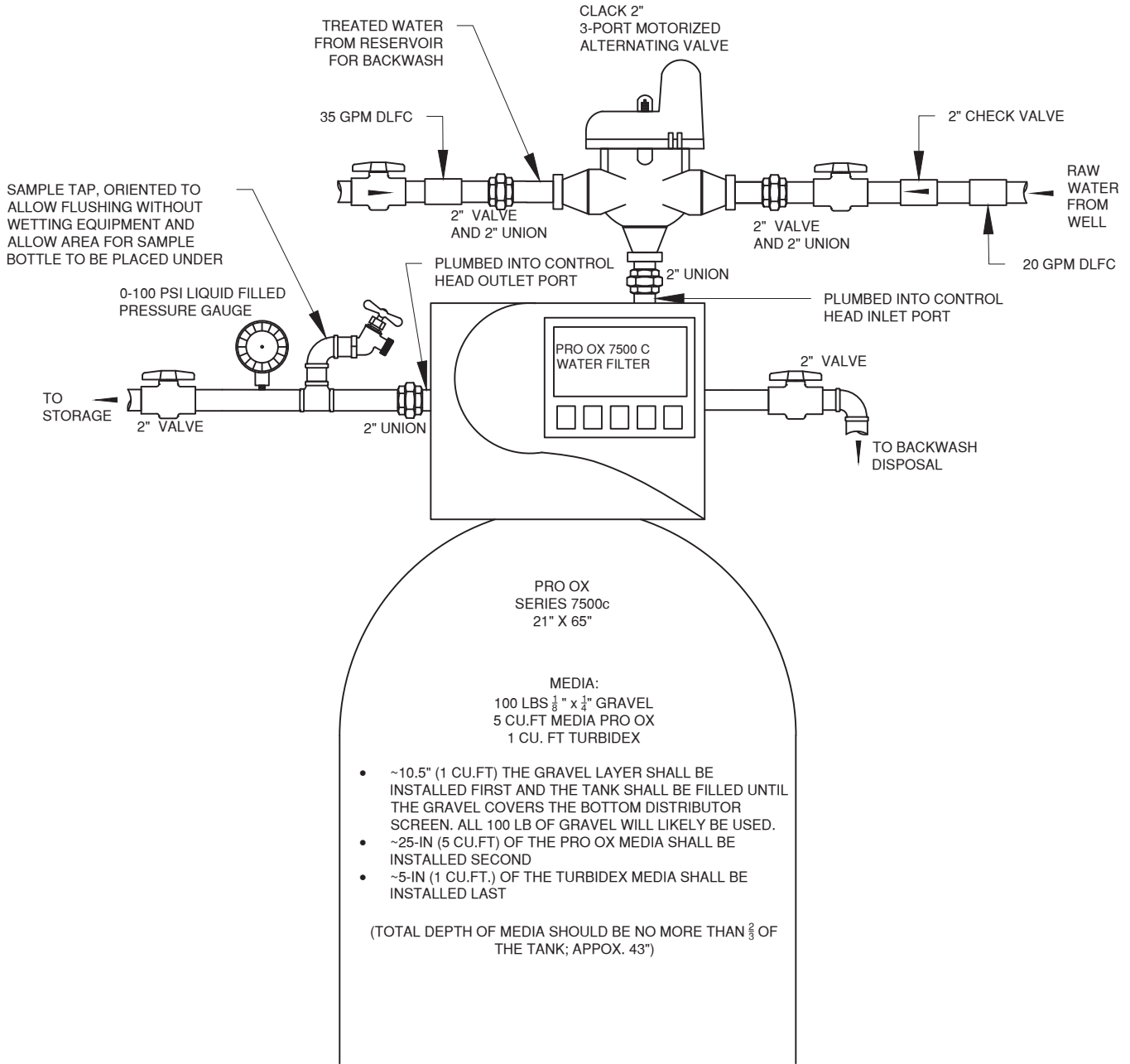
NOTE:

IF NATURAL TOPOGRAPHY WILL ALLOW, THE FOLLOWING CONFIGURATION CAN BE USED



REVISION		SYSTEM	
DESCRIPTION	DATE	BACKWASH TO INFILTRATION POND AIR-GAP DETAIL	
DRAWN BY: CHECKED BY:		FILE NO. DETAILS	FILE NAME POND AIR GAP
		DATE OCTOBER 29, 2010	SCALE NTS
<p>NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958</p>			

FILTER HEAD DETAIL



EQUIPMENT INCLUDED WITH EACH UNIT:

- 2" 7500-C CONTROL VALVE
- POWER SUPPLY
- TOP SCREEN
- FITTING UNIONS WITH SEALS FOR INLET (3 EA.)
- OUTLET AND DRAIN
- DISTRIBUTOR TUBE WITH BOTTOM SCREEN
- FUNNEL FOR ADDING MEDIA
- 100 LBS $\frac{3}{8}$ " X $\frac{1}{4}$ " GRAVEL
- 7 CF MEDIA (PRO OX AND TURBIDEX)
- DRAIN LINE FLOW CONTROL (DLFC)

SYSTEM	SHADOW CREEK WATER SYSTEM		OWNER	THURSTON PUD
FILE NO.	200701	FILE NAME	FILTER HEAD DETAIL	
DATE	APRIL 15, 2021		SCALE	NTS
NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958				

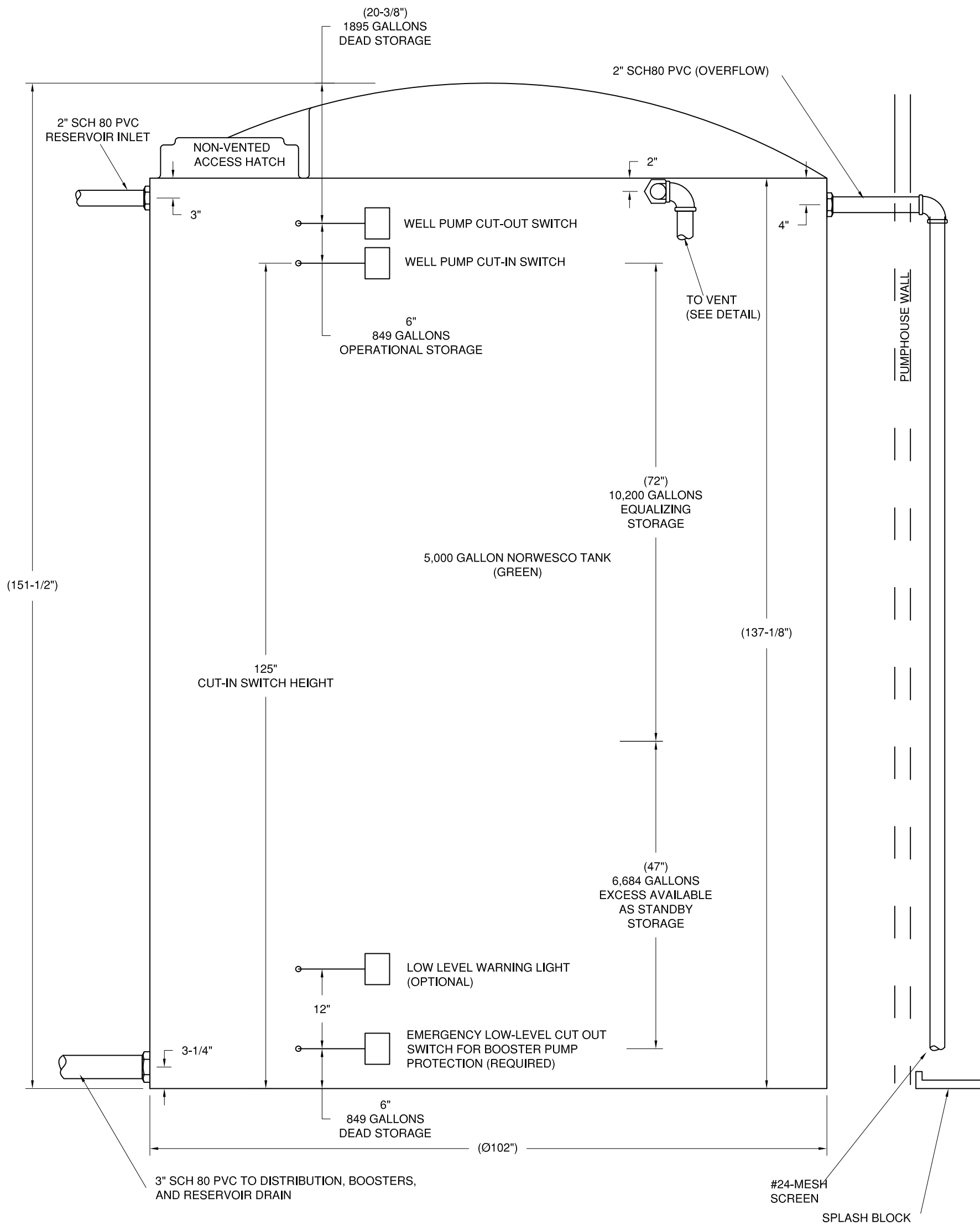


SITE INFORMATION PROVIDED BY: THE CLIENT AND THURSTON COUNTY

THIS IS NOT A SURVEY. PROPERTY LINES AND ELEVATIONS SHOWN ARE BASED UPON THE AVAILABLE INFORMATION AND ARE APPROXIMATE ONLY.

DISTURBANCE OF EXISTING SURVEY MONUMENTS IS A GROSS MISDEMEANOR UNDER RCW 58.04.015

DRAWN BY: Anna Nelson, EIT CHECKED BY: Doug Piehl, PE		SYSTEM SHADOW CREEK WATER SYSTEM		OWNER THURSTON PUD	
REVISION		FILE NO. 200701	FILE NAME VICINITY MAP	SHEET NO. 1 OF 1	
DESCRIPTION		DATE APRIL 19, 2021	SCALE NTS		
PRELIMINARY DRAFT TO DCH UPDATED SATELLITE PHOTO		DATE 8/29/2021 2/20/2025	NORTHWEST WATER SYSTEMS, INC. DESIGN - CONSULTING - MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958		



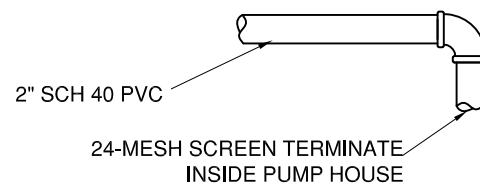
INSTALLATION NOTES:

1. RESERVOIR SHALL BE THOROUGHLY RINSED WITH POTABLE WATER BEFORE FILLING. UPON FILLING, THE RESERVOIR SHALL BE CHLORINATED TO A CONCENTRATION OF 50 PPM FOR 24 HOURS.
2. DISINFECTION WATER SHALL BE DECHLORINATED WITH SODIUM THIOSULFATE BEFORE BEING DISCHARGED TO SURFACE WATERS. CHLORINATED WATER MAY BE DISCHARGED DIRECTLY INTO AN INFILTRATOR OR ONTO THE GROUND, PROVIDED NO CHLORINATED WATER DIRECTLY REACHES SURFACE WATER. ALL DISCHARGED WATER MUST DRAIN AWAY FROM THE PUMPHOUSE AND WELLHEAD.
3. A SATISFACTORY COLIFORM SAMPLE MUST BE TAKEN DOWNSTREAM OF THE RESERVOIR BEFORE PUTTING THE RESERVOIR INTO SERVICE.
4. ALL PENETRATIONS ON THE TANK SHALL BE BULKHEAD FITTINGS.
5. ALL COMPONENTS IN SUBSTANTIAL CONTACT WITH POTABLE WATER SHALL BE NSF CERTIFIED.
6. FLOAT SWITCHES REQUIRED IN ONLY ONE OF THE FOUR TANKS.
7. DIMENSIONS SHOWN IN PARENTHESIS () ARE FOR REFERENCE ONLY.
8. TANKS WILL BE ENCLOSED INSIDE A PUMPHOUSE WITH LOCKABLE DOOR.
9. STORAGE VOLUMES SHOWN REPRESENT TOTAL COMBINED VOLUME FOR ALL FOUR TANKS AS SHOWN BELOW:
 DEAD STORAGE BOTTOM..... 4 X 121.2 = 849 GALLONS
 EQUALIZING STORAGE..... 4 X 2550 = 10,200 GALLONS
 OPERATIONAL STORAGE 4 X 121.2 = 849 GALLONS
 DEAD STORAGE TOP..... 4 X 473.8 = 1895 GALLONS
 TOTAL REQUIRED STORAGE = 13,793 GALLONS
 TOTAL AVAILABLE STORAGE = 20,448 GALLONS*

EXCESS STORAGE AVAILABLE = 6,655 GALLONS

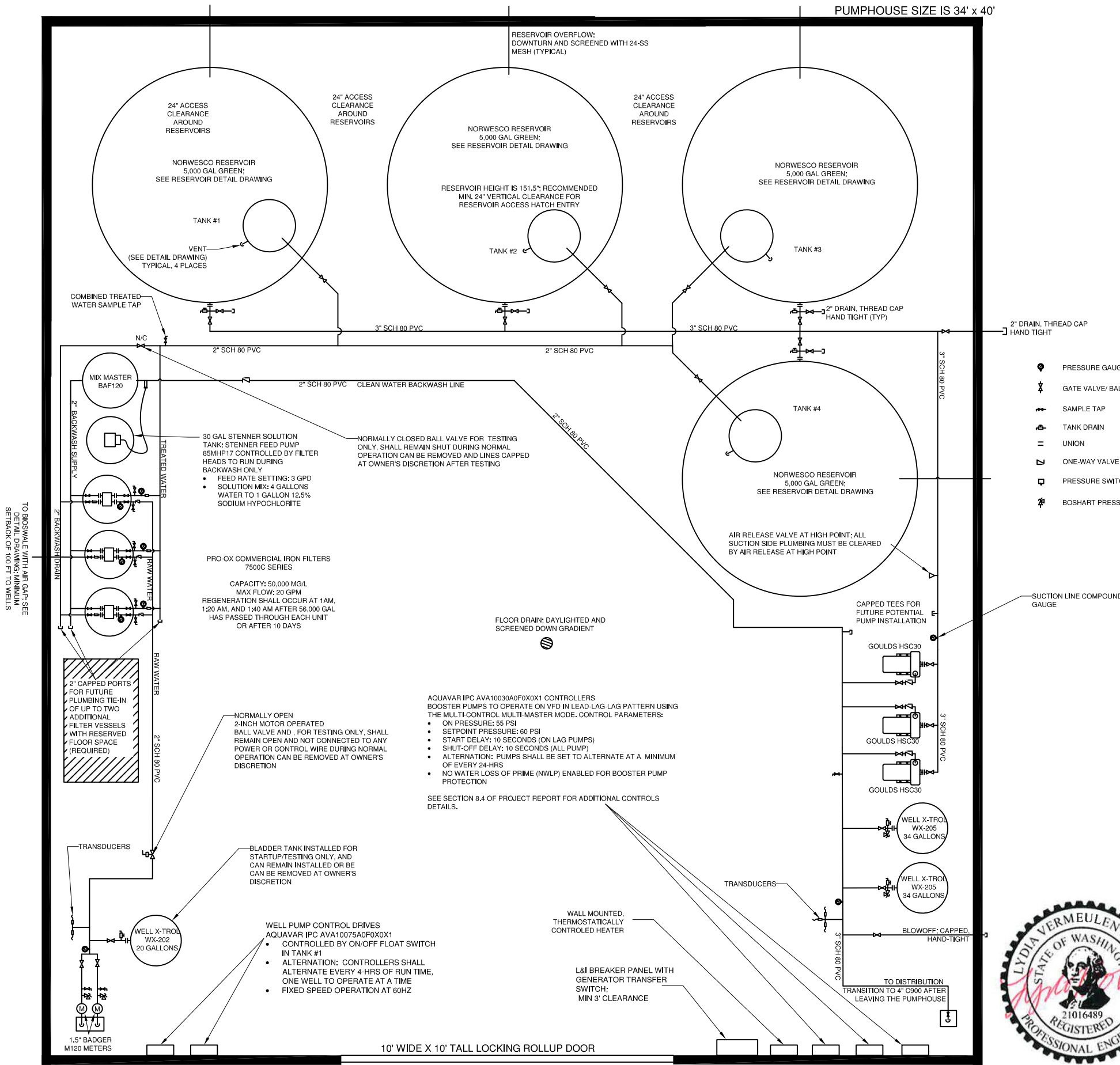
*MANUFACTURER'S MARKETED TANK SIZE IS 5,000 GALLONS WHICH DOES NOT INCLUDE EMPTY DOME VOLUME ABOVE THE ACCESS HATCH. TOTAL VOLUME OF EACH TANK IS ESTIMATED TO BE 5112 GALLONS.

DOWN TURNED VENT DETAIL



REVISION		TITLE		
DESCRIPTION	DATE	5,000-GALLON NORWESCO CROSS SECTION		
PRELIMINARY	1/13/23	FILE NO. 200701	FILE NAME TANK SECTION	SHEET NO. OF
		DATE MARCH 15, 2023	SCALE 3/4" = 1'	
NORTHWEST WATER SYSTEMS DESIGN-CONSULTING-MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958				

PUMPHOUSE SIZE IS 34' x 40'



PUMPHOUSE LAYOUT IS SCHEMATIC AND DOES NOT IN ALL CASES SHOW THE ACTUAL LAYOUT OF EQUIPMENT. NOT EVERY FITTING IS SHOWN.

ALL PLUMBING SHALL BE 2" NOMINAL DIAMETER SCH 80 PVC, UNLESS OTHERWISE NOTED GALVANIZED SCHEDULE 40 IRON PIPE MAY BE SUBSTITUTED FOR SCHEDULE 80 PVC EQUIVALENT MATERIALS MAY BE SUBSTITUTED UNLESS OTHERWISE NOTED

PUMPHOUSE SHALL BE EQUIPPED WITH A VENT, AN OVERHEAD LIGHTS AND AT LEAST ONE DUPLEX OUTLET EQUIPPED WITH A GFI.

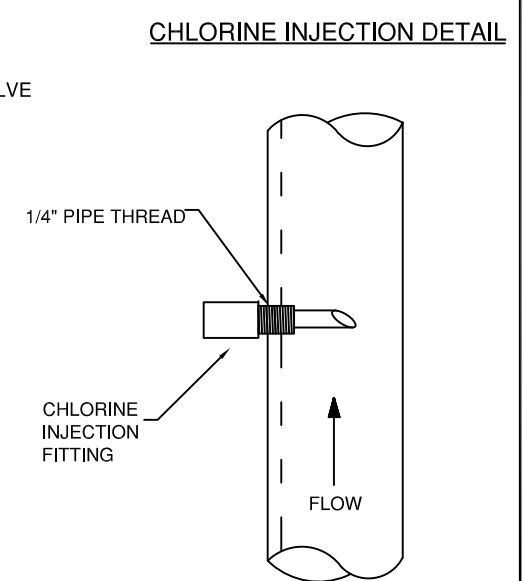
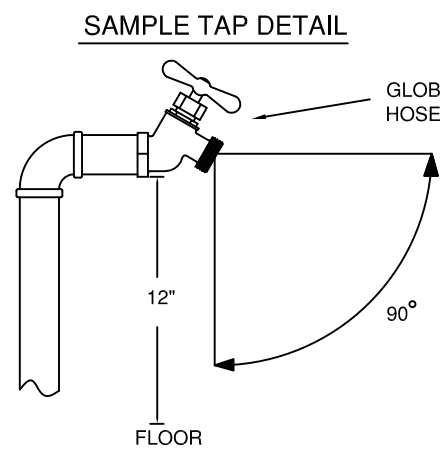
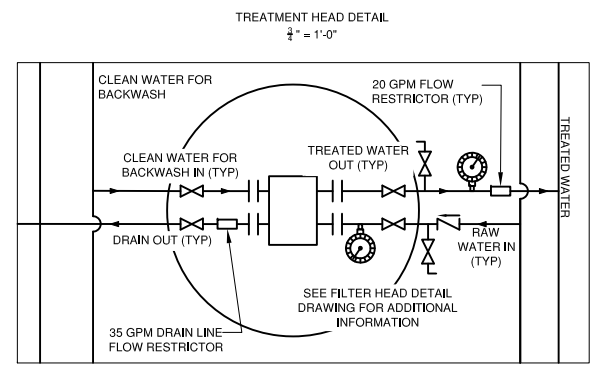
ASME VIII PRESSURE RELIEF VALVE IS REQUIRED FOR BLADDER TANKS OVER 37.5 GAL GROSS VOL.

ALL COMPONENTS IN SUBSTANTIAL CONTACT WITH POTABLE WATER SHALL BE NSF CERTIFIED

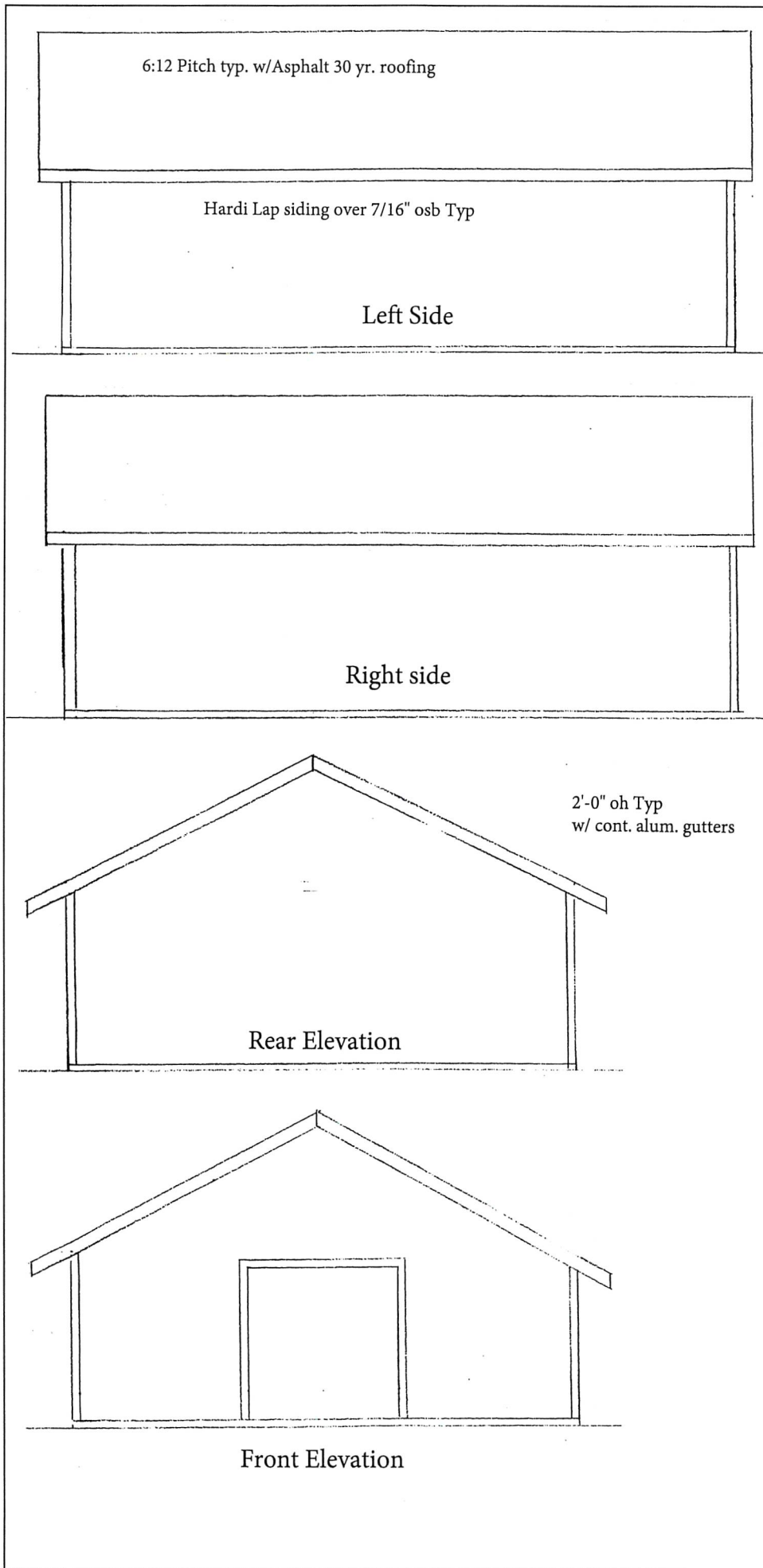
PUMPHOUSE LAYOUT MAY VARY AS LONG AS THE INTENT OF THE DESIGN IS MET; THE INSTALLER SHALL LOCATE EQUIPMENT AND PLUMBING TO FACILITATE EXPANSION OF BUILDING AND INSTALLATION OF ADDITIONAL BOOSTER PUMP AND TWO ADDITIONAL FILTER VESSELS.

ALL VALVES SHALL BE NORMAL OPEN (N/O) UNLESS OTHERWISE LABELED AS NORMALLY CLOSED (N/C)

- PRESSURE GAUGE (LIQUID FILLED) 0-100 PSI
- ⊕ GATE VALVE/ BALL VALVE
- ⊕ SAMPLE TAP
- ⊕ TANK DRAIN
- ⊕ UNION
- ⊕ ONE-WAY VALVE
- ⊕ PRESSURE SWITCH
- ⊕ BOSHAUT PRESSURE RELIEF VALVE RVNBO7-100NL



REVISION		TITLE		
DESCRIPTION	DATE	SHADOW CREEK WATER SYSTEM		
PRELIMINARY DRAFT TO DOH	6/29/2021	FILE NO. 200701	FILE NAME EQUIPMENT	SHEET NO. 1 OF 1
CHANGE WELL PUMP VFD CONTROLLER SET POINT TO 60 GPM (57.2 HZ)	11/23/2022	DATE APRIL 13, 2021		SCALE 1/4" = 1'
CHANGE TANK SIZE TO 5,000-GAL ADD RESERVE SPACE FOR TWO ADDITIONAL FILTER VESSELS	03/15/2023	NORTHWEST WATER SYSTEMS, INC. DESIGN - CONSULTING - MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958		
AS-BUILT CHANGES	9/8/2023			



STRUCTURAL NOTES

CONTRACTOR, OWNER, AND FRAMER ARE TO THOROUGHLY REVIEW THESE DOCUMENTS AND THEIR RELATIONSHIP TO THE ARCHITECTURAL PLANS. IF THERE ARE ANY QUESTIONS, OR DISCREPANCIES ABOUT THE NOTES, DETAILS, OR PLANS, CONTACT THE ENGINEER OF RECORD AT THOMPSON ENGINEERING (509) 987-1599.

These structural notes supplement the drawings. Any discrepancy found among the drawings, these notes, and the site conditions shall be reported to the Engineer, who shall correct such discrepancy in writing. Any work done by the Contractor after discovery of such discrepancy shall be done at the Contractor's risk. The Contractor shall verify and coordinate the dimensions among all drawings prior to proceeding with any work or fabrication. The Contractor is responsible for all bracing and shoring during construction. All construction shall conform to the applicable portions of the latest edition of the 2018 International Building Code except where noted.

Construction Stability:

The design, adequacy and safety of erection bracing, shoring and all temporary supports is the sole responsibility of the Contractor, and has not been considered by the Engineer of Record. The Contractor shall provide the bracing necessary to provide stability to the structure prior to the completed application of the lateral resisting system. During construction, the Contractor shall keep loads within the design roof and floor load limits indicated below.

Design Criteria:

1. Live Load = 25 PSF (Snow)
2. Dead Load = 15 PSF (Roofs) = 10 PSF (Wood Walls) = 150 PCF (Concrete)
3. Wind : 2018 IBC
 - a. Basic wind speed = 110 mph
 - b. V-wind speed = 85 mph
 - c. Risk category = "II"
 - d. Exposure category = "B"
 - e. Internal pressure coefficient = +0.55/-0.55
4. Earthquake: 2018 IBC
 - a. Risk category = II
 - b. Importance factor "I" = 1.0
 - c. Spectral response acceleration parameter $S_s = 1.327$
 - d. Spectral response acceleration parameter $S_1 = 0.545$
 - e. Site classification = "D"
 - f. Spectral response acceleration parameter $S_{ds} = 0.885$
 - g. Spectral response acceleration parameter $S_{d1} = \text{null}$
 - h. Seismic design category "D2"
 - i. Seismic response coefficient $CS = 0.127$
 - j. Response modification factor = 6.5
 - k. Basic force resisting system = bearing walls-"K"
 - l. Design procedure = Simplified analysis
5. Soil = 1500 PSF, Assumed Bearing Capacity

Foundation

1. All footings shall be founded on native undisturbed soil.
2. **Optional:** A continuous 4" diameter perforated footing drain shall be placed around the entire perimeter of the foundation and installed as shown on the drawings. The footing drain shall be sloped and terminated at an approved location down hill of the structure.
3. Pressure-treated studs: Use 1/2" diameter X 10" ASTM A307 anchor bolts at 72" on center with pressure treated 2x nominal thickness plates, unless otherwise noted on the foundation plan.
4. All anchor bolts shall use 3" square X 1/4" thick steel plate washers.

Concrete & Reinforcing Steel:

1. All concrete work shall be per the 2018 IBC Chapter 19. Tolerances shall be per IBC Chapter 19, Section 07. Mixing, placement, and inspection shall be per Sections 03, 04, 05, and 06.
2. Cement: ASTM C150, normal-Type I or I-II.
3. Coarse or fine aggregate: ASTM C33.
4. All reinforcing shall be ASTM A615 Grade 40 for #4 bars or smaller and Grade 60 for #5 bars or larger.
5. Use 24" elbow bars at all footing and stemwall corners and intersections at horizontal continuous reinforcement.
6. Admixtures: Water reducers-ASTM C494, Type A. Air entrainment-ASTM C260 and ASTM C494, with no chlorides. Concrete shall be in accordance with ASTM 150. Do not use calcium chloride, fly ash or related materials. $f'c = 2500$ PSI @ 28 day-5-1/2 sack mix-3/4" maximum size aggregate. Slump = 5" maximum, 6" max Air entrained.

Carpentry:

1. Structural 2x 4 framing shall be #2 Doug-Fir.
2. Roof trusses shall be by a pre-approved manufacturer and constructed according to the specifications of the Truss Plate Institute. Contractor and Truss Manufacturer are responsible for all bracing of the trusses including end wall bracing and all other bracing between the building and the trusses unless specifically shown otherwise on the drawings.
3. Sheathing at roofs shall be laid with face grain perpendicular to supports and end joints staggered 4'-0" on center. Provide 1/8" space between panel edges as required by sheathing Manufacturer's. Roof sheathing shall be nailed with 8d box nails at 6" o.c. edges and 12" o.c. in the field unless otherwise noted on plans.

CAUTION

PLACE TRUSSES PER MANUFACTURER'S RECOMMENDATIONS. BRACE PER RECOMMENDATIONS.

CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY BRACING AND SHORING REQUIRED DURING PLACEMENT OF TRUSSES.

CONTRACTOR IS REQUIRED TO FIELD VERIFY ALL CONDITIONS AND ALL ELEVATIONS.

TYPICAL SHEAR-WALL NOTES

All wall sheathing shall be 15/32" CDX plywood, 7/16" OSB (with studs at 16" o.c.), or as called out below, with exterior exposure plus and span rate "S2 24" or better. (5/8" T1-12 siding is an acceptable substitution except where 5/8" or thicker sheathing is specifically called out in the schedule below). Sheathing may be installed either horizontally or vertically.

All nails shall be per table below. Nail size and spacing at all sheathing edges shall be as required in shear-wall schedule below.

Nail Type	Diameter (inches)	Length (inches)
Ed box	0.113	2-1/4
10d box	0.128	3
16d sinker	0.148	3-1/4
8d common	0.131	2-1/2
10d common	0.148	3

ALL SHEARWALL FRAMING LUMBER SHALL BE #2 DOUG-FIR SPECIES MATERIAL.

SHEAR-WALL SCHEDULE

Sheathing nailed with 8d box at 6" on center all edges = 260 plf.

ADDITIONAL SHEAR WALL NOTES:

- Blocking is required at all horizontal edges of sheathing. Sheathing edge nailing is required at all hold-down posts.
- Intermediate framing is to be minimum 2x members with nailing at 12" on center.
- Double 2x studs nailed together with (2) rows of 10d's at 4" o.c. may be used in place of a single 3x stud, unless other wise required in hold-down schedule below.

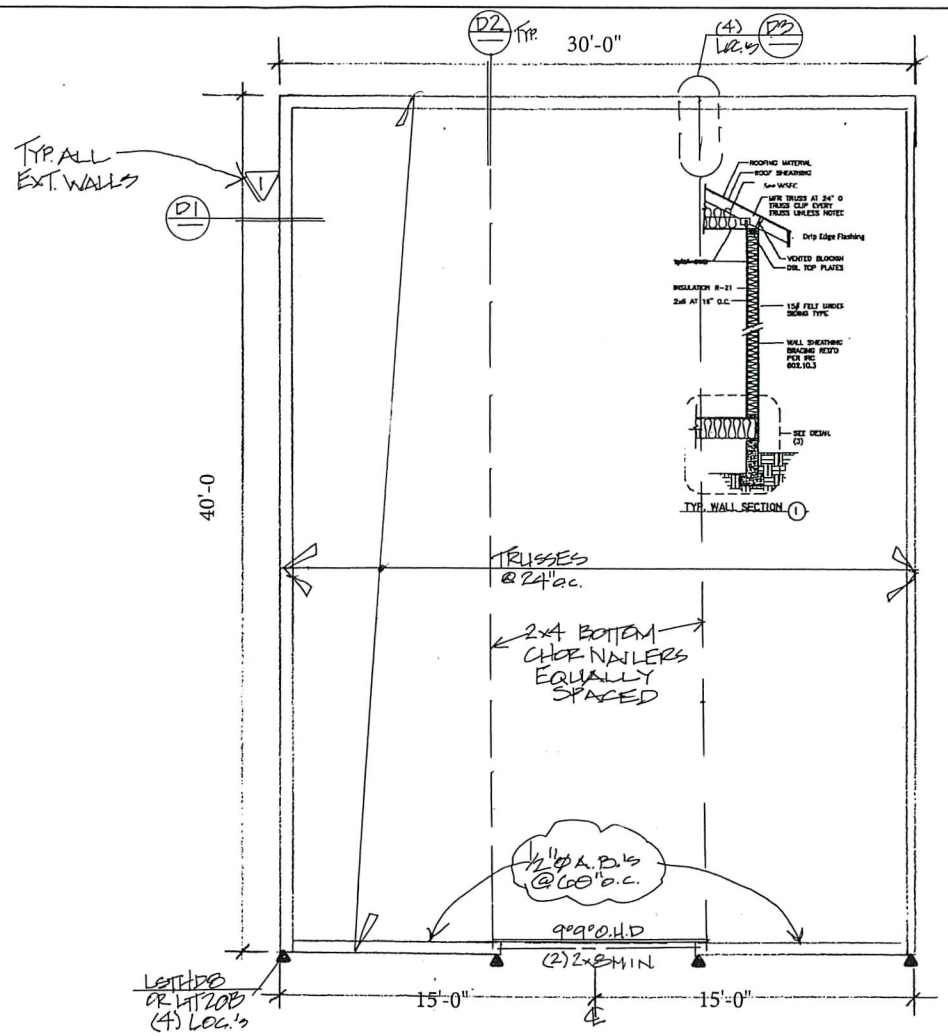
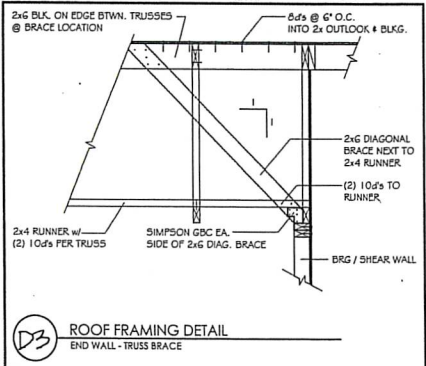
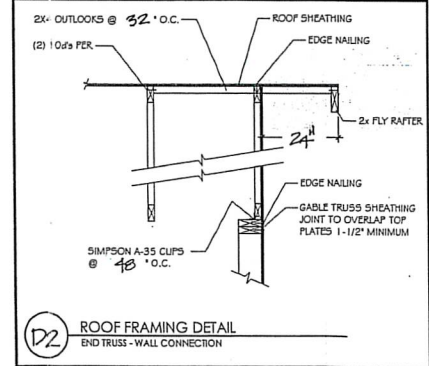
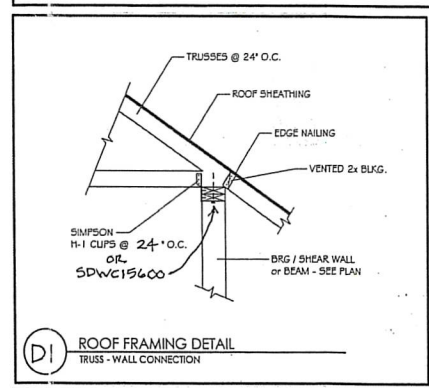
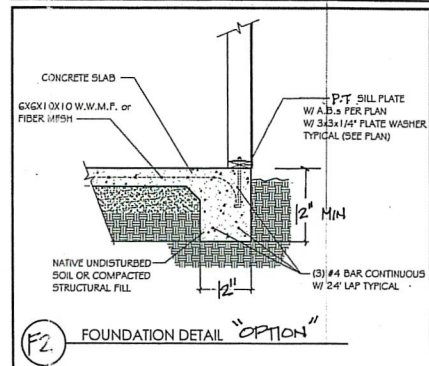
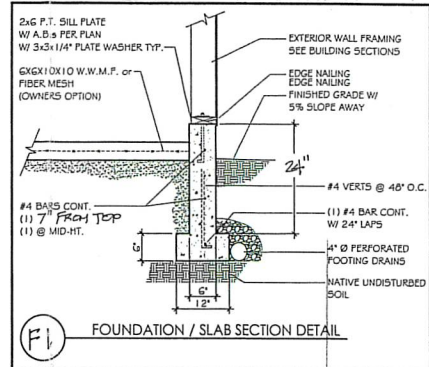
HOLD-DOWN SCHEDULE

Hold-downs shall be Simpson "Strong Tie" and shall be installed per the manufacture's recommendation.

All double or triple studs (ALLOWED PER HOLD-DOWN SCHEDULE BELOW) shall be nailed together with (2) rows 10d's staggered at 4" on center each row for each layer.

LST208/LST208B--embeds a minimum of 8 inches into concrete foundation and to a double 2x6 stud with (16) 16d sinker nails in wall above.

LFT208 attaches to concrete foundation with a 5/8" diameter bolt 10" minimum into concrete. LFT208 attaches to double 2x studs with (10) 16d SINKER nails in wall above.

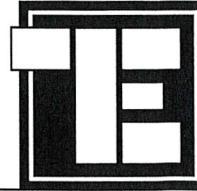


Floor Plans 1/4" = 1'-0" typ

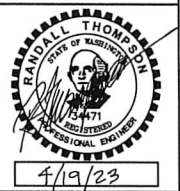
Notes:
 Down spout to drain to splash blocks Count. ridge vent at Ridge
 2x6 D.F. 16" o.c. Ext Walls Typ. w/ 7/16" osb nailed 6"/12"
 7/16" osb Roof sheathing nailed 6"/12"
 Insul. walls & ceiling for freeze protection

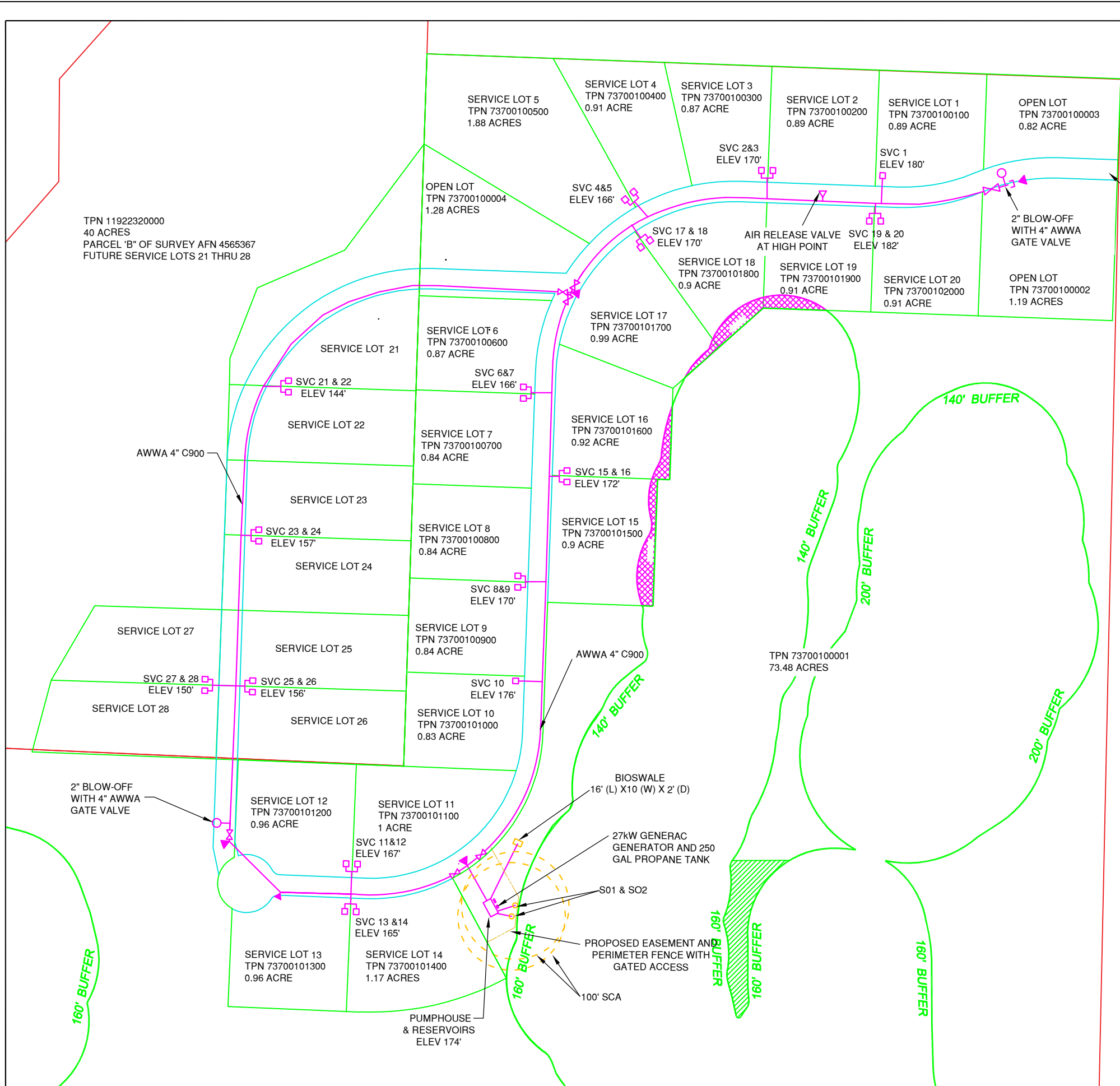
THURSTON COUNTY RECEIVED
 APR 20 2023
 BUILDING DEVELOPMENT CENTER

ATTENTION:
 ALL ENGINEERING CALLOUTS ON THESE PLANS MUST BE STRICTLY FOLLOWED! NO EXCEPTIONS! ANY CHANGES OR MODIFICATIONS MUST BE PRE-APPROVED BY THE ENGINEER OF RECORD!



THOMPSON ENGINEERING, INC.
 541 JORDAN LN RICHLAND, WA 99352
 PHONE: (509) 987-1599 email: rthompsonengineering@yahoo.com
 SCALE: PROJECT #23-082 DRAWN BY: REVISIONS:
 DATE: SHADOW CREEK PUMP HOUSE REVISED:
 STRUCTURAL PLAN, NOTES & DETAILS DRAWING NUMBER: SHEET S1 OF 1
 4/19/23





- LEGEND
- SERVICE CONNECTION
 - BLOW-OFF
 - ⊗ GATE VALVE
 - ▶ THRUST BLOCK

THIS IS NOT A SURVEY. PROPERTY LINES AND ELEVATIONS SHOWN ARE BASED UPON THE AVAILABLE INFORMATION (THURSTON COUNTY MAP) AND ARE APPROXIMATE ONLY. SITE INFORMATION PROVIDED BY: THE CLIENT

DISTURBANCE OF EXISTING SURVEY MONUMENTS IS A GROSS MISDEMEANOR UNDER RCW 58.04.015

WATER LINES TO BE 4" AWWA C900

IF POTABLE WATER PIPE IS WITHIN 10 FEET OF SEPTIC COMPONENTS, THE WATER PIPE MUST BE SLEEVED.

PUBLIC WATER SYSTEM RESPONSIBILITY ENDS AT THE DOWNSTREAM SIDE OF THE METER. HOMEOWNER TO MAINTAIN SERVICE LATERAL. ANY FUTURE REPLACED LATERALS SHALL BE OF SAME SIZE, OR LARGER.

SEE THRUST BLOCK, TRENCH, DISINFECTION, SERVICE CONNECTION, AND BLOWOFF DETAILS FOR FURTHER GUIDANCE.

IF REQUIRED, THE CONTRACTOR MUST CALL FOR UTILITY LOCATE WITH AT LEAST 2 BUSINESS DAYS OF NOTICE (BUT NO MORE THAN 10 DAYS) BEFORE DIGGING BEGINS. THE CALL CENTER NUMBER IS 800-424-555.

WATER MAINS SHALL HAVE MINIMUM 1' CLEARANCE BETWEEN OTHER UTILITIES AT CROSSING.

FITTINGS SHALL BE MECHANICAL JOINTS OR COMPRESSION STYLE; SOLVENT WELDED JOINTS ARE PROHIBITED FOR PIPE SIZES LARGER THAN 2-IN

NOT ALL REQUIRED FITTINGS ARE SHOWN; ALL FITTINGS FOR MAINS EQUAL TO OR OVER 4-IN DIAMETER SHALL BE CLASS D, CAST IRON, SHORT BODY TYPE ACCORDING TO AWWA STANDARD C110. FITTINGS SHALL BE EITHER CAST IRON FITTINGS, FLANGE END, WITH FLANGE ADAPTERS SUITABLE FOR JOINING PVC PIPE FOR DUCTILE IRON FITTINGS, OR MECHANICAL JOINTS.

ALL PLUGS, CAPS, TEES, BENDS, AND VALVE BODIES INSTALLED WITH PIPE 4-IN AND OVER IN SIZE OR WHEN SPECIFIED ON THE DRAWING SHALL BE RESTRAINED WITH CONCRETE REACTION BLOCKING OR TIE-DOWNS AS SHOWN ON THE DETAIL DRAWING "HORIZONTAL RESTRAINT BLOCKING". BLOCKING SHALL NOT OBSTRUCT ACCESS TO FITTINGS OR PIPE JOINTS. ALTERNATIVELY, MECHANICAL FULLY RESTRAINED JOINTS ARE ACCEPTABLE.

WATERLINES TO LOCATED IN COUNTY RIGHT-OF-WAY OR PRIVATE EASEMENT. ALL PRIVATE EASEMENTS FOR ALL WATER SYSTEM INFRASTRUCTURE SHALL BE GRANTED TO THURSTON PUD UPON TRANSFER OF OWNERSHIP.

THE BIOSWALE OR THE TREATMENT INFILTRATION SYSTEM SHALL BE LOCATED A MINIMUM OF 100FT AWAY FROM THE WELLS

DRAWN BY: ANNA NELSON, EIT CHECKED BY: DOUG PIEHL, PE	SYSTEM SHADOW CREEK WATER SYSTEM	OWNER THURSTON PUD
REVISION	FILE NO. 200701	FILE NAME SITE MAP
DATE MARCH 6, 2021	SHEET NO. 1 OF 1	SCALE 1" = 200'
NORTHWEST WATER SYSTEMS, INC. DESIGN - CONSULTING - MANAGEMENT P.O. BOX 123 PORT ORCHARD, WA 98366 (360) 876-0958		
WELL SITE INSPECTION 05/26/2021 PRELIMINARY DRAFT TO DOH 06/29/2021 UPDATE LOCATION AND WETLAND 11/12/2021 REVISED TO INCLUDE SVCS 21-28 11/16/2022 AND TPN 11923320000 IN SVC AREA 03/15/2023 LOOP TIE-IN IN FRONT OF LOT 17 07/07/2023 AS-BUILT CHANGES FOR LOTS 1-20 04/9/2025 UPDATED LOTS WITH TPNs		