

**Utilities Committee Meeting Agenda**  
**August 12, 2019**  
**9:30 a.m. at City Hall - Room #306**

- Stormwater Comprehensive Plan (2021) - Update
- Geiger/Blueberry Sewer Service Area (WSUD) - Discussion
- McCormick Water Campus - Discussion:
  - McCormick Communities Agreement
  - City of Bremerton (580 & 260 ILA)
  - SKFR
- Utility Department Work Plan - Update:
  - Foster Pilot Project & Water Rights 2019/2020
  - Well #13 Drilling
  - Well #13 - Mains & PRV's
  - Well #13 – Maple Avenue (Water Main & Well #6)
  - Well #11 Construction - Discussion
  - McCormick Sewer Pump Station #2
  - Water System Plan 2019
  - Albertson's Sewer Pump Station
  - Marina Sewer Pump Station
- Well No. 9 - Update
- McCormick Sewer Pump Station #1 - Update
- Next Meeting: September 16, 2019

**Future Agenda Items:**

- NPDES Ph. 2 Permit 2019 Annual Report - Discussion
- 2019-2024 NPDES Permit Draft Comments - Update
- 2017-2018 City Hall Boiler/HVAC - Update
- Bay Street - Street Lighting & Marquee - Update
- Touch-Read Water Meters - Update
- Water System Fluoridation - Update
- Grease Trap Program Implementation - Update
- Fire Hydrant & Valve Repair/Maintenance Program - Update
- Fire Hydrant/Valve Operation & Maintenance - Update
- Sanitary Side Sewer Policy - Discussion

## **City of Port Orchard**

### **Stormwater Comprehensive Plan**

Currently:

Preparing for planning by comparing plans from other small – medium waterfront communities

September, 2020:

Selection process for consulting firm

December, 2021:

Plan completion and adoption

2022:

City Comprehensive Plan



~~2021~~  
2019

# Stormwater Comprehensive Plan



<https://marinas.com/view/harbor/vwtne> Port Orchard Harbor Port Orchard WA United States

City of Port Orchard

Public Works

4/6/2019

## Executive Summary

Urban stormwater continues to be a significant source of water pollution and a public health concern (EPA, 2017). As communities grow and develop their local economies, they look for justifiable and effective approaches to reduce these existing and emerging sources of pollution. This can be accomplished through comprehensive planning. Comprehensive planning is a process that determines community goals and aspirations in terms of community development. This Stormwater Comprehensive Plan (SCP) is intended to provide a framework to guide the City of Port Orchard (City) Stormwater Utility Program (Utility) as it grows and adapts to changing government and society.

Since the Washington State Department of Ecology (Ecology) issued its first Phase II National Pollution Discharge Elimination System (NPDES) permit to the City in 2009, stormwater management requirements have increased significantly (Ecology, 2018). Population within the City has increased as well due to annexations and urban development. These facts, when coupled with Port Orchard's aging infrastructure, have increased the need for a refined comprehensive plan to manage City stormwater utilities and Best Management Practices (BMPs).

In 2012, an additional requirement was outlined in the form of a Total Maximum Daily Load (TMDL) Water Quality Implementation Plan (WQIP) for Sinclair and Dyes Inlet (Ecology, 2012). This plan is focused on reducing Fecal Coliform (FC) bacteria levels in Sinclair Inlet and its tributaries. Three streams (Blackjack, Annapolis and Karcher Creeks) have been identified within City limits as contributing FC bacteria to the nearshore environment of Sinclair Inlet (Ecology, 2012). Since the plan was enacted, these numbers have been improving or remaining stationary annually within City streams (KPHD, 2017).

The City owns and operates a comprehensive system of drainage pipes, treatment facilities and other assets that manage stormwater runoff. This infrastructure prevents damage to private property and public infrastructure and helps to protect water quality and wildlife habitat. The City is faced with the challenge of managing stormwater cost-effectively while also preventing adverse impacts. In addition, recent state and federal stormwater regulations make it technically and financially challenging to address these issues while balancing ratepayer costs.


The intent of this SCP is to detail an approach that the City will use to address specific requirements such as Stormwater Program Management and Stormwater Utility operation and maintenance (O&M). Another goal of the SCP is to outline how the City is addressing stormwater financial elements and capital facility needs.

## Stormwater Program Description

While the City has always worked to maintain its stormwater facilities and conveyances, A formal Stormwater Utility Program was not initiated until 2008. The Utility is responsible for funding the maintenance and operation of City stormwater

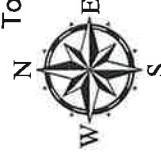


## Geiger-Blueberry Subarea

-  Existing Sewer Service Area  
 Proposed Service Area

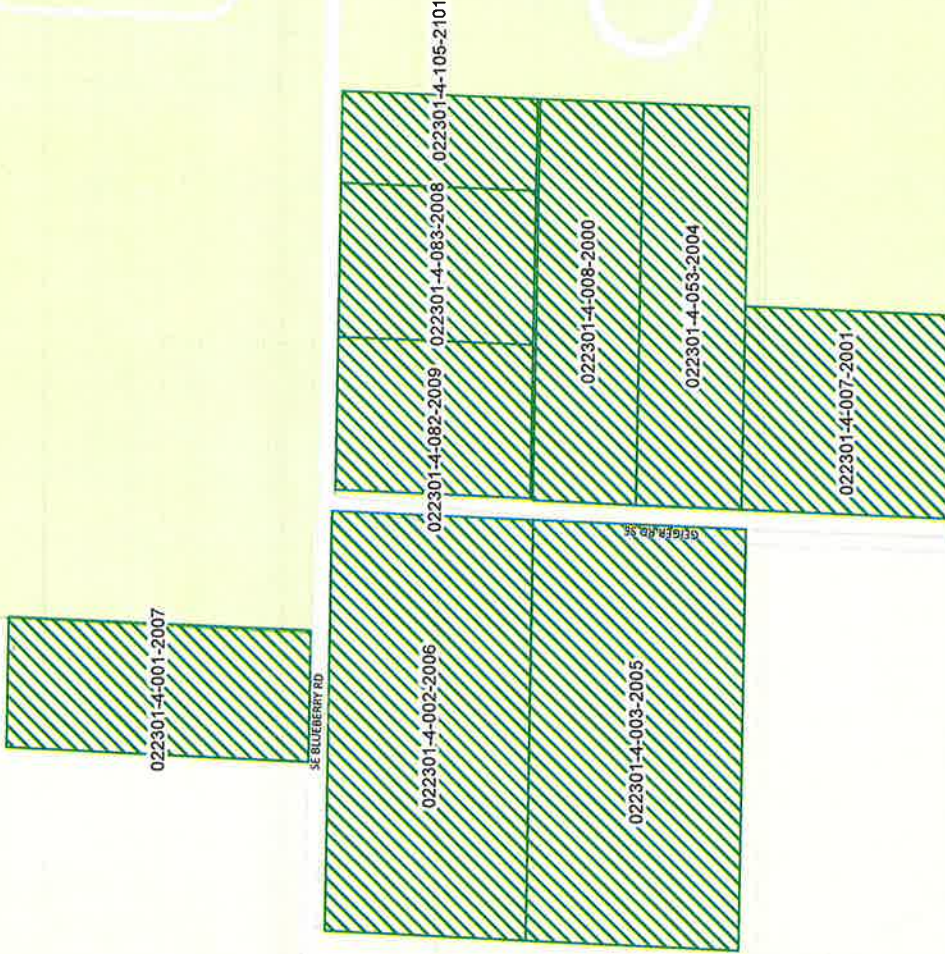
Tax Parcel ID	ACRES
022301-4-001-2007	2.19
022301-4-002-2006	4.75
022301-4-003-2005	4.98
022301-4-007-2001	2.35
022301-4-008-2000	2.3
022301-4-053-2004	2.37
022301-4-082-2009	1.67
022301-4-083-2008	1.69
022301-4-105-2101	1.01

Total Acres: 24.1



0 150 300 600 US Feet

**West Sound**  
 UTILITY DISTRICT  
 2924 SE Lund Ave  
 Port Orchard WA, 98366  
 PHONE# 360-876-2545









## **City of Port Orchard**

### **Foster Pilot Project and Water Rights**

Cost of completion of the Foster Pilot Project has increased due to the initial hydraulic modeling results. New estimates indicate that we will need  $\pm$  \$500,000 for additional work required to complete the Foster Pilot Project.

Jacki attended her first Watershed Restoration and Enhancement Committee meeting last week. The Department of Ecology has issued the final guidance for determining Net Ecological Benefit for watershed planning – the first step in planning watershed restoration projects to mitigate potential impacts of pumping water from permitted wells.

We are still waiting for the Department of Ecology to respond to the water rights change applications. Our water rights attorney contract will need to be renewed in the near future.

(updated May 30, 2019)

Item	Timeline	Notes
<b>Define Work Plan Objectives and Timeline</b>	Jan-Feb 2019	updated
Draft to Ecology and Suquamish Tribe	January 22, 2019	Send update with new COPO contact info to ECY and Stakeholders
Meeting with Ecology	January 29, 2019	Complete
<b>Cost Reimbursement Agreement (CRA)</b>	Before Ecology review of draft ROE Late 2019/early 2020	Ecology verbally OK'd streamlined approach; Need confirmation by contract
<b>Population/Demand Projections and Water Use Efficiency Report</b>	Updated 3-29-2019	To share with stakeholders, w/ new COPO contacts
<b>Grants for Port Orchard Mitigation Projects</b>	Due date likely October 1, 2019 for 2020 grant cycle	See WAC 173-566 Adoption expected by 5-31-2019
<b>Complete Impact Analysis for Pilot Project</b>	Mid-late June 2019	Robinson Noble completing transient model runs; Joe Becker to consult with John O'Leary, Suquamish Tribe re model margin of error
<b>Tier 1 Avoidance Analysis - <u>conservation</u></b>		NA per Ecology
<b>Tier 2 Minimization Analysis – in kind water replacement and “not reasonably attainable”</b>	June-July	RN and engineering firm TBD Consider adding Westwater Research to team for replacement water investigation
<b>Tier 3 Compensation Analysis</b> <ul style="list-style-type: none"> <li>• Funding</li> <li>• Review NEB guidance from ECY</li> <li>• Project selection</li> </ul>	<ul style="list-style-type: none"> <li>• ?</li> <li>• June</li> <li>• June-July</li> </ul>	<ul style="list-style-type: none"> <li>• Need COPO approval of contract scope for RN &amp; ESA</li> <li>• Need updated PSA for Tom Pors</li> </ul>
Tribal/WDFW analysis of positive effects of Blackjack Creek HP on fish habitat	June-October	Tribal and WDFW staff comment letters?
ESA to draft NEB analysis and finding	September-November?	
Meetings re draft mitigation sequence findings	August through December?	3 monthly meetings suggested
<b>Drafting of monitoring and reporting conditions</b>	October-November	Request templates from Ecology and 3d parties
Replacement water monitoring		
Habitat monitoring		Streamflow Restoration Grants?
<b>Drafting of compliance and assurance conditions</b>	October-November	Request templates from Ecology and 3d parties



(updated May 30, 2019)

<b>Port Orchard JARPA application for BCHP</b>	Draft JARPA before ROE	Develop project schedule and funding plan
<b>Draft ROE</b>		Include in scope of CRA
Preliminary draft to Tribe	March 2020	
Draft ROE to Ecology	April 2020	
Ecology public notice (?) and ROE issuance	May to June 2020	
<b>Ecology Report to JL Task Force</b>	October 2019	Status update to ECY
<b>JL Task Force Report/Recommendations to Legislature</b>	November 15, 2019	?



BHC Consultants, LLC  
1601 Fifth Avenue, Suite 500  
Seattle, WA 98101

206 . 505.3400  
206 . 505.3406 (fax)  
www.bhcconsultants.com

July 31, 2019

Mike Pleasants, P.E.  
City of Port Orchard  
Port Orchard, WA 98366

Re: Preliminary Well 13 Cost Estimates

Mike:

Below is a preliminary cost break out of the 5 sub-projects for Well 13.

Construction Projects

Site Preparation: Final cost = **\$484,000**

Well Drilling: Initial driller contract cost = \$1,400,000  
Estimated additional costs due to deeper well = \$475,000  
Total Well Drilling Estimated Cost (includes sales tax) = \$1,875,000 say  
**\$2,000,000**

Maple Avenue: From the attached June 23, 2016 BHC estimate for Maple Avenue improvements, the transmission main pipe replacement cost = \$774,000 and the road reconstruction was \$185,000.  
Subtotal = \$959,000  
Tax (9%) = \$86,000  
Contingency (15%) = \$157,000  
**Total = \$1,200,000**

PRVs: Assume the cost to furnish and install (complete) each package PRV, including tax = \$100,000  
**Total = \$300,000**

Site Upgrades: From the attached June 23, 2016 BHC estimate, the Well 13 site treatment and site work  
Subtotal = \$1,300,000  
Additional costs not shown – ShakeAlert (\$50,000) and Sedgwick Tank modifications for incoming water pipe from treatment building (\$50,000).  
Adjusted Subtotal = \$1,400,000  
Tax (9%) = \$126,000



Contingency (15%) = \$229,000  
**Total = \$1,760,000**

Total Preliminary Construction Cost Estimate = \$5,750,000

Engineering Fee = \$950,000 say \$1,000,000

**TOTAL CONSTRUCTION and ENGINEERING COSTS = \$6,750,000**

**Low End of Range (-10%) = \$6,080,000**

**High End of Range (+15%) = \$7,760,000**

Disclaimer: The opinion of probable cost herein is based on our perception of current conditions at the project location. This opinion reflects our professional opinion of costs at this time and is subject to change as the project design progresses. BHC Consultants has no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. BHC Consultants cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the costs presented as shown."

Sincerely,  
BHC Consultants



John Gillespie  
BHC Project Manager

cc:

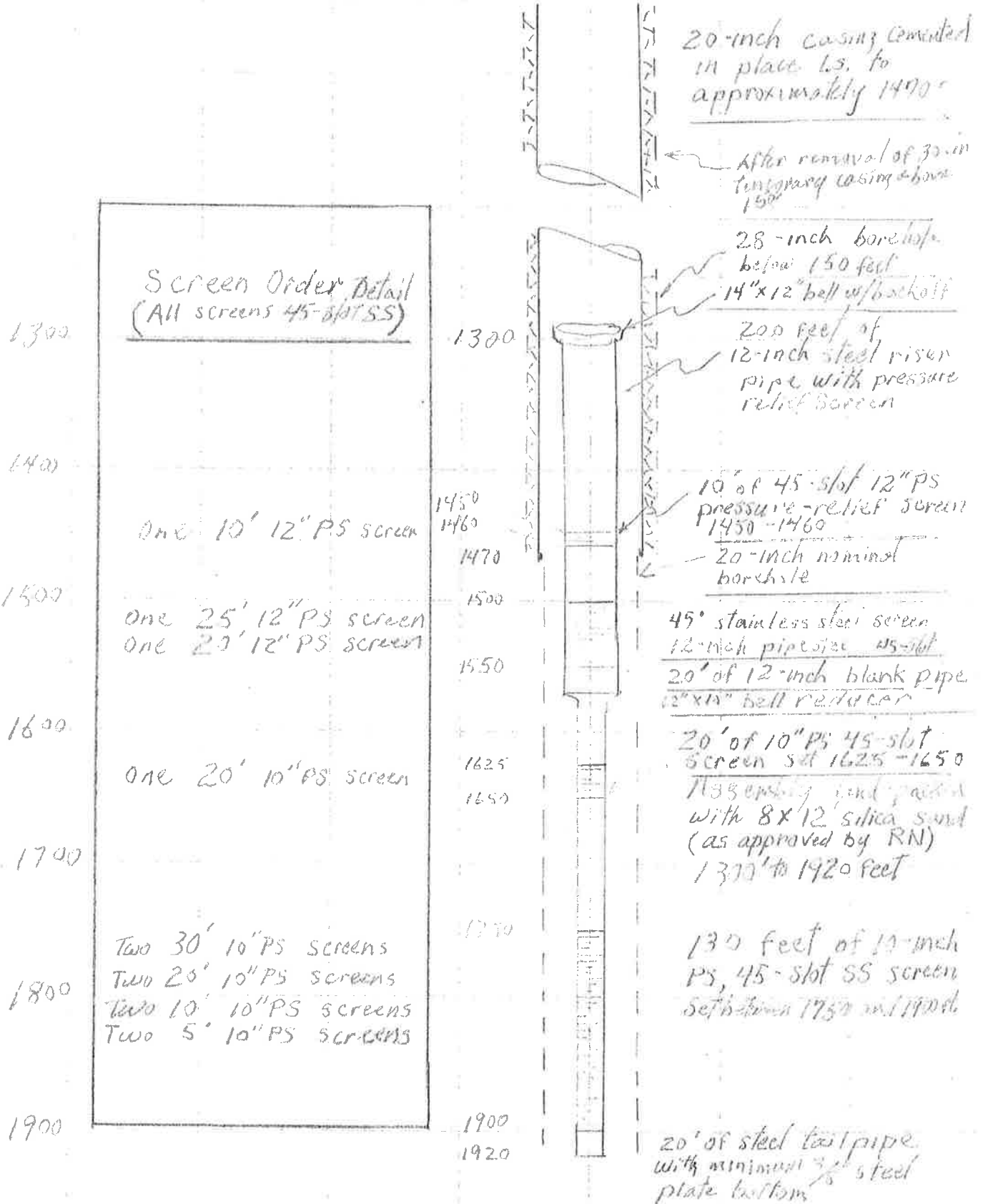
Attachments: July 23, 2016 BHC Well 13 Preliminary OPCC

WELL 13 PROJECT - TOTAL PROJECT COSTS			
ELEMENTS	Well 13 Project Cost	"Well 10" Project Costs	Notes
1 Property - Owned by City	\$ -	\$ -	No project costs
2 Water Rights		\$ -	Separately contracted with Robinson Noble
3 Well Development			
Access Road, Site Clearing	\$ 20,000		Allowance - engr. design req'd to develop basis of design
Well Driller to develop well	\$ 680,000	\$ 700,000	Well 13 - Robinson Noble est. 4/25/2016. (Well 10 - \$700,000).
Mitigation			Allowance required - TBD following USGS modelling
Well Design and Oversight - Robinson Noble	\$ 122,000		Robinson Noble estimate 4/25/2016
Subtotal, Item 3	\$ 822,000	\$ 700,000	
4 Well 13 Site, Treatment and Site Work			
Well pump, motor, pitless adapter, column, cable, check valve	\$ 157,000		6/20/16 quote \$157K [Pumptech]. Incl install & start-up.
Treatment for Mn, H2S	\$ 375,000		\$250K ATEC + 50% piping/install.
B/wash Disposal: Detention Basin	\$ 50,000		Allowance - engr. design req'd to develop basis of design
B/wash Disposal: 2,000' of 6" (\$100/ft) to sewer	\$ 200,000		Thru ex. power line ROW/unpaved area. Rvw on-site alternates.
Chlorine Storage and Feed	\$ 20,000		Allowance - engr. design req'd to develop basis of design
Fluoridation	\$ 10,000		Allowance - engr. design req'd to develop basis of design
E/I&C allowance, well/treatment systems	\$ 122,000	15%	
Structural - Building. 1,100 sf @ \$150/sf	\$ 165,000		Well - 180 sf. Treatment - 700 sf. Total 880 * 1.25 = 1,100 sf.
Civil - Site work - siting, roads, grading	\$ 50,000		Allowance - engr. design req'd to develop basis of design
Site Power (Transformer, etc.)	\$ 20,000		Allowance - engr. design req'd to develop basis of design
Yard Piping	\$ 20,000		Allowance - engr. design req'd to develop basis of design
Fencing	\$ 20,000		Allowance - engr. design req'd to develop basis of design
Startup & Testing	\$ 10,000		Allowance - engr. design req'd to develop basis of design
Stormwater Handling	\$ 20,000		Allowance - engr. design req'd to develop basis of design
Mobilization, Demobilization	\$ 62,000	5%	
		\$ 280,000	Well 10 Site Improvements
		\$ 1,321,800	Treatment/Site Improvements at Well 6 Site
Subtotal, Item 4	\$ 1,301,000	\$ 1,601,800	Subtotal, Well 10 Site and Treatment
5 Reservoir - Not required	\$ -	\$ -	
6 Perry Ave North Upgrades- Well 10 Project		\$ 389,600	Road Reconstruction - No longer included in project.
		\$ 487,000	Water Pipeline - No longer included in project.
Subtotal, Item 6	\$ -	\$ 876,600	Subtotal, Well 10 Project - Perry Ave North Upgrades
7 Transmission Piping - 390 Zone to 260 Zone			
2,600' of 12" pipeline at \$150/ft.	\$ 390,000	\$ 345,300	Route: East side Blackjack Creek ravine (south end of cemetery) north to Well 6 site for connection to 260 Zone plping.
Mechanical added cost	\$ 78,000	20%	
Cemetery slide stabilization	\$ 306,000	\$ 44,300	Contractor quote. 53 piles, 5' o.c., 24'-34' in length.
Subtotal, Item 7	\$ 774,000	\$ 389,600	Subtotal, Well 10 Transmission Piping and Slide Stabilization
8 Maple Avenue Reconstruction	\$ 185,000	\$ 185,400	Allowance - engr. design req'd to develop basis of design
Subtotal, Item 8	\$ 185,000	\$ 185,400	Subtotal, Well 10 Maple Avenue Reconstruction
9 Well 6 Site Improvements	\$ 50,000		Allowance - engr. design req'd to develop basis of design
Subtotal, Item 9	\$ 50,000	\$ -	Included in Item 4, above
Subtotal, Well 13 Project	\$ 3,132,000	\$ 3,753,400	
Allowance For Unspecified Equipment	\$ 626,000	20%	\$ 750,680
Subtotal	\$ 3,758,000		\$ 4,504,080
Sales Tax	\$ 327,000	8.7%	\$ 391,855
Construction Cost	\$ 4,085,000		\$ 4,895,935
Engineering/Construction Management	\$ 1,226,000	30%	\$ 1,468,780
TOTAL	\$ 5,311,000		\$ 6,364,715
Low end of range	\$ 3,983,000	-25%	
High end of range	\$ 7,967,000	50%	
Prepared by:	BHC Consultants		
	Charles Dougherty, PE		
Date:	June 23, 2016		
Reviewed by:	Jim Gross, PE and Ron Dorn, PE		
Date:	June 23, 2016		





# City of Port Orchard - Well 13 Production Well Amended Schedule B 7-31-17





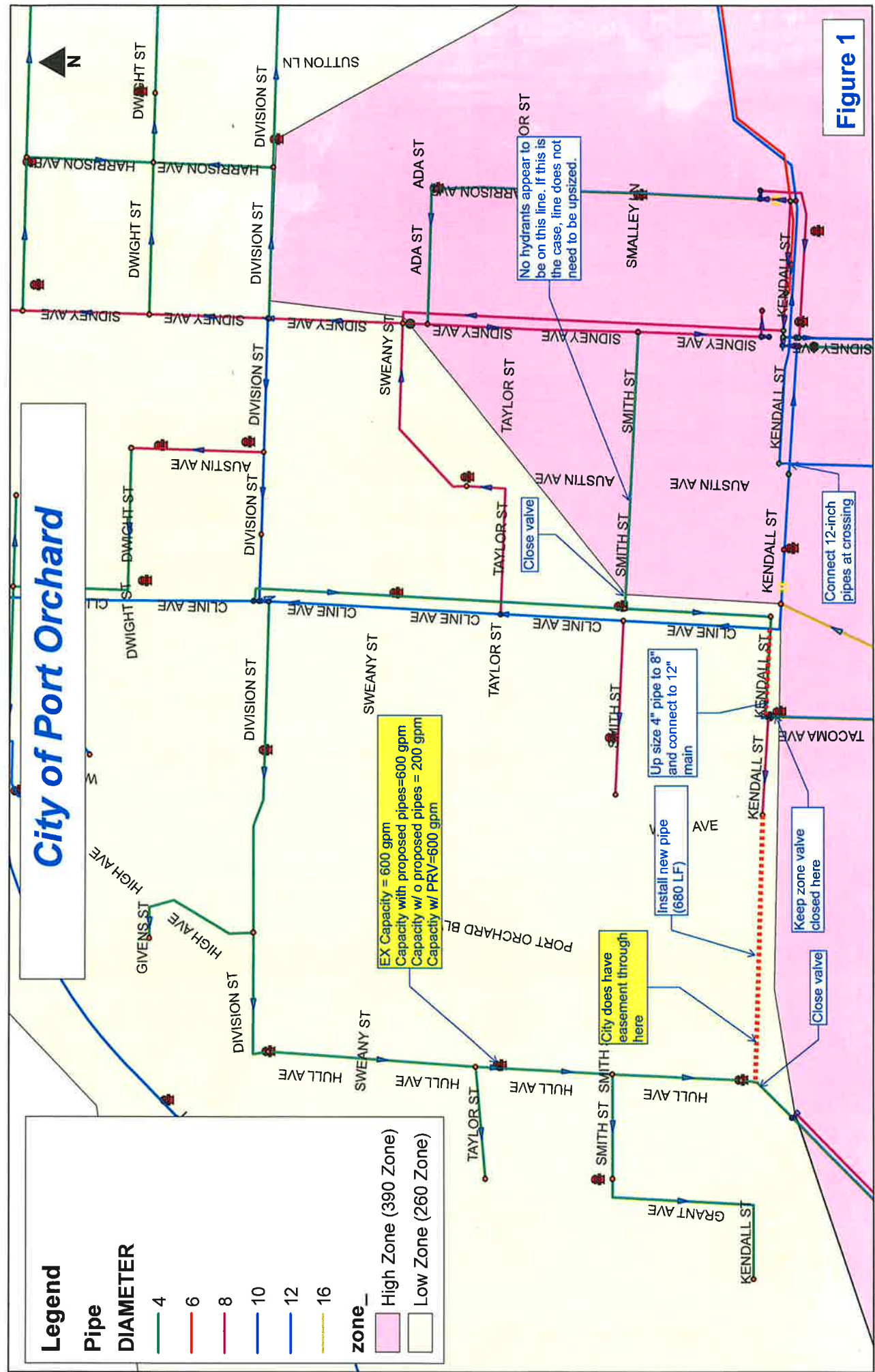




Figure 2



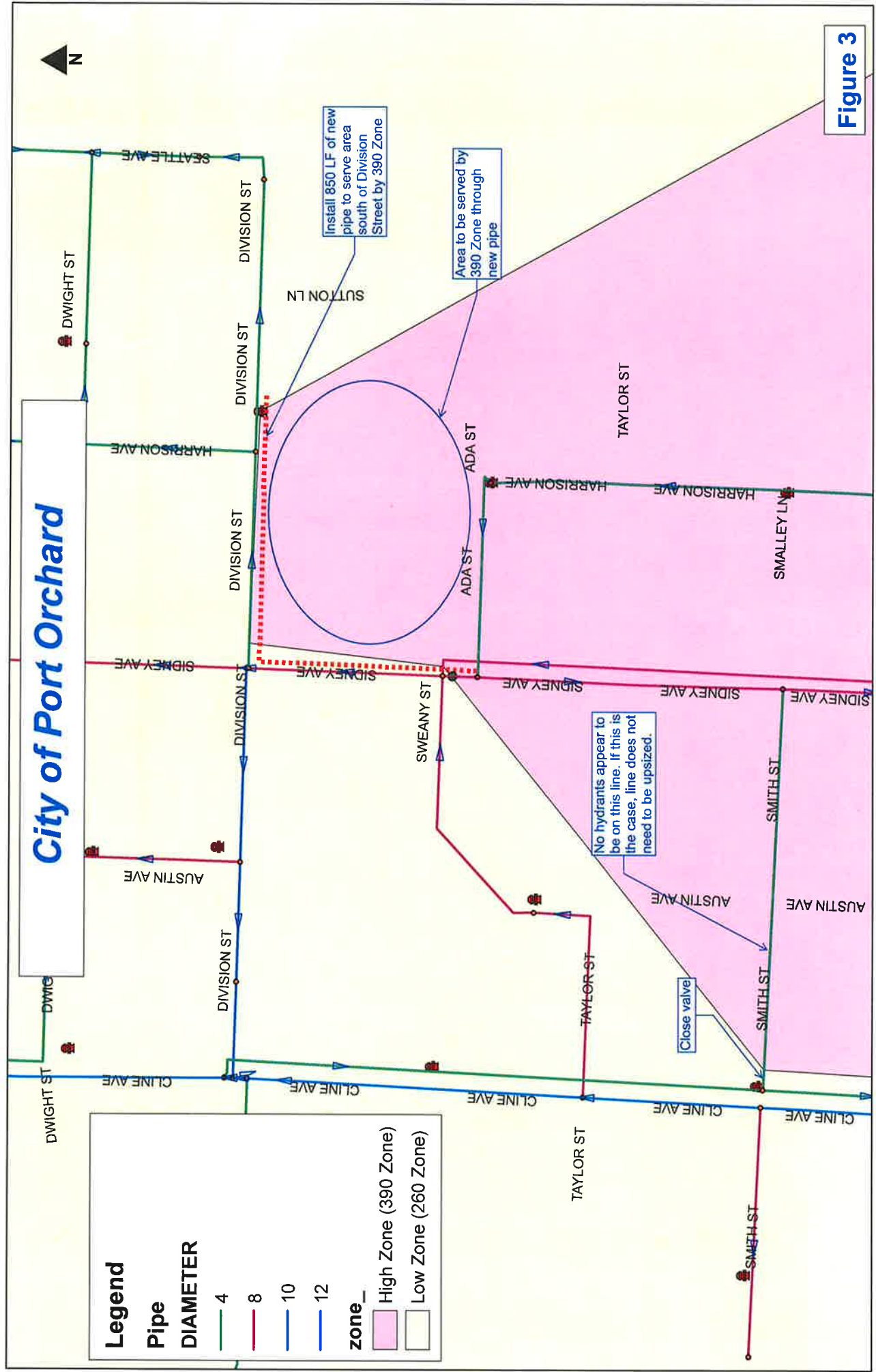
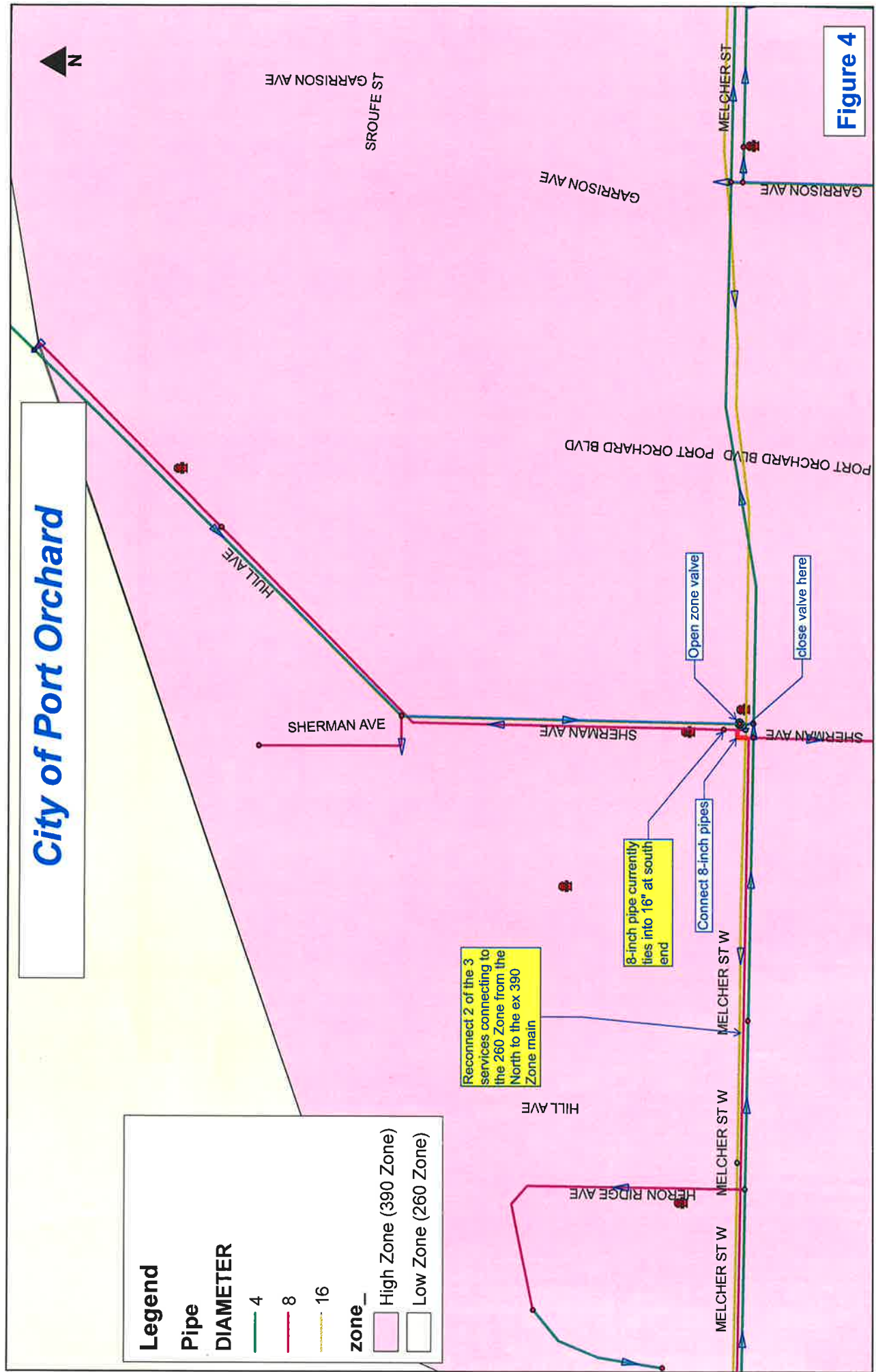


Figure 3



**Figure 4**

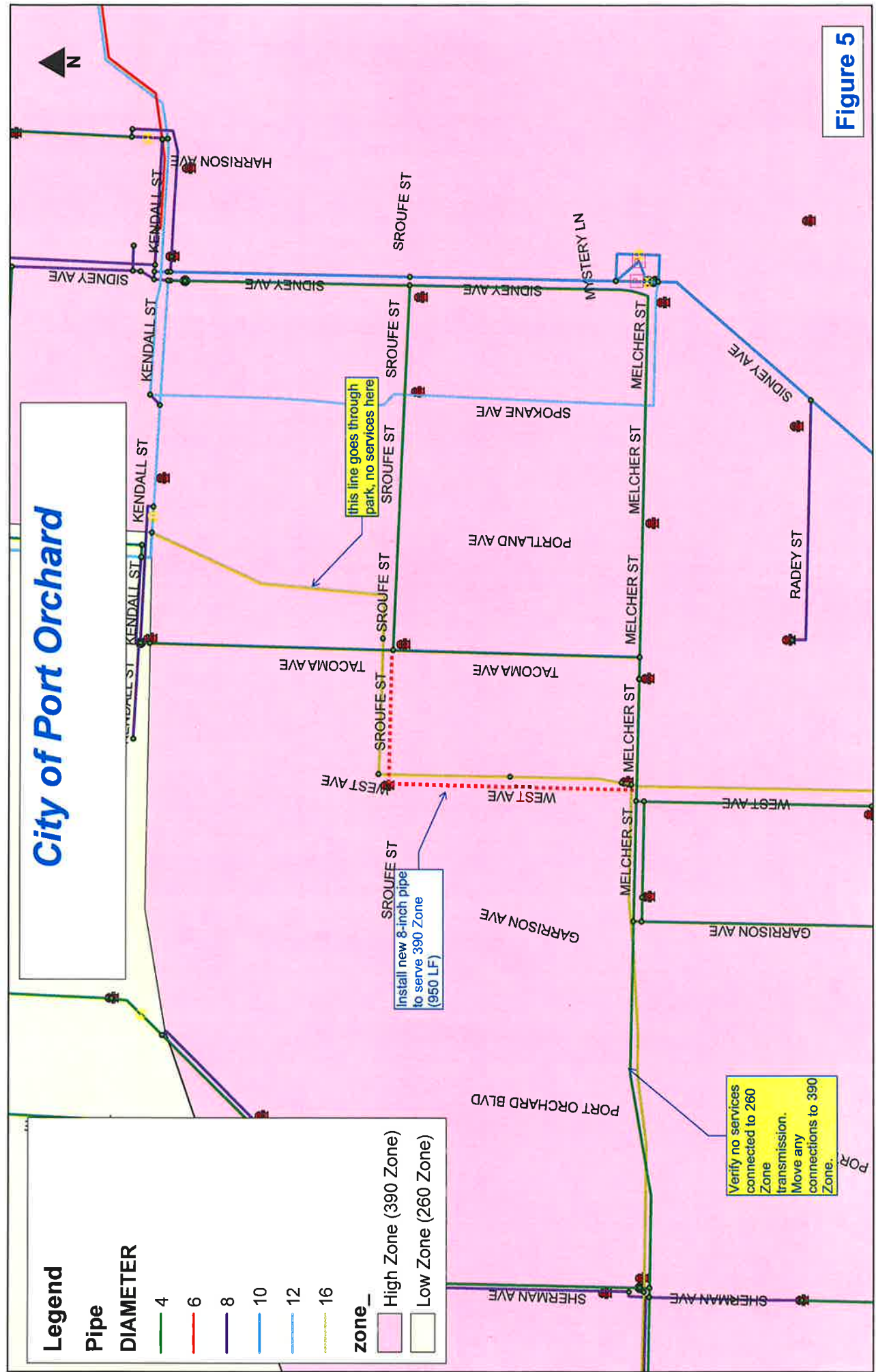
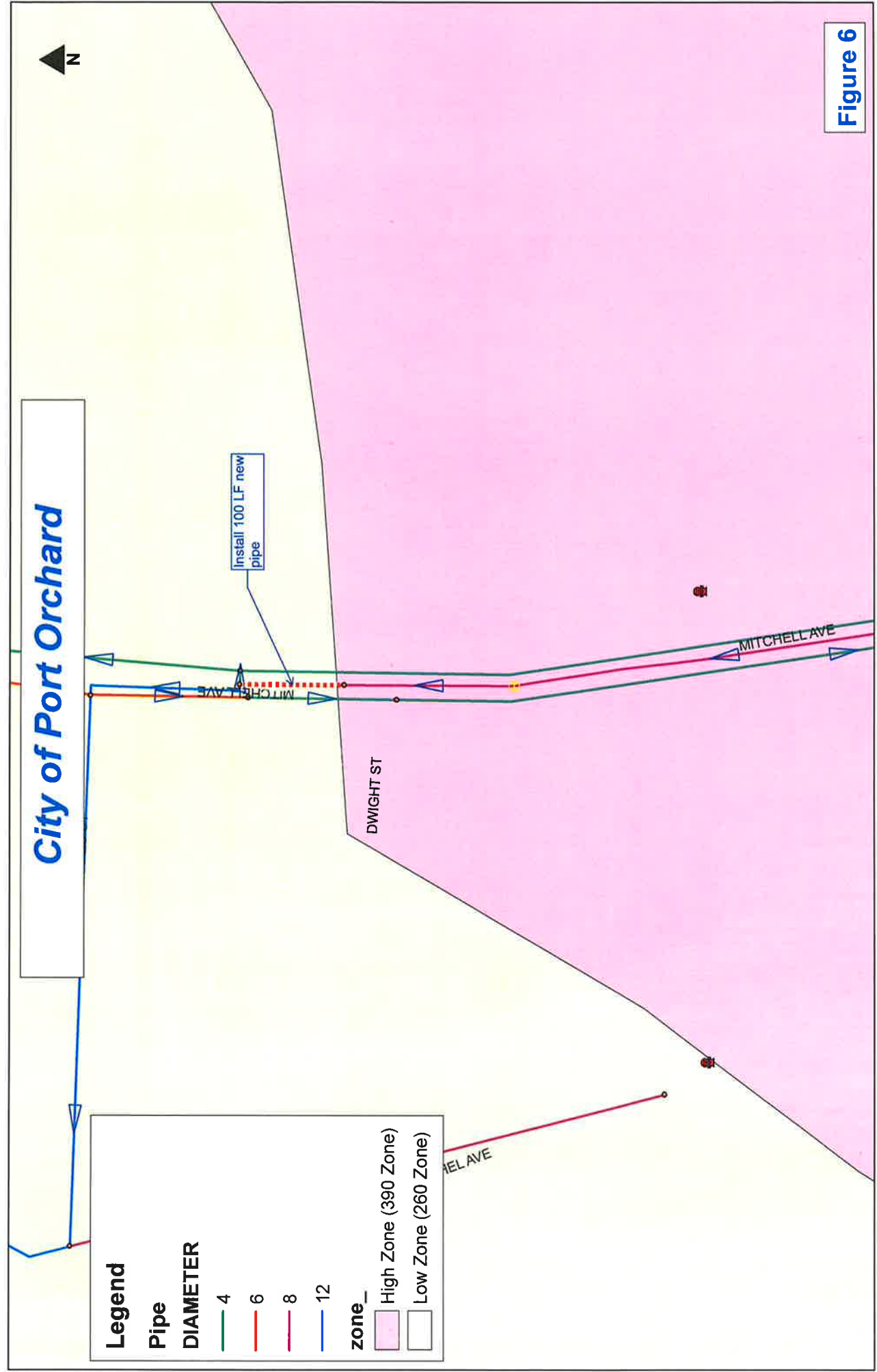


Figure 5





# City of Port Orchard Existing Zones

## Legend

**Pipe**  
— Transmission

## ZONE

— 390

— 260

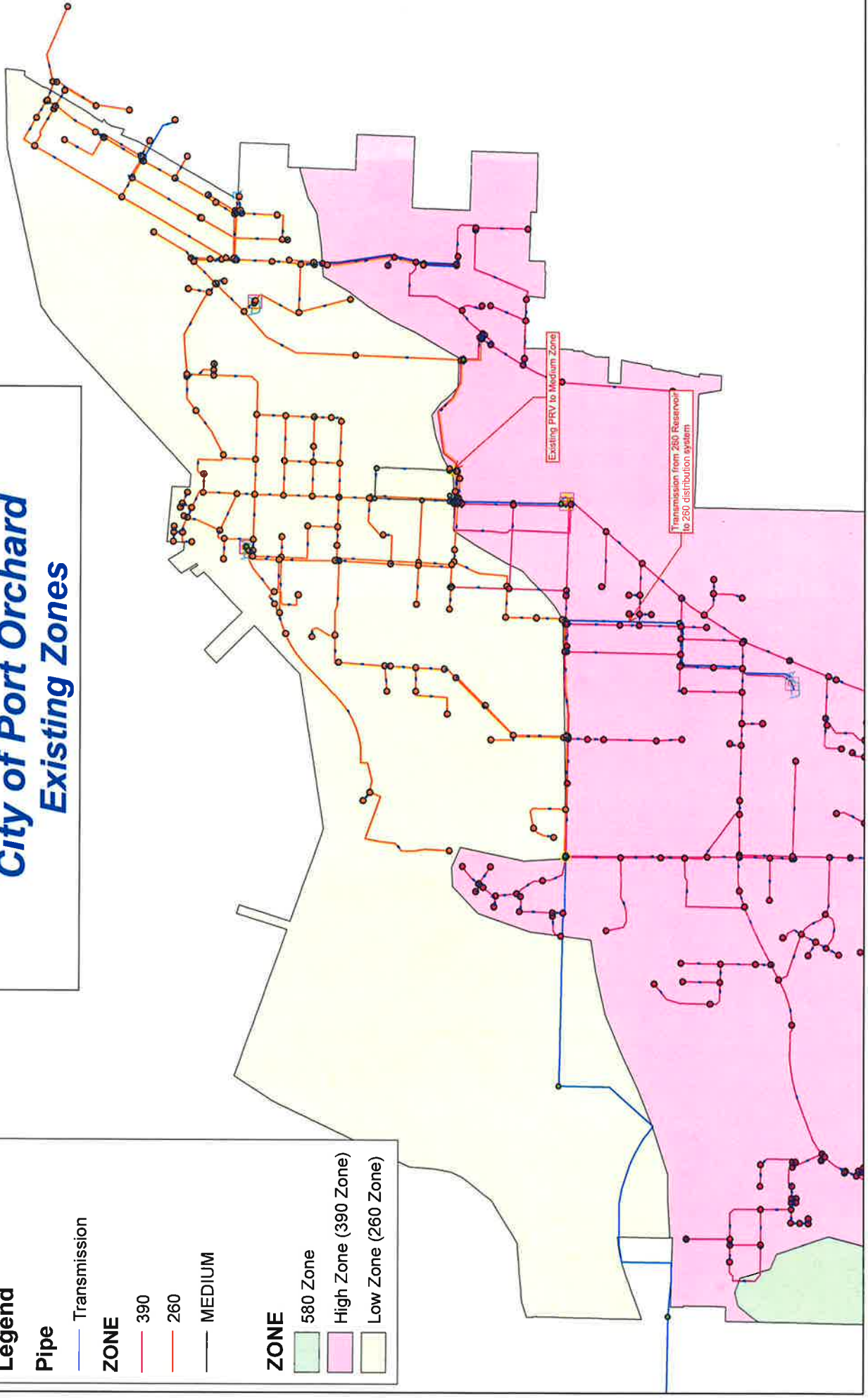
— MEDIUM

## ZONE

580 Zone

High Zone (390 Zone)

Low Zone (260 Zone)



# City of Port Orchard Proposed Rezone

## Legend

### Pipe

— Transmission

### ZONE

— 390

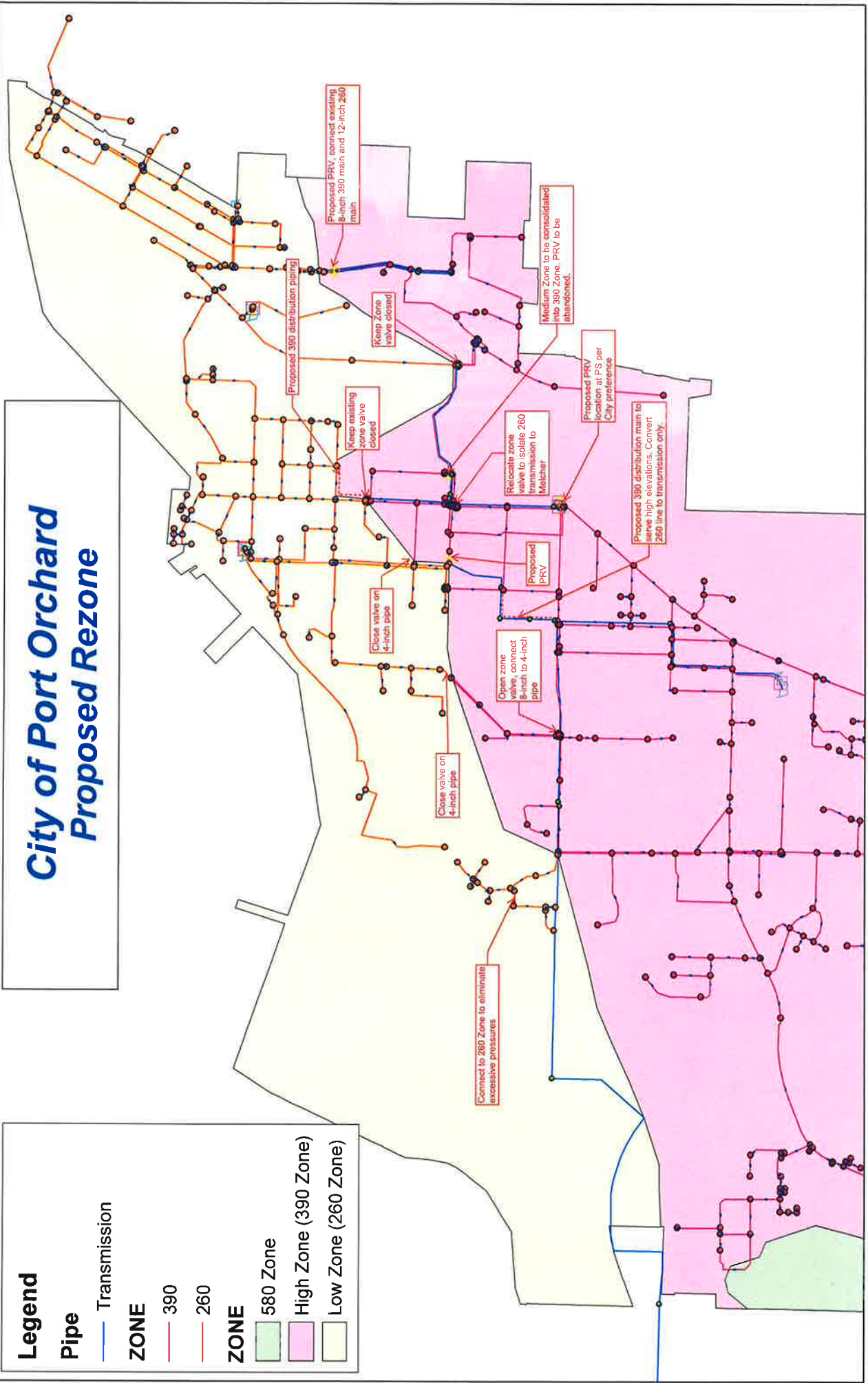
— 260

### ZONE

580 Zone

High Zone (390 Zone)

Low Zone (260 Zone)





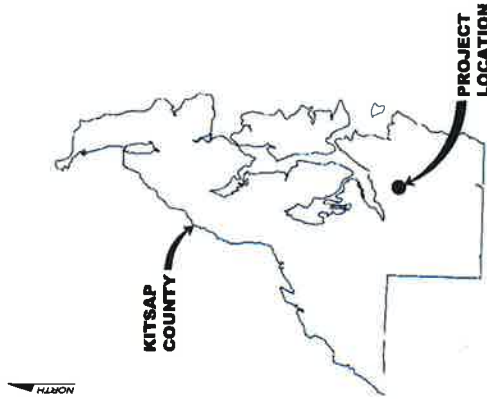


**CITY OF PORT ORCHARD  
MAPLE AVENUE IMPROVEMENTS AND  
WATER MAIN REPLACEMENT  
CONTRACT NO. CXXX-XX PROJECT NO. PW201X-XXX**

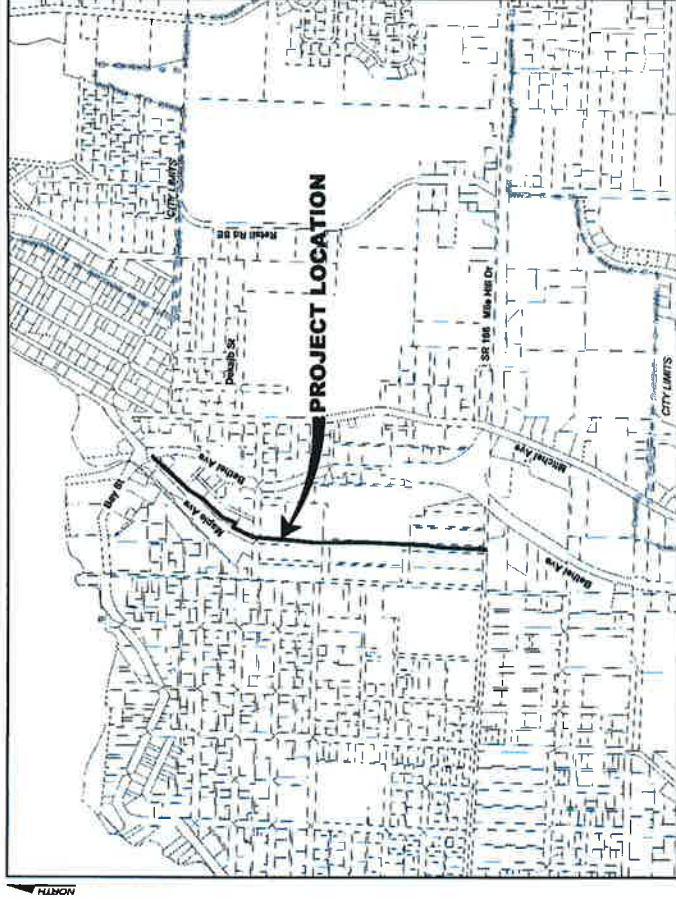
**APRIL 2019**

**Preliminary  
30% Review Set**  
Not For Construction  
04-2019

**PROJECT LOCATION MAP:**  
NTS



**VICINITY MAP:**  
APPROX SCALE: 1" = 500'



**PREPARED BY:**



BHC Consultants, LLC  
1601 Fifth Avenue, Suite 500  
Seattle, Washington 98101  
P 206.505.3400  
F 206.505.3408

**IN ASSOCIATION WITH:**

Environmental - Landau Associates  
Geotechnical / Survey - N.L. Olson & Associates, Inc.



## TECHNICAL MEMORANDUM

**Date:** August 6, 2019  
**To:** Mark Dorsey, PE, City of Port Orchard Public Works Director/City Engineer  
**From:** John Gillespie, PE  
**CC:** Mike Pleasants, PE, City of Port Orchard Assistant City Engineer  
Jim Gross, PE, BHC  
**Subject:** City of Port Orchard - Well 11 Campus Improvements Design, Bid Assistance, and Construction Management LOE and OPCC

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The City of Port Orchard (City) requested BHC to develop a high-level design, bid assistance, and construction management LOE, and opinion of probable construction costs (OPCC) for Well 11 Campus improvements based on a well production of 750 gpm. This was completed and a technical memorandum was submitted to the City on February 27, 2019. Based on recent information, the City has requested BHC to revise the February 27, 2019 Technical Memorandum to reflect a well production rate of 1,150 gpm.

The Well 11 improvements were identified in the August 28, 2018 Technical Memorandum by BHC to the City. The Well 11 improvements include:

- A small well house, well pump, valves, meter, and piping to convey well water to the new on-site booster pump station/water treatment building. A well has been drilled and capped.
- Booster pump station with water treatment systems. The pump station will pump water to a new on-site water tank. The treatment systems will include:
  - Filtration backwash system
  - Provisions for backwash water disposal
  - Fluoridation feed system
  - Chlorination feed system



The pump station will be a CMU or pre-fabricated building with the necessary mechanical and electrical support systems. An on-site standby generator is included.

- A water storage tank. BHC estimated a 500,000-gallon tank would be required for the 750 gpm rate. For the 1,150 gpm rate, BHC estimates a 750,000 gallon tank would be required. This will need to be confirmed during design. This improvement also includes the required inlet/outlet pipe(s).
- The City currently maintains and operates two 60,000-gallon concrete tanks, a small pump station, and three wells at the Well 11 Campus. The existing structures and wells would be re-purposed, decommissioned, and/or removed.
- Site piping will be required, including piping from the tank to the project site boundary and interconnection to the 580 pressure zone.
- Site development, to include site grading, access road improvements, stormwater management, security, lighting, landscaping, sewer routing, fencing, and parking.

#### **Design, Bid Assistance, and Construction Management Level of Effort**

Included in the design estimated cost are additional tasks required to support the design, which are:

- Permitting
- DOH approval (Source Approval for the well and a Project Report)
- Stormwater management

Since a number of project elements are similar to the proposed Well 12 Campus improvements, design costs from Well 12 were used for the design Level of Effort (LOE) for Well 11. The sub-consultants and LOE for Well 12 were used for the Well 11 design costs. The sub-consultants and their roles for Well 12 included:

- Robinson Noble – hydrogeologic services associated with the well development
- Landau Associates – environmental permitting
- NL Olson – surveying and geotechnical services

Assumptions used to develop the design, bid assistance, and construction management LOE costs are:





- Contractor will hire tank manufacturer to design water tank, tank foundation, and appurtenances. Tank manufacturer to secure required permits for tank. Design engineer to develop performance specifications for tank foundation and tank.
- Water system modeling will be needed for design.
- No public outreach included in the LOE.
- Water treatment, chlorination, and fluoridation systems to be designed by associated vendors.
- The three existing wells will be decommissioned, and the two concrete tanks and pump station will be demolished.
- Construction management LOE includes startup assistance, record drawings, and O&M manual.
- Design LOE is based on a drawing set that includes 58 drawings.
- Design and permitting effort to take 14 months.
- Bid and construction period to be 16 months.
- Plumbing and architectural design to performed by sub-consultants.
- Previously generated Well 12 DOH Source Approval (\$28,000) and Project Report (\$23,500) costs to the City dated December 5, 2018 were used.
- Bid Assistance includes coordination with Builder's Exchange, one addendum, pre-bid meeting attendance, and responses to contractor questions.
- Full time construction inspection not included.
- Two site visits per month during construction.
- Water rights assistance not needed.

The design and permitting LOE estimated cost = \$ 850,000

The bid assistance and construction management LOE estimated cost = \$ 250,000

**TOTAL ESTIMATED DESIGN, BID ASSISTANCE, and CONSTRUCTION MANAGEMENT  
COST = \$ 1,100,000**

#### **Opinion of Probable Construction Costs**



As mentioned above, the construction elements for Well 11 Campus are similar to Well 12 Campus, except Well 12 included the installation of a new water well.

The OPCC was based on the following assumptions:

- The OPCC for Well 11 Campus was based on the attached figure.
- The water treatment system is assumed to be provided by ATEC.
- The construction cost for the tank includes design for the foundation and tank.
- Sewer and water treatment backwash discharge water to connect to existing sewer main on St. Andrews Drive SW, approximately 1,000 feet from Well 11 site.
- Contingency = 25%
- The three existing wells will be decommissioned, and the two concrete tanks and pump station will be demolished.

Based on the Cost Estimate Classification system by the American Association of Cost Estimating, this OPCC would be classified as a Class 5 estimate. The characteristics of a Class estimates are:

- Maturity level of deliverables – 0% to 2%
- End Usage – concept or screening
- Expected Accuracy Range – Low: -20% to -50%  
High: +30% to +100%

OPCC Component Costs	
Well Development with well house and pump	\$200,000
Booster Pump Station with Treatment Systems	\$2,000,000
Water Tank (750,000 gallons)	\$1,500,000
Site Piping	\$50,000
Decommission wells/demo tanks and building	\$50,000
Site Development	\$200,000
Subtotal	\$4,000,000
Mob/Demob (5%)	\$200,000
Subtotal	\$4,200,000
Sales Tax (9%)	\$378,000



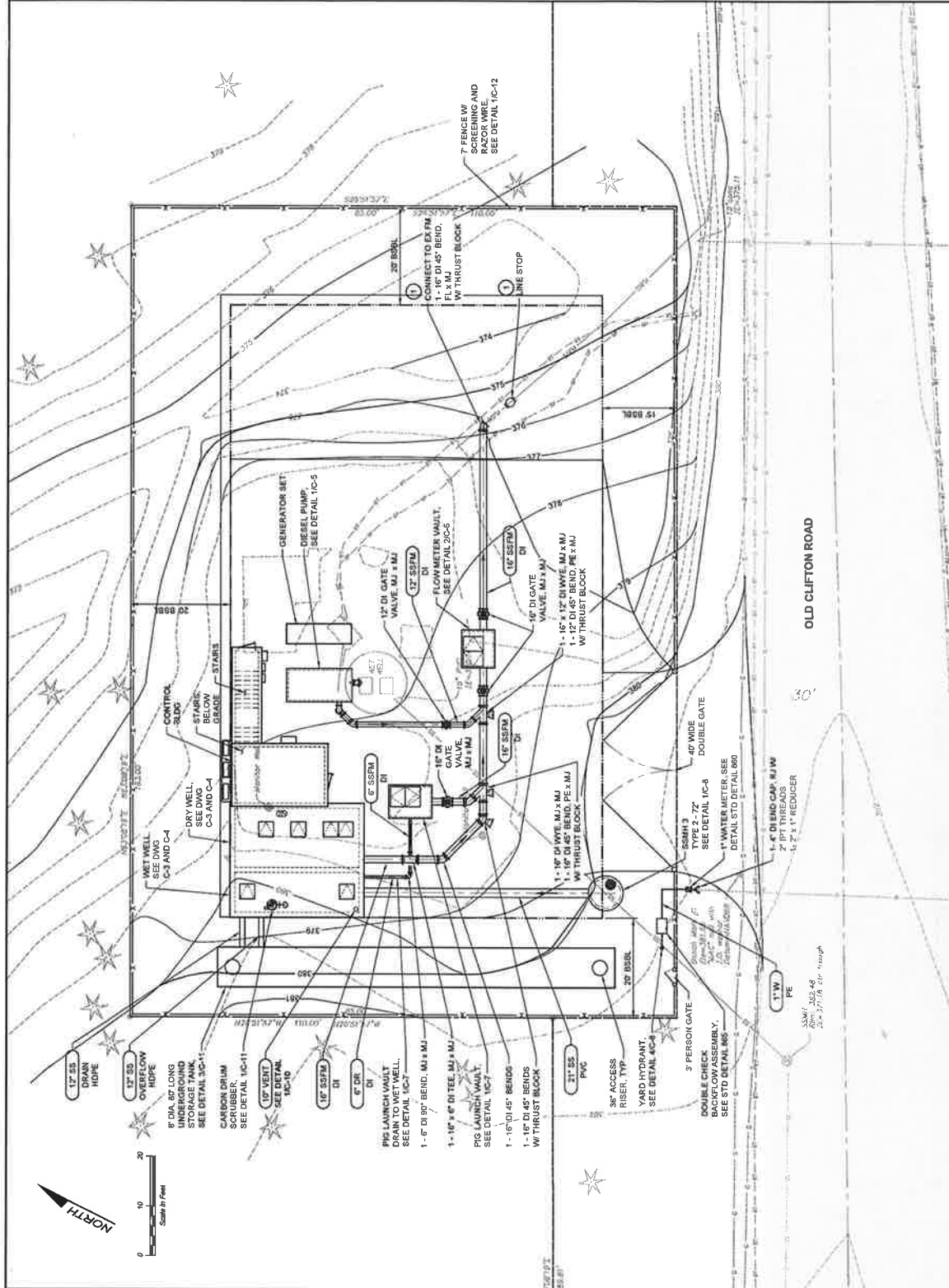
Contingency (25%)	\$1,050,000
<b>TOTAL</b>	<b>\$5,700,000</b>



City of Port Orchard  
 McCormick Sewerage LS No.2  
 Preliminary Engineer's Projection of Probable Construction Cost  
 Prepared by: S. Palmerton  
 Reviewed by: P. Cunningham  
 7/2019

Bid Item No.	Bid Item Description	Unit Bid Price	Quantity	Unit	Total
1	Mobilization, Bonding, and Insurance	\$196,000	1	LS	\$196,000
2	Temporary Erosion & Sediment Control	\$40,000	1	LS	\$40,000
3	Clearing and Grubbing	\$50,000	1	LS	\$50,000
4	Demolition	\$60,000	1	LS	\$60,000
5	CSBC	\$45	180	TN	\$8,100
6	CSTC	\$40	180	TN	\$7,200
7	HMA Pavement	\$230	190	TN	\$43,700
8	Wet Well, Dry Well, and Control Building Structures	\$307,800	1	LS	\$307,800
9	Storage Tank	\$141,000	1	LS	\$141,000
10	Vaughan Model PE6W8CS-105 Vertical Pedestal Chopper Pump and Motor	\$34,800	3	EA	\$104,400
11	Diesel Pump	\$160,000	1	EA	\$160,000
12	Electrical (Incl. Generator Set)	\$753,000	1	LS	\$753,000
13	Pig Launch Vault	\$54,000	1	LS	\$54,000
14	Flow Meter Vault	\$33,000	1	LS	\$33,000
15	21-inch PVC Pipe	\$240	100	LF	\$24,000
16	16-inch Ductile Iron Pipe	\$258	150	LF	\$38,700
17	72-inch Manhole	\$17,000	1	LS	\$17,000
18	Connection to Existing Force Main	\$30,000	1	LS	\$30,000
19	Wet Well and Dry Well Valves, Piping, and Fittings	\$141,000	1	LS	\$141,000
20	Concrete Equipment Pads	\$20,000	1	LS	\$20,000
21	Ventilation	\$35,000	1	LS	\$35,000
22	Odor Control	\$11,250	1	LS	\$11,250
23	Security Fence	\$53	550	LF	\$29,000
24	Traffic Control	\$40,000	1	LS	\$40,000
25	Dewatering	\$157,000	1	LS	\$157,000
26	General Restoration	\$40,000	1	LS	\$40,000
27	Minor Changes	\$100,000	1	LS	\$100,000
				Subtotal	\$2,641,150
				Contingency 25%	\$660,288
				Construction Subtotal	\$3,301,438
				Sales Tax 9%	\$297,129
<b>TOTAL ESTIMATED CONSTRUCTION COST</b>					<b>\$3,600,000</b>

The estimate of probable cost herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. BHC Consultants has no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. BHC Consultants cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the costs presented as shown.



**NOTES:**

1. MAINTAIN OPERATION OF EXISTING PUMP STATION DURING CONSTRUCTION.
2. ALL PIPE AND APPURTENANCE JOINTS SHALL BE RESTRAINED.

**CONSTRUCTION NOTES:**

1. RESTRAIN ALL EXISTING JOINTS WITHIN 20' OF 45° BEND. PROVIDE TEMPORARY CONNECTION TO EXISTING DI 10" x 10" FL CROSS. FULLY TEST NEW PUMP STATION, INCLUDING CONTROLS, ONCE PUMP STATION IS INSTALLED. PROVIDE TEMPORARY STOP AND MAKE PERMANENT CONNECTION TO FORCE MAIN.
2. PROVIDE CONTINUOUS UPWARD SLOPE IN FORCE MAIN BETWEEN ELEVATIONS NOTED ELSEWHERE.

Call 48 Hours  
Before You Dig  
1-800-424-5555  
UNDERGROUND SERVICE



**Preliminary Set**  
**100% Review Set**  
Not For Construction  
07-2019

Drawing	C-1
Sheet	7 of 57
File	PH-0505_C-1
Date	July 2019

**MCCORMICK L32 IMPROVEMENTS**  
**SITE AND YARD PIPING**  
**PLAN**

**Public Works Department**  
216 President St.  
Port Orchard, WA 98366  
(360) 874-4991  
(360) 874-4997 Fax



Scale	1" = 10'-0"
Drawn	P. Smith
Checked	P. Cunningham, P.E.
Approved	R. Dem, P.E.

**BHC CONSULTANTS, LLC**  
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No.	Revisions	Date	By	App'd

## **City of Port Orchard**

### **Water System Plan Update 2019**

Drafts of chapters 1, 2, 4, and 5 have been received from the consultant, reviewed by staff, and comments have gone back to BHC.

Calibrating the hydraulic model of the water system has been challenging since no as-built maps have been located for some of the older parts of the City. Tony and his crew have working diligently to gather as much information as possible and it has all been sent to the consultant.





## TECHNICAL MEMORANDUM

**Date:** August 7, 2019  
**To:** Nick Bond  
**From:** Peter Cunningham, P.E.  
**Subject:** Sidney Pump Station Feasibility Analysis

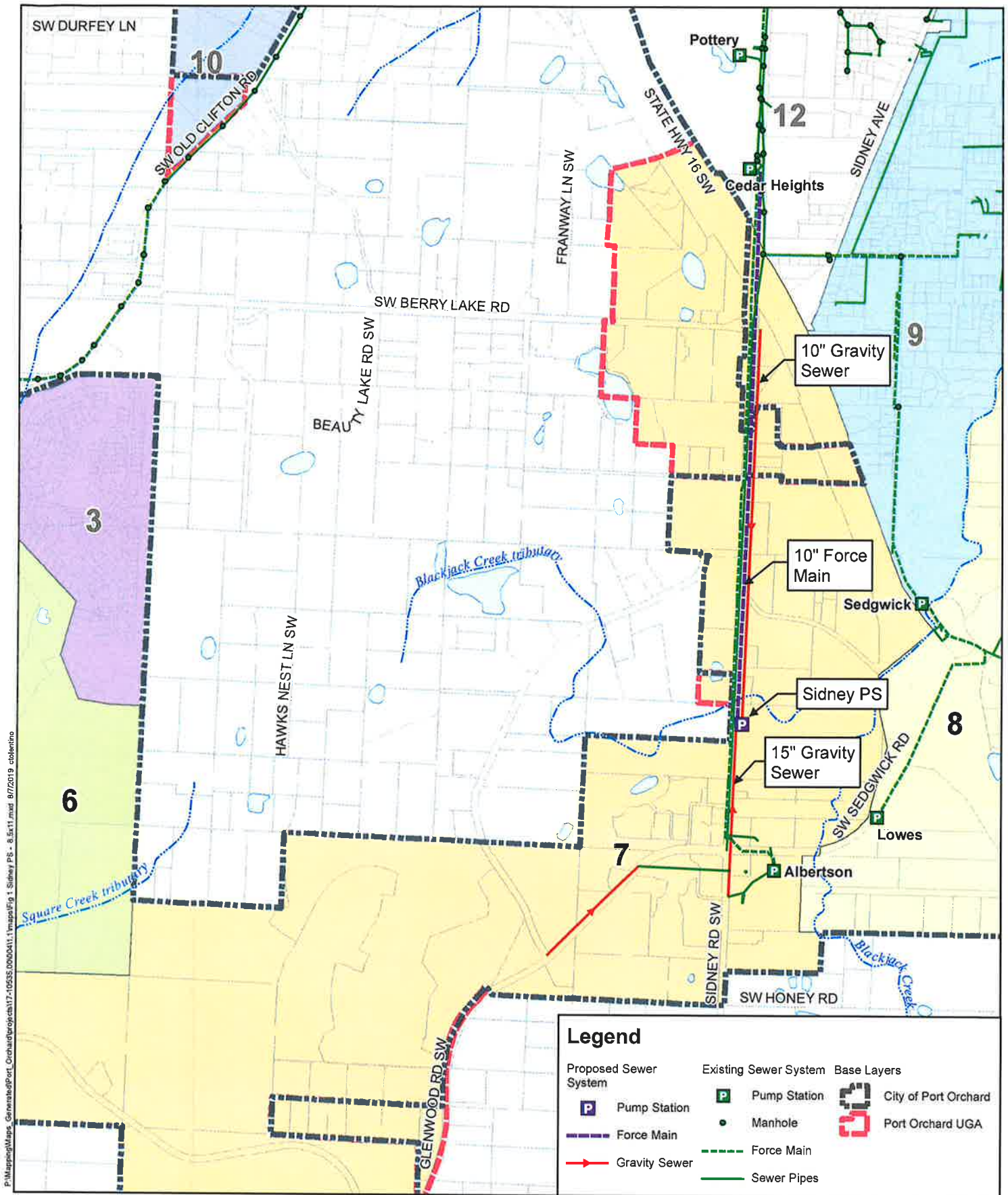


### 1. Introduction

The purpose of this technical memorandum is to document the analysis performed to determine the feasibility of constructing the new Sidney Pump Station (SPS) to serve the area southwest of SR-16 within the City of Port Orchard (City) sewer service area. This area is currently served by the Albertsons Pump Station (APS) and some grinder pumps along Sidney Road. Zoning changes and proposed development in this area are anticipated to add approximately 1,000 equivalent residential units (ERUs) in the near term, and a total of 2,000 ERUs over the next 20 years. Figure 1 shows the planned service area, proposed location of the SPS, and new piping.

### 2. Flow Analysis

The basin draining to the SPS is called Basin 7 in the 2016 General Sewer Plan (GSP). Basin 7 flows were estimated in the GSP through build-out conditions. Since the GSP was completed, zoning has been changed to allow for mixed use developments, resulting in higher potential density. Conversations with the City's planning department indicate that approximately 1,000 ERUs are expected in the short term, and 2,000 ERUs are expected in the build-out conditions. These estimates were added to the existing conditions estimate from the GSP to determine expected flows to the new pump station. These projected flows are shown in Table 1.



This map is a geographic representation based on available information. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.



0 550 1,100 Feet



**Sidney Pump Station**  
City of Port Orchard, Washington

Figure

**1**



**Table 1  
Projected Basin 7 Sewer Flows**

Scenario	Existing ERUs <sup>1</sup>	Projected ERUs <sup>2</sup>	People/ ERU	Flow/Person (gpcd)	Average Annual Flow (gpm)	Peaking Factor <sup>3</sup>	Peak Hour Flow (gpm)
Short term	131	1,131	2.5	78	153	3.46	531
Build-out	131	2,131	2.5	78	289	3.22	929
Notes: 1) From the 2016 General Sewer Plan Update. 2) Projected ERUs includes 131 Existing ERUs. 3) From Figure C-1.1 of the Department of Ecology Criteria for Sewage Works Design (Orange Book).							





### 3. Upstream Gravity Sewers

Two new gravity sewers will connect to the SPS. One will come from the existing gravity sewer in Sidney Road, approximately 400 lf south of SW Sedgwick Road, and extend north to the SPS site on the east side of Sidney Road just south of Ruby Creek. This pipe would be approximately 1,700 lf long and will need to be sized for approximately 75 percent the build-out peak hour flow, or 700 gpm. The other pipe will serve the area of the basin north of Ruby Creek, and will need to be sized for approximately 25 percent of the build-out peak hour flow, or 230 gpm. Estimated sizes, slopes, and capacities are shown in Table 2.

Table 2 Gravity Main Sizing				
Area Served	Peak Hour Flow <sup>1</sup> (gpm)	Diameter (in)	Slope <sup>2</sup> (ft/ft)	Capacity (gpm)
North of SPS	235	10	0.0028	520
South of SPS	700	15	0.0015	1,120
Notes: 1) 75 percent of the basin flows are expected to come to the SPS from the south, with the remainder coming from the north. 2) Minimum slope based on Department of Ecology Criteria for Sewer Works Design.				

At the minimum slope, the 15-inch sewer pipe serving the southern portion of the basin would have an elevation drop of 2.55 ft across 1,700 lf. Based on available as-built data, the invert at the existing upstream manhole is at elevation 179.15 feet on the NAVD88 datum. This would result in an inlet elevation of 176.60 feet at the wet well. The ground elevation at the site varies but based on available GIS data is approximately 190-195 feet. This would result in an invert approximately 18 feet deep, with a total wet well depth of approximately 23-25 feet deep. This would be roughly the same depth as the Marina Pump Station. The gravity sewer depth would be between approximately 10 and 18 feet deep.

The 10-inch gravity main serving the northern portion of the basin can be constructed in concurrence with the new force main discussed in Section 4. The slope of the roadway from the top of the basin to the low point at Ruby Creek is approximately 1-2 percent, and so will not in itself be a limiting factor in the wet well depth.



The bottom elevation of Ruby Creek is approximately 173 feet. If the 10-inch gravity main from the north goes under Ruby Creek, it would need approximately 3-5 feet of cover, depending on soil conditions and scour velocities in the creek. This would increase the depth of the wet well by approximately 5 feet, for a total wet well depth of 28-30 feet.

Alternatively, if the gravity sewer could be located above the culvert in Sidney Road, the gravity sewer could be installed at a shallower depth and would not have an impact on the SPS wet well depth. The feasibility of this option would depend on the depth of cover over the culvert and the condition of the culvert. If the culvert is in poor condition and needs to be replaced, it would likely need to be upsized and designed for fish passage, which would increase the scope and cost of the project.

#### **4. Force Main**

There is currently a 6-inch 7,145 lf long force main located in Sidney Road. The APS and several grinder pumps discharge into this force main and discharge into the gravity system upstream of the Pottery Pump Station. APS flows are proposed to be routed to the new SPS. This will impact the hydraulics at APS and may require new pumps to prevent the pumps from running out on their curves. The SPS could utilize the existing 6-inch force main in the short term, but pump hydraulics would need to be carefully evaluated to ensure they operate within their allowable operating range (AOR). Build-out flows will exceed the recommended capacity of the 6-inch force main, and an additional force main will need to be constructed in Sidney Road. This force main could be built in conjunction with the 10-inch gravity sewer described in Section 3 to minimize mobilization, surveying, trenching, paving, and other construction costs. The discharge location of the new force main will be in a similar location as the existing force main, upstream of the Pottery Pump Station. Neither the existing nor the future force main contribute flow to the Cedar Heights Pump Station. The new force main will be approximately 5,000 lf.



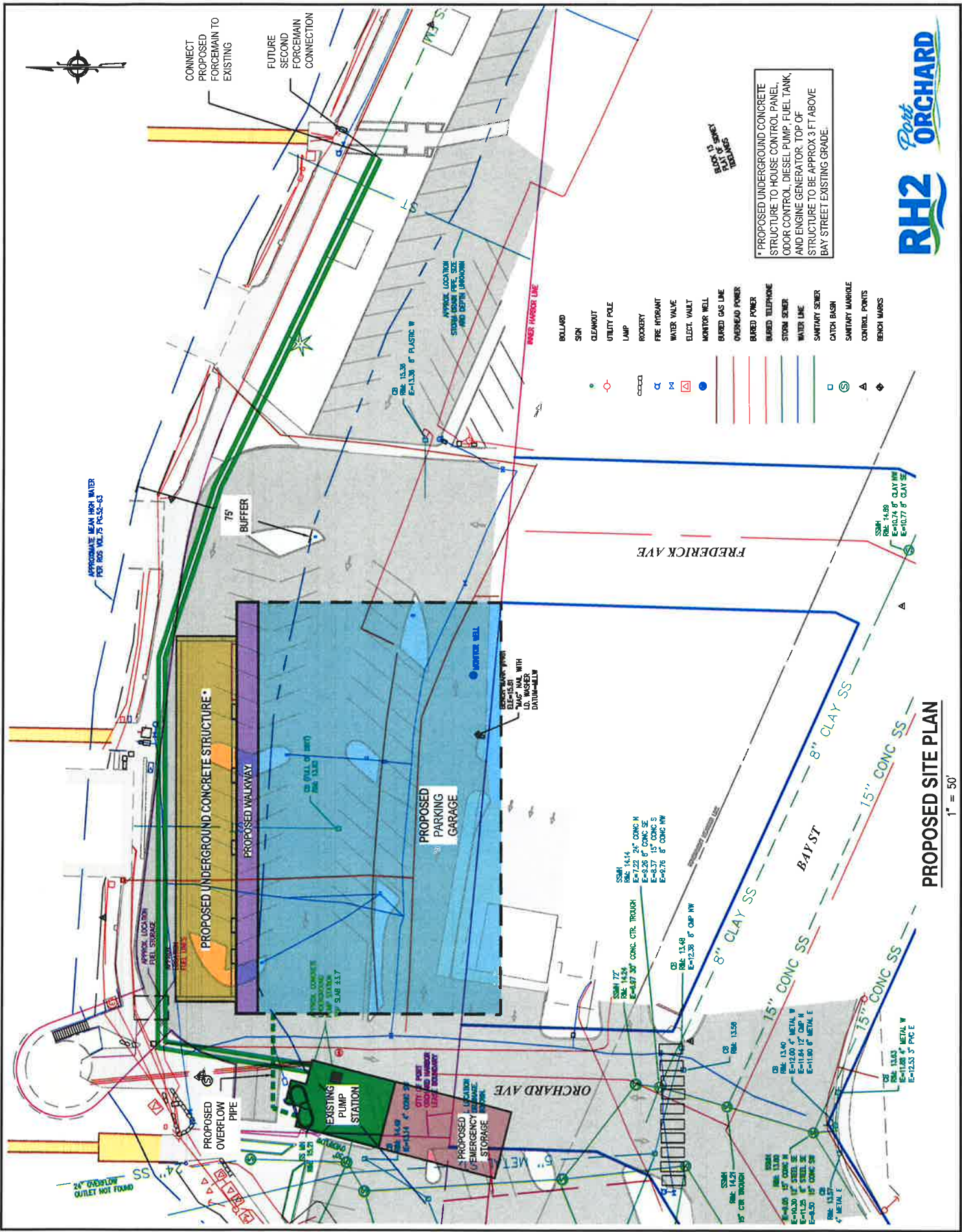
Table 3 shows the flows, velocities, and sizing of the force mains.

<b>Table 3 Force Main Sizing</b>			
<b>Scenario</b>	<b>Peak Hour Flow (gpm)</b>	<b>Velocity<sup>1</sup> (fps)</b>	<b>Existing or New Force Main</b>
Existing	130	2.0	Existing 6-inch
Short Term (1,000 additional ERUs)	531	5.8	Existing 6-inch
Build-out (2,000 additional ERUs)	929	4.0	New 10-inch
Notes: 3) Velocities are based on PVC C900 DR18 pipe. 4) Velocity assumes current APS pumping capacity of 180 gpm.			

## 5. Pump Station Recommendations

To minimize project costs, the new SPS should be constructed as a duplex pump station utilizing the existing 6-inch force main. The wet well will need to be sized to provide room for a third pump for build-out conditions, sufficient operational volume to provide adequate pump starts per hour, and sufficient response time through projected peak hour flows. The Controls Building will be sized for an additional motor starter necessary to install and operate the third pump.

Additional upgrades are needed at the APS. The pump curves need to be evaluated with the revised configuration of a shorter force main discharging to the SPS. This will have less static and dynamic head, and the current pumps may run out on their curves, which can cause motors to burn out and cavitation. Because of the reduced head, the existing electrical equipment should be adequate to operate new pumps with smaller motors. Additionally, SCADA needs to be installed at the APS site to alert operations staff in the event of a high level alarm.



\* PROPOSED UNDERGROUND CONCRETE STRUCTURE TO HOUSE CONTROL PANEL, ODOR CONTROL, DIESEL PUMP, FUEL TANK, AND ENGINE GENERATOR. TOP OF STRUCTURE TO BE APPROX 3 FT ABOVE BAY STREET EXISTING GRADE.



# PROPOSED SITE PLAN

1" = 50'



## **City of Port Orchard**

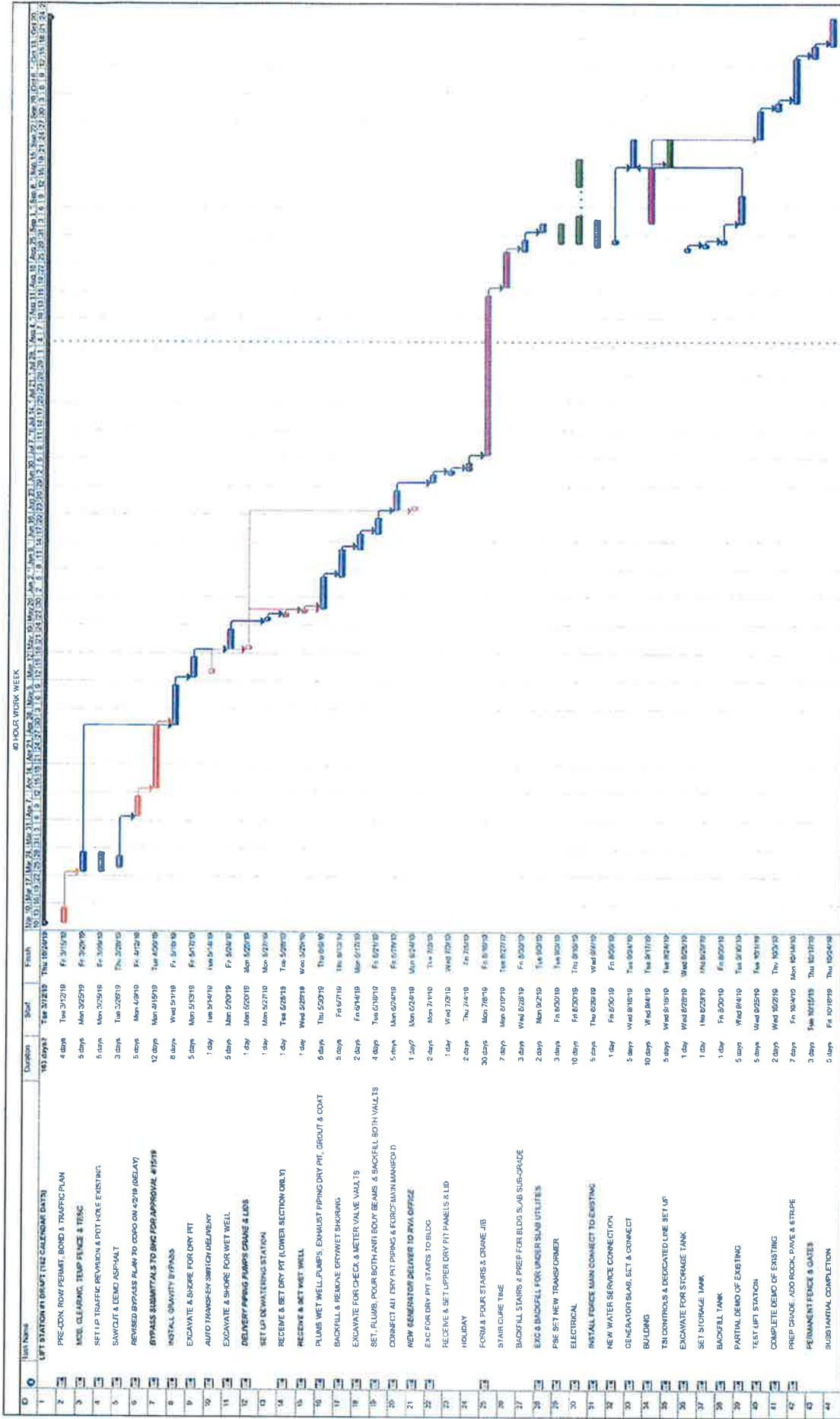
### **Well #9 Treatment Upgrade**

The Office of Drinking Water engineer emailed Jacki on July 29 asking for four additional pieces of information:

- 1) A piping and equipment layout for the disinfection and booster pump station since she was unsure of how the system works and noted such in the 2018 sanitary survey;
- 2) An iron and manganese checklist;
- 3) Operation and maintenance manuals for three of the components of the new system;
- 4) An updated Water Facilities Inventory form.

Items 2, 3, and 4 have been sent. Item 1 has been explained to her in an email and, as of this writing, we are waiting to hear from her if she still needs the drawing since that portion of the system was not altered in this project.

Once she responds we will either have a drawing created to send to her or be able to energize the system.



5/5/19







