Portland to Sandy Water Filtration Plant Transmission System

Draft Conceptual Design Report

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Figure 1 – BRSPS Conceptual Design

Figure 2 – Approximate Alignment of City of Sandy and PHWD Transmission Mains

Figure 3 – Approximate Alignment of City of Sandy Transmission Main

Abbreviations

AACE	Association for the Advancement of Cost Engineering
ADD	Average Day Demand
AWWA	American Water Works Association
BRSPS	Bull Run Supply Pump Station
CGAC	Catalytic Granular Activated Carbon
CML	Cement Mortar Lined
DI	Ductile Iron
ft	Feet, Foot
fps	Feet per Second
FWP	Finished Water Pipeline
GAC	Granular Activated Carbon
gpm	Gallons per Minute
HGL	Hydraulic Grade Line
hp	Horse Power
ID	Inside Diameter
MDD	Maximum Day Demand
MG	Million Gallons
mgd	Million Gallons per Day
OD	Outside Diameter
OHA	Oregon Health Authority
OPCC	Opinion of Probable Construction Costs
PHWD	Pleasant Home Water District
Psi	Pounds per Square inch
SDWRP	Sandy Drinking Water Reinvestment Program
SF	Square Feet
SRF	State Revolving Fund
VFD	Variable Frequency Drive
WSMP	Water System Master Plan
WTP	Water Treatment Plant

1.0 INTRODUCTION AND BACKGROUND

The City of Sandy (City) provides drinking water to its customers from a combination of sources, including the Alder Creek water treatment plant (WTP), Hudson Road Pump Station (using chlorinated, unfiltered Bull Run water), and Brownell Springs. The City's current average day demand (ADD) is 1.33 million gallons per day (mgd), with a maximum day demand (MDD) of 2.3 mgd, based on the most recent Water Master Plan (Consor, 2022). The City's water supply and distribution systems require significant investment to replace and upgrade existing infrastructure and develop new capacity to meet its projected drinking water needs over a 20-year planning horizon and beyond.

The City recently initiated the Sandy Drinking Water Reinvestment Program (SDWRP, Program), including retaining Stantec Consulting Services, Inc. (Stantec) as its Program Manager. The primary purpose of the Program is to develop a phased approach to invest in the water system in a prioritized manner, which will result in multiple contracts being executed to qualified design consultants and contractors to implement the projects.

Three phases of improvements are currently planned:

1. Near-term over the next 7-10 years (through 2030)
2. Mid-term from 2030 to 2040
3. Long-term (2040 and beyond)

The City's goal is to be able to develop the projected year 2040 ADD of 1.79 mgd by 2030 through a combination of finished water from:

- ✓ Alder Creek WTP
- ✓ Bull Run Supply Pump Station (BRSPS)

The City has determined that the upgraded Alder Creek WTP should have a capacity of 1.75 to 2.0 mgd. The conceptual design for the improvements at the Alder Creek WTP facility are being developed separately from this Portland to Sandy Water Filtration Plant Transmission System Conceptual Design Report (Report).

The Bull Run Supply Pump Station (BRSPS) is planned to be operational in 2027 and is intended to:

1. Supplement treated water from the Alder Creek WTP.

2. Have shared facilities with Pleasant Home Water District (PHWD). However, the City and PHWD will operate independently.

The BRSPS is planned to have an initial capacity of 2.5 mgd and be expandable to an ultimate capacity of 5.0 mgd.

2.0 PURPOSE AND OBJECTIVE

The purpose of this Report is to assist the City with steering high-level decisions which define the preferred design criteria for a new pump station and associated transmission mains.

3.0 BRSPS DESIGN CRITERIA

As presented in **Section 1.0**, the BRSPS is planned to provide treated water to both the City and PHWD. However, the City will have its own pumps, electrical, instrumentation, and other infrastructure. Similarly, PHWD will also have its own pumps, electrical, instrumentation, and other infrastructure. Each utility will operate separately but use the pump station building as a shared space.

Incoming water to the pump station will be supplied through a single 24-inch (to be confirmed) finished water suction pipe (designed by others) that will terminate in a valve vault (also designed by others) housing isolation valves upstream of the BRSPS.

The pump station is proposed as one building that will require separate Pump Rooms, Electrical Rooms, and Generator Rooms for each of the City supply and PHWD supply. An additional room housing two 10-foot diameter granular activated carbon (GAC) contactors and chlorination equipment is also anticipated, specific to City only.

Due to land use considerations, it is not anticipated that surge tanks will be permitted. Alternative means of surge protection will need to be considered during final design of the BRSPS.

Based on these requirements, a building size of approximately 60 feet x 40 feet is anticipated but shall be confirmed by the design consultant during subsequent stages of design.

A conceptual design of the BRSPS is presented in **Figure 1,** showing a concept of piping configurations and components for each supply system as noted above.

The process components within the pump station should also include, but are not limited to, the following requirements for each of the City and PHWD supply systems:

- Number of pumps should meet firm capacity requirements (meets design flow with largest pump out of service)
- Flow meter on the discharge headers
- Each pump discharge main will require a dismantling joint, air release valve, flow meter, swing check valve, and butterfly valve prior to connection to discharge header.
- Pumps, electrical, instrumentation, and other infrastructure for PHWD may be excluded from the current design scope, pending further discussions between the City and PHWD. This includes design and construction of the associated improvements presented in Section 3.2 of this Report.

Design criteria for the pumping and downstream pipeline requirements of each utility is presented in the following narratives.

3.1 City of Sandy Supply

The BRSPS is planned to have a firm capacity of 5.0 mgd for the City's supply. This will require an ultimate "2 + 1" pump configuration, with each pump sized at 2.5 mgd with variable frequency drives (VFDs) to facilitate throttling down to lower flows.

Initially, two pumps are planned, so that one pump can be taken off-line for maintenance while the other can meet current demands. A third 2.5 mgd pump will be installed in the future to meet projected demand increases, so that one pump can be taken offline for maintenance while the other two can meet future demands. The conceptual design assumes that pumps will be multistage canned vertical turbine pumps.

A new 16-inch Class 52 DI water main, approximately 11,000 feet long, is planned for the City's supply from the BRSPS to a connection to an existing 24-inch City water transmission main in SE Bluff Road (at its intersection with SE Hudson Road), as shown in **Figure 2** and **Figure 3**. The design will also include electrical conduit(s) (size and number to be confirmed by the design consultant during subsequent stages of design) installed parallel to the new 16-inch water main, for future SandyNet wire installation (by others). From this connection, the existing water transmission main conveys water via public rights-of-way, approximately 21,000 feet long, to the City's Revenue Avenue Reservoir located at 17160 Revenue Avenue. The sizes and routing of the existing transmission mains from the connection point to the Reservoir vary and will need to be confirmed by the design consultant during subsequent stages of design.

A 16-inch pipe will convey the ultimate BRSPS capacity of 5.0 mgd at a velocity of approximately 5.5 feet per second (fps).

Critical elevations considered in development of the City's BRSPS design criteria include:

1. Approximate ground elevation at BRSPS: 700 feet
2. Approximate suction pipe centerline elevation: 675 feet
3. Approximate elevation at bottom of pump can: 670 feet
4. Overflow elevation of Revenue Avenue Reservoir: 995 feet

3.2 Pleasant Home Water District Supply

The BRSPS is planned to have a firm capacity of 0.4 mgd for the PHWD supply. This will require an initial and ultimate "1 + 1" configuration, with each pump sized at 0.4 mgd with VFDs to facilitate throttling down to lower flows. This pump configuration will facilitate one pump being taken off-line for maintenance while the other is able to meet current and future demands.

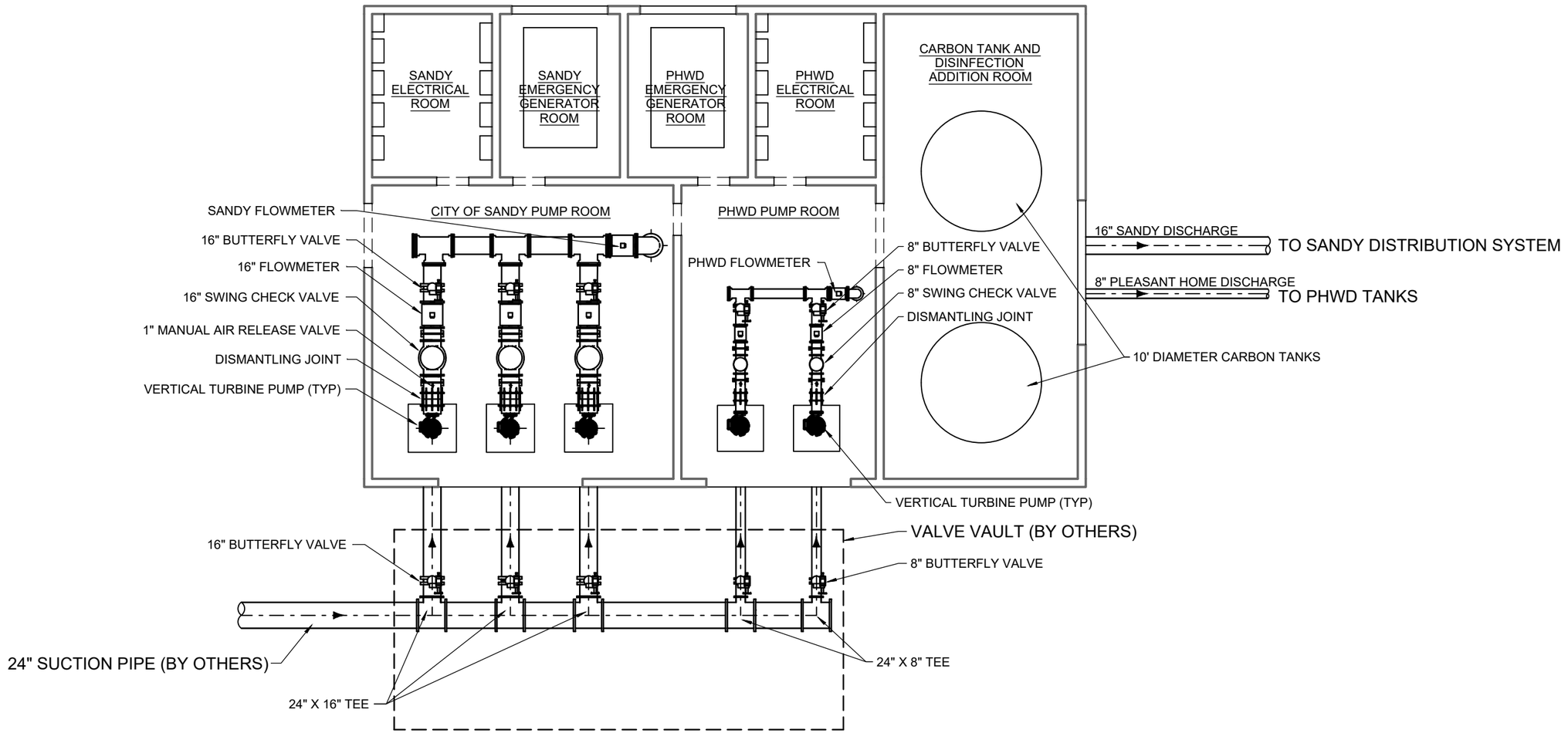
An 8-inch Class 52 DI water main, approximately 2,000 feet long, is planned for PHWD's supply, from the BRSPS to PHWD's existing water storage tanks located at 35524 SE Carpenter Lane in Boring, as shown in **Figure 2**.

An 8-inch pipe will convey 0.4 mgd at a velocity of approximately 1.8 fps.

Critical elevations considered in development of PHWD's BRSPS design criteria include:

1. Approximate ground elevation at BRSPS: 700 feet
2. Approximate suction pipe centerline elevation: 675 feet
3. Approximate elevation at bottom of pump can: 670 feet
4. Overflow elevation of PHWD Reservoirs: 819 feet

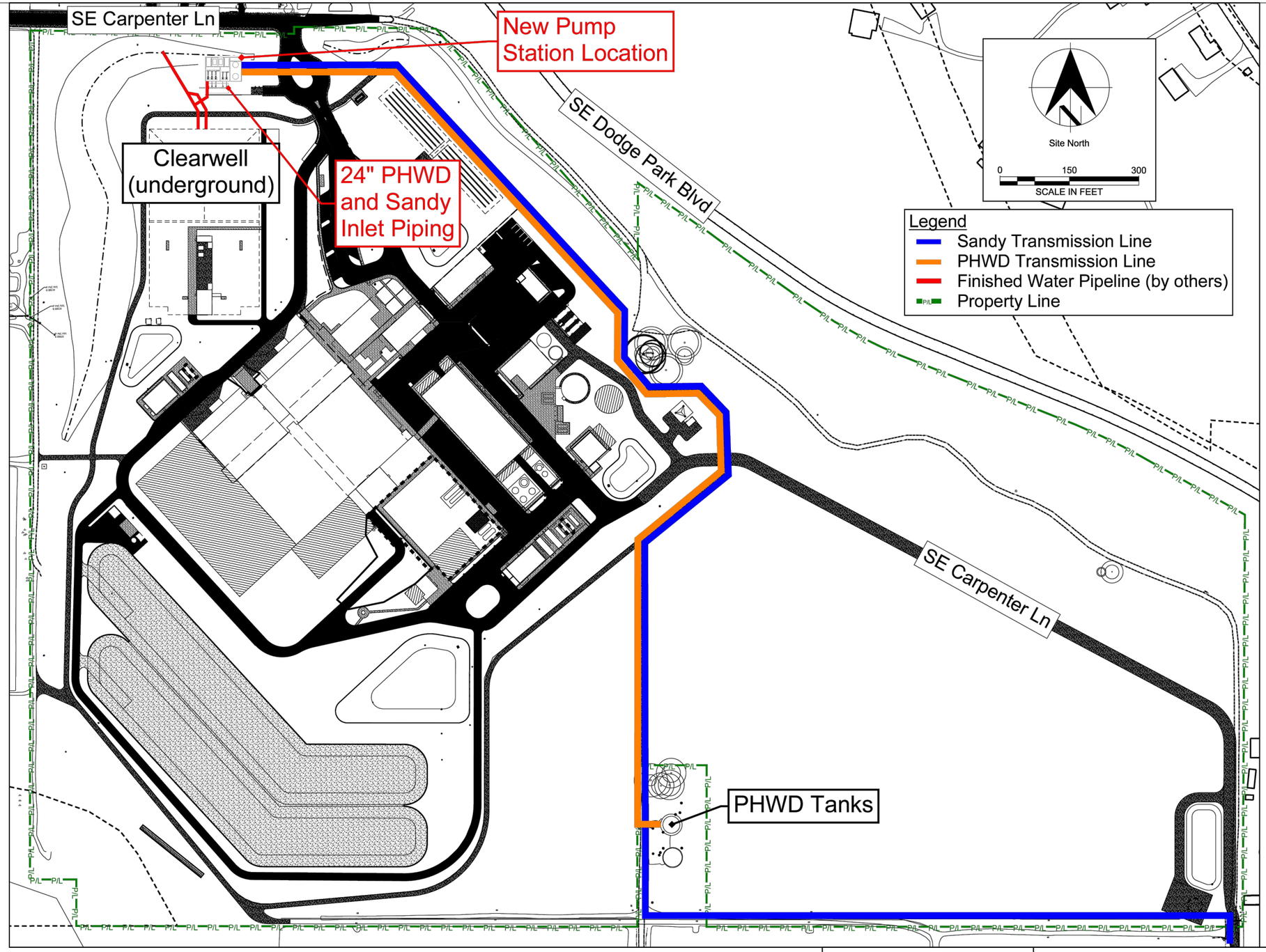
ATTACHMENTS



PUMP STATION - FLOOR PLAN LAYOUT

SCALE: 1/4" = 1'-0"

Stantec	BRSPS Conceptual Design	Figure 1



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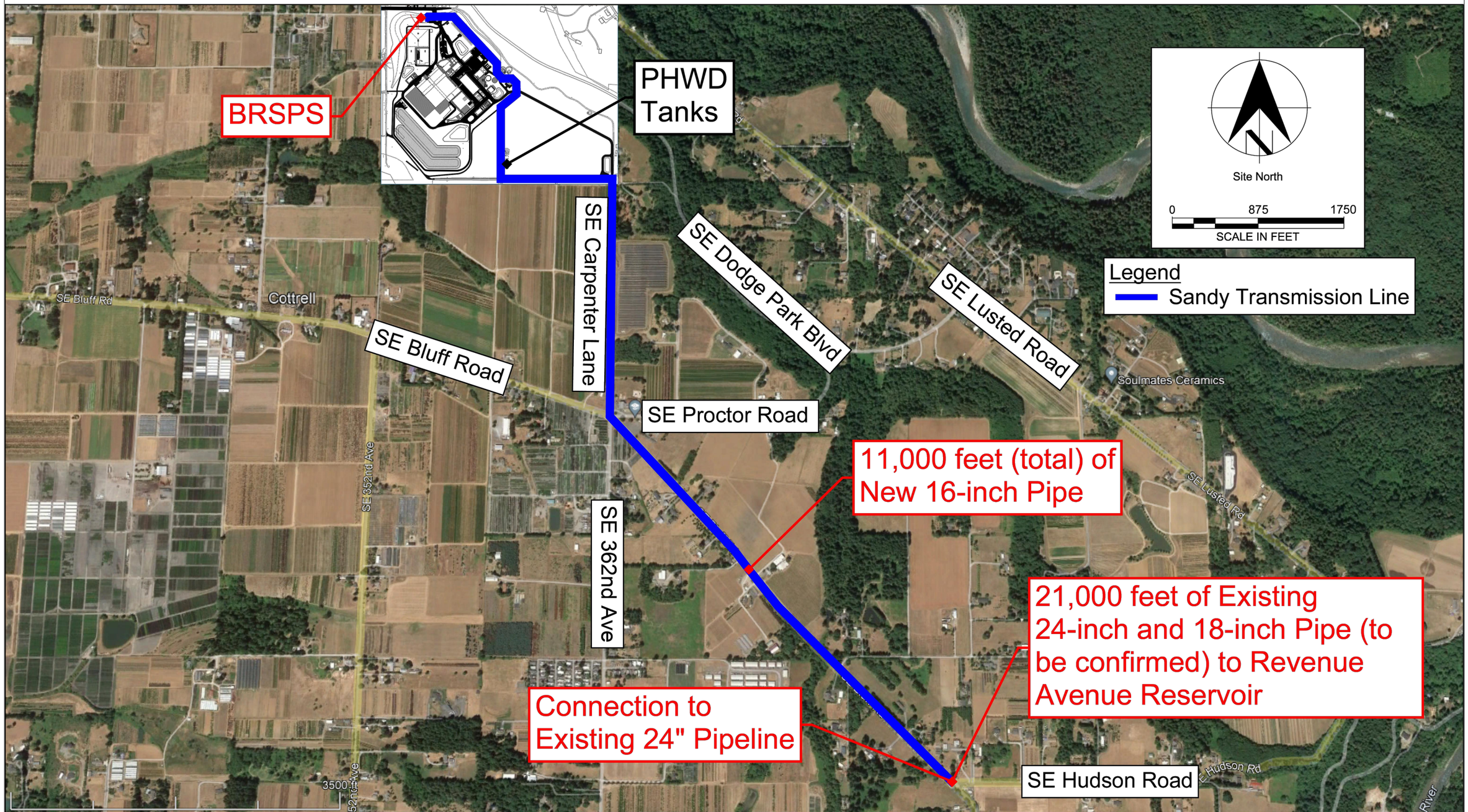
Approximate Alignment of City of Sandy and PHWD Transmission Mains

Figure

2



Stantec	Approximate Alignment of City of Sandy Transmission Main	Figure 3