



APPENDIX J:
CIVIL UTILITIES ASSESSMENT

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PORT OF LONGVIEW MASTER PLAN PHASE I FEASIBILITY STUDY Civil Utilities Assessment



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1.0 INTRODUCTION

In 2010 the Port of Longview (Port) purchased the 275-acre property at Barlow Point for future Port industrial development. The Port acquired an additional 7.5 acres of tidelands in 2012 bringing the site total to 282.5 acres. The property is located downstream of the current developed Port at approximately river mile 64 (RM 64), which is on the west side of the City of Longview, Washington (City), see location map in Figure 1 for site location. In order to better understand the full potential of the Barlow Point site, the Port determined that a comprehensive master planning process was necessary. The first step in that process was to perform a due diligence study to assess the feasibility to develop the site into a marine terminal.

A market analysis and conceptual site planning exercise was performed in late 2014 through early 2015 to identify possible types of use and site layouts. Specific industry types were identified from the market analysis to be the basis to analyze potential site layout and use at Barlow Point. Two options arose from that evaluation, which focus on production and/or export of dry or liquid bulk commodities. Both options identified would have a site occupied by three bulk commodity tenants. The dry bulk option (Option 1) consists of potash (export only), urea (production and export) and wood pellets (export only). The liquid bulk option (Option 2) consists of crude oil (export only), methanol (production and export) and biodiesel (production and export). A third option (Option 3) was also considered where a single commodity/tenant occupies the entire site. Only the process water demands for Option 3 will be discussed in this report as the site layout and other utility needs are similar to Option 1 and 2. See the Conceptual Site Plans in Appendix A and the Concept Planning and Market Analysis Report in Appendix B of the main report.

As part of that study, the feasibility and accessibility of the utilities necessary for each option was analyzed. The utilities analyzed in this study include water (for domestic use, fire suppression and process water use), sanitary sewer, communications and natural gas.

2.0 EXISTING CONDITIONS

2.1 EXISTING SITE DESCRIPTION

The Barlow Point property is a Greenfield site which consists of approximately 282.5 acres and is located approximately 4 miles down-river (West) of the Lewis and Clark Bridge. The site is zoned heavy industrial (HI) and is contained within the Longview City limits (see the Location Map in Figure 1). The existing site is composed of undeveloped farm land with isolated pockets of trees and gravel maintenance roads.

The site is bounded to the north by State Route 432 (SR 432) and Mt. Solo Landfill. SR 432 is adjacent to the property between approximately State Route Milepost 2.17 to 2.78. The majority of the northern site

boundary is shared with Mt. Solo landfill, a capped landfill, and is separated from the landfill by a large private ditch. The ditch straddles the property boundary creating a shared stormwater discharge location between the two sites. The shared ditch meanders forming oxbows which creates an atypical property boundary.

The southern boundary of the site is adjacent to the Columbia River and contains a 6,200 linear feet of levee which is part of the greater City of Longview flood control system. The levee is overseen by the Consolidated Diking District #1 (CDID#1) and has a top elevation of approximately 30' NAVD88 and separates the river from the main site which has an approximate elevation of 10' NAVD88.

The site is bounded to west by undeveloped farm land also zoned for heavy industrial. To the east, the site is bounded by Ditch #14, one of many large ditches owned by CDID#1. Ditch #14 is drained by the CDID#1 Reynolds Lift Station which is located adjacent to the south east corner of the site. The adjacent property beyond Ditch #14 is historically used for industrial processes and is also zoned heavy industrial.

2.2 EXISTING UTILITIES

The site is an undeveloped Greenfield site with no documented buried utilities on the property. The site contains a number of shallow manmade agricultural ditches that convey stormwater to the large private drainage ditch shared with Mt. Solo landfill to the north and Ditch #14 to the east. The ditches discharge through numerous culverts under the gravel maintenance roads that circle the property.

A high power transmission line easement granted to Bonneville Power Administration (BPA) runs over the eastern portion of the site. The easement is 900' in width and is located over the eastern edge of the property. There are four high voltage transmission towers and numerous overhead power lines within the easement area. However, only three of the four transmission towers are located in the southeastern property corner. While not confirmed, it is likely there are buried grounding systems around the base of the towers.

Low voltage distribution poles and overhead power lines run on the eastern edge of the property in an easement and feed power to the Reynolds Lift Station. The power lines depart from SR 432, cross the northeaster portion of the property and then run between the gravel maintenance road and Ditch #14 to the lift station.

A four inch diameter high density polyethylene (HDPE) leachate pipe conveys leachate flow from Mt. Solo Landfill to the east between the property boundary and Ditch #10 and SR432. This line is not on the property, but will need to be addressed to accommodate a new site entrance from SR432 and all utility connections within SR432.

Communications and water lines are adjacent to the property within the SR432 right of way. Natural gas and sanitary sewer are located further to the east and the west of the property. Existing offsite utilities will be described further below.

3.0 PROPOSED CONDITIONS (CONCEPTUAL DEVELOPMENT)

Two conceptual plan options were developed which focus on dry and liquid bulk industries. The likely infrastructure required to support the two options include a new site entrance from SR432, an access road around the perimeter of the site, a levee access/maintenance road, rail infrastructure, cargo piers and trestles, ditch realignments, various storm water features, and supporting utilities which are detailed below (see the Conceptual Plans located in Appendix A of the main report). These items will be considered “backbone infrastructure” to be constructed by the Port ahead of, or in conjunction with, future tenant improvements. Both options for development detailed in the introduction have a similar layout with the rail heavy tenant located inside the rail loop on the west side of the site and the major process tenant occupying the majority of the east side of the site. Remaining space not needed by the process tenant could be occupied by a smaller third tenant.

The necessary utilities associated with the “backbone infrastructure” will likely be routed along or within the access road around the perimeter of the site as needed. This will provide flexible access to the various anticipated service connection points for each tenant and for each pier structure (see Figure 5 for the Civil Utilities Map). These utilities include domestic water, fire water, process water, site power and lighting, process power, natural gas, sanitary sewer and communications/fiber. Based on the two options and the types of bulk commodity process, planning level utility demands were developed (see Figure 6 for the utility demand matrix). Process demands were estimated by comparing similar sized existing facilities to Barlow Point and through discussions with commodity trades groups and interested potential tenants. Non-process utility demands were estimated using industry standard methods and past experience. These utility demands were then compared to the available offsite utilities to better understand what the utilities were capable of providing and how they would be brought to the site.

3.1 REQUIREMENTS FOR UTILITIES NEAR LEVEE

Development at Barlow Point is anticipated to have infrastructure that will interact with the levee. This infrastructure may include new utility piping for fire suppression water lines, outfall pipes through or over the levee, product conveyor foundations and piles, pier abutments, access road, turnouts, ramps and levee enlargements. Specific development requirements are outlined in the USACE design manual EM 1110-2-1913 Design and Construction of Levees. Requirements related to potential new pipelines state that it is preferable for pipelines to cross over a levee rather than penetrating the levee embankment and that generally, only new gravity lines area allowed to penetrate the embankment. Meaning any pressure or non-gravity utilities near the embankment may likely be required to remain above the levee envelope. Further design and coordination with USACE is required to determine levee requirements.

4.0 WATER SUPPLY

Demand for the water supply comes from three potential sources: fire suppression, domestic water and process water. Fire suppression sources can include the public utility system, or on-site solutions such as foam fire suppression or various types of reclaimed or pumped on-site water. Domestic water demand is generally fairly low and includes the future feeds to the various tenants as well as feeds to the proposed pier structures for filling vessels potable water tanks. The domestic water demand source is likely the public utility system. Process water demands vary depending on tenant activities but are generally much larger than the previous two demands. Similar to the fire water system, the source can be from the public utility or an on-site purpose-built system. Each demand is detailed below, including potential quantities and probable sources for each.

The limiting factor for the existing offsite water system is the available flow that can be delivered to the site and the available storage volume available to supply the site. Information provided by the City of Longview Public Works Department and per the City's 2012 Comprehensive Water System Plan indicates that the City has two potable water pipelines near the site (see Figure 2).

To the west, there is a 50+ year old six inch diameter cast iron pipe which dead ends near the site on Barlow Point Road. The cast iron pipe does not have sufficient capacity to supply site flow requirements. Unless upgrades are performed to this line extending approximately 1.5 miles to the north along Barlow Point Road, this is not a preferred option for feeding the site.

To the north, there is a 12-inch diameter water distribution pipe that runs along the north side of SR 432. This line may be a connection point for the site water system for development at Barlow Point (see Figure 2). On January 26, 2015 the City performed a hydrant flow test at a nearby hydrant of similar elevation with the site. Results indicated that 95 pounds per square inch (psi) residual pressure in the line with a flow at 20 psi of 6,470 gallons per minute (gpm). This test, in conjunction with information from the City, indicates that the 12-inch diameter water is capable of supplying the anticipated flow needed for fire and domestic demands. It is unlikely that the 12-inch water distribution pipe could supply process water demands as well. See Section 4.3 for discussion on process water demands and sources and see Figure 6 for the utility demands matrix.

In regards to available volume, the City's 2012 Comprehensive Water System Plan indicates (CSWP) a number of reservoirs with a potential storage volume of 13.6 million gallons (MG) within the Main Zone of which Barlow Point is included. The anticipated system demand per the City's 2012 CWSP is 4.42 MG averaged daily demand (ADD) and 8.23 MG maximum daily demand (MDD). This allows for approximately 5.4 MG of available volume during MDD within the entire system. The nearest reservoir to the site located less than a mile from Barlow Point on Mt Solo and has an effective storage capacity of 4 MG. This volume is sufficient for anticipated fire water and domestic water demands (see sections 4.1 and 4.2 for more information). Further coordination is needed with the City and the Fire Marshal to determine if the full demand can be supplied from the City or if additional fire water storage will be needed.

For both the fire water and domestic water supplies, a looped system, versus a “dead end” system, is the preferred design alternative. Looped water systems increase reliability by allowing the water to be fed from two directions thus preventing potential down time due to breaks in the line or maintenance requirements. Loop systems also decrease energy loss and water velocity in the pipe which improves the efficiency and life span of the system. For fire water suppression purposes, a looped system provides greater flows for more effective firefighting. For domestic water use, a looped system improves water quality by increasing water circulation and preventing stagnation in the dead end of a line. The fire water and domestic water analysis below assume the use of a looped system with a single connection to the 12 inch diameter water line in SR 432. The looped systems in this case, would be new fire and domestic water lines that follow the path of the access road around the perimeter of the site (see Figure 5). The fire water line and the domestic water line would each include approximately 13,400 linear feet of pipe.

4.1 FIRE WATER

The demand for fire water is the rate of water flow and system capacity necessary to control a major fire for the anticipated duration of the fire at the point of interest. The fire system is to be designed to maintain a minimum pressure of 20 psi residual throughout the entire system during a major event. These requirements are outlined in the Washington Administrative Code (WAC) 246-290-230(6).

The fire water suppression system needs to provide water to the land side of each pier structure, to hydrants along the backbone road and to allow for connection by any future tenant to bring fire water to their site. Preliminary analysis indicates that the fire system needs to be a loop system in order to provide the required fire flow to the pier structures, while providing the anticipated needs of each tenant.

The preliminary layout for the fire system loop is proposed to follow the access road around the site. Potential tenants will be able to connect into the fire loop at the most suitable location for their potential development. Fire Department Connections (FDC's) and hydrant pairs will be placed either at the top of the levee or adjacent to the levee to allow for fire suppression on the proposed pier structures. This fire flow analysis assumes that the hydrant/FDC pairs will be placed at the top of the levee rather than adjacent to the levee, which was the City Fire Marshall's preference, and represents the more difficult scenario for supplying required demands. Utilities placed near levee will require additional consideration. See Section 3.1 for information on utilities on or near the levee.

Hydrants will be spaced along the backbone road, typically at 300 foot intervals for heavy industrial facilities, and a nominal hydrant flow of less than 3,000 gpm. However, the controlling fire flow will be at the proposed buildings and at the proposed pier structures. Estimated fire flow requirements for each building are shown in the Figure 6 and are based on National Fire Protection Association (NFPA) requirements, International Fire Code 2012 (IFC) requirements, and anticipated building types and sizes as identified in the planning study and market analysis (see the Conceptual Planning and Market Analysis Report located in Appendix B of the main report). The maximum anticipated fire flow demand is listed in Table 1 for the dry bulk and liquid bulk options as well as at the pier structures which will be similar for each option. For the dry and liquid bulk options, the maximum anticipated fire flow is 6,000 gpm and

4,500 gpm respectively. These flows assume no sprinklers within the larger buildings. If sprinklers are installed fire flow demand can be reduced by as much 75% or as low as 1,500 gpm (whichever is higher). The City's Fire Marshall, in late May of 2015, indicated that it is likely that any large buildings on site will need sprinklers, depending on the configuration. For dry bulk tenants, hydrants with the potential addition of sprinklers are likely sufficient. However, for liquid bulk tenants foam suppressant systems in conjunction with a fire water system will likely be needed. Fire flow demand for the pier structures will be approximately 3,000 gpm at any pier structure. The pier structures will require FDC's and nearby hydrants to supply required demand.

Table 1 - Fireflow Requirements

Liquid Bulk/Dry Bulk	Flow Rate Requirement (for largest building)¹	Flow Duration Requirement (for largest building)	Required Available Volume	Minimum Residual Pressure
Dry Bulk	6,000 gpm	4 hrs	1.4 MG	20 PSI
Liquid Bulk	4,500 gpm	4 hrs	1.1 MG	20 PSI
Pier Structure	3,000 gpm	4 hrs	0.7 MG	20 PSI

¹Estimated minimum required fire flow and duration based on typical construction type and size provided by Cargo Velocity and the 2012 IFC, Table B105.1.

The anticipated design flow rate for fire water of 6,000 gpm is within the capacity of the system of 6,470 gpm as determined by the fire flow test discussed above in Section 4.0. The flow rate in conjunction with the required flow duration produces a required volume, shown in Table 1. The maximum required available volume of 1.4 MG is within the available system storage volume indicated in Section 4.0

WaterCad was used to analyze the system and size the fire water loop. Based on the analysis done, the piping for the fire water suppression system will need to be 12 inch diameter or larger ductile iron pipe in order to supply the required flow while maintaining the minimum allowable residual pressure of 20 PSI. The system may vary depending on future build out. Changing the pipe material to a plastic pipe type (PVC, C900, HDPE, etc.) which has a more favorable friction coefficient may allow for the decrease of pipe size to 10 inches in diameter. A secondary method to decrease the pipe size that was investigated is to install an FDC/hydrant pair on each side of the double check backflow prevention assembly near SR 432. This configuration allows for a fire engine to park near the assembly and bypassing the check valve assembly to remove the greatest energy loss to the system. However, the City's Fire Marshall indicated that this is not a likely option for due to the small size of the fire department which includes only 3 fire engines. Such a configuration would require at least two engines to fight a fire at Barlow Point, with would leave only one remaining engine to provide fire response to other areas.

Other options are available to supply the fire suppression water system demand. These include a surface water intake in the Columbia River or a groundwater intake system such as a Ranney Well. Further

coordinate with the Port and potential tenants in required to determine if these systems would be economical.

4.2 DOMESTIC WATER

Separate domestic and fire water lines are preferable to ensure continued uninterrupted use of the domestic water system. Separating the lines also decreases any residence time and stagnation issues that are common in large combined systems which would decrease water quality for domestic water use. The domestic water line will parallel the fire water system, connecting to the 12-inch diameter supply in SR 432 and follow the access road looping around the site. Potential tenants will be able to connect into the domestic water loop at the most suitable location for their potential future build out.

Domestic analysis does not require off-site analysis similar to fire flow analysis outlined in Section 4.1 due to the lower demand of the domestic system. There is sufficient off-site capacity to supply the domestic water system, based on the fire flow analysis. Therefore the design of the domestic water system is dependent on the on-site geometry.

The hydrant flow test discussed in Section 4.0 provided a residual pressure at the connection point to the site of 95 pounds per square inch (psi). This will be the input pressure for analysis of the domestic water line in WaterCAD. The industry standard operating range for a domestic water service is between 100 psi and 20 psi. Flows will need to be maintained within this range given the supply pressure and the demands of the site.

For planning level design, the Department of Ecology (DOE) provides typical domestic flows in the Water System Design Manual Table 5-2: Guide for Non-Residential Water Demand. Water consumption is between 15-35 gallons per day (gpd) for factories. For planning level analysis 35 gallons per day is used for estimates in this report. The full time employee estimates have been calculated based on values provided from the Concept Planning and Market Analysis Report in Appendix B of the main report. Calculations assume all components of the terminal would be operational seven days per week and that about 20% of the employees would be office/administrative staff working traditional days and hours (Monday through Friday 7:30 A.M. to 5:00 P.M.). It is assumed 80% of the remaining employees would be shift workers with three shifts per day, seven days per week. The shift employees are assumed to distribute with about two-thirds (66%) on day shift and the remaining third split evenly between swing shift and night shift. Truck deliveries were also considered for the demand. Each Truck Job counts as half a full time employee (FTE) with a similar split between day, swing and night shifts. See Table 2 for the combined employment totals for the dry and liquid bulk options.

Table 2 - Full Time Employee Estimates

	Option 1 (Dry Bulk)		Option 2 (Liquid Bulk)		
	Terminal Jobs (FTE)	Truck Jobs (FTE)	Terminal Jobs (FTE)	Truck Jobs (FTE)	
Admin Staff	78	x	72	x	7:30 am to 5:00 pm
Day Shift Staff	206	26	190	13	7:30 am to 5:00 pm
Night Shift Staff	101	13	95	7	5:00 pm to 7:30 am ¹

¹Night shift does not drive peak flow demand, but was included in total volume demand.

Based on a 9.5 hour per day shift (7:30am – 5:00pm) and approximately 35 gallons per FTE the domestic water demand for the dry bulk option is approximately 19.1 gpm and the liquid bulk option is approximately 16.9 gpm. See the Demand Matrix in Figure 6 for a breakdown of the domestic water demand for each tenant.

In addition to the standard domestic water needs for each building, the domestic water system will also need to be capable of filling the water tanks on as many as three Handymax vessels simultaneously moored at the piers.

Typical Handymax vessels have a domestic water storage capacity of approximately 70,000 gallons. Assuming the tanks are completely empty, filling times for varying flow rates are as follows:

Table 3 - Handimax Ship Fill Rates

Flow Rate (GPM) ^{1,2}	Time Required (Hrs.) ²
100 GPM	12hrs.
75 GPM	16 hrs.
50 GPM	24 hrs.
35 GPM	34 hrs.
25 GPM	47 hrs.

¹Flow rate and time required are based on an assumed 70,000 gallon tank.

²Fill times are rounded up to the nearest hour.

As a comparison, the Port's Export Grain Terminal (EGT) located at Berth 9 has similar dry bulk activity also serviced by Handymax size vessels. These vessels typically dock for 2 to 3 days. Assuming a similar loading scenario, anywhere from 35-100 gpm would provide an acceptable fill time. The analysis of the domestic water system assumes a 75 gpm minimum fill rate which would allow for a 16 hour fill rate. Due to the larger flow rate for filling vessels, the fill rate will control the analysis for the domestic water line.

Similar to the fire water loop, WaterCad was used to analyze the domestic water line. The analysis assumes 4 inch diameter plastic pipe and assigned demands of 75 gpm and then 100 gpm to each pier structure simultaneously based on the flows listed above. Additional flow demand was then added to each tenant to determine the maximum allowable flow to all tenants during simultaneous filling of three moored vessels. Table 2 summarizes the available domestic flows to each tenant at a minimum pressure of 20 psi while simultaneously filling vessels. The proposed system allows for a maximum combined available flow of 20 to 50 gpm for the three tenants which exceed the demand listed above and in Figure 6.

Table 4 - Available Domestic Flow to Tenants During Ship Refilling

Demand at each Pier (EL 25' NAVD88) (GPM)	Pipe Type	Diameter (Inches)	Maximum Combined Available Flow to Tenants (GPM)
75	Plastic (C=150)	4	50
100	Plastic (C=150)	4	20

4.3 PROCESS WATER

Process water demands were supplied by the Port or obtained through information provided by bulk industry representatives and then scaled to the anticipate production/export volumes for Barlow Point. Estimated process water demands are listed in the Demand Matrix in Figure 6. For the dry bulk option, the primary process water use is for urea at approximately 6,500 gpm. For the liquid bulk option methanol requires 760 gpm. If the single site user option (Option 3) contains a large ammonia/methanol plant, the demands increase to approximately 8,300 gpm. Due to the high instantaneous flow and volume demand, process water will likely not be supplied with existing infrastructure.

Alternate sources of process water were investigated including a surface water intake from the Columbia River, a ground-water intake well, or a new dedicated service main from the City. See the Riverfront Environmental and other Regulatory Considerations report located in Appendix D of the main report for more information on water rights for alternate process water sources in the area.

An available source of process water would be a surface water intake on the Columbia River. This would likely consist of a screening and pump system with a feed line over the levee to supply process water to the tenant(s). See the Riverfront Environmental and other Regulatory Considerations report located in

Appendix D of the main report for additional permitting issues associated with a surface water intake.

Another option to supply process water would be a groundwater intake structure. A structure such as a Ranney Well or other groundwater well could potentially provide tenant needs without impacting the levee or river. Such a well could be placed near the levee and would similarly supply tenant(s) via a direct supply line.

A third option would be to coordinate with the City to receive water from the Mint Farm Groundwater Intake. Based on information provided by the City, there may be availability in the Mint Farm system. Supplying Barlow Point with process water from the Mint Farm would require a new water main to be constructed from the Mint Farm to Barlow Point.

All process water effluent would likely need to be treated on-site by the tenant(s) prior to direct discharge to the Consolidated Diking District #1 (CDID#1) ditch network or to the Columbia River. Process water would likely not be able to be discharged to the sanitary sewer system due to the distance to the nearest connection point and capacity in the conveyance system to the treatment plant. If additional study determines that conveyance capacity is available, the National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit for the Three Rivers Regional Wastewater Treatment Plant indicates there is available capacity for treatment. The treatment plant has a total design capacity of 26 million gallons per day (MGD), the current estimated average inflow ranges from 7 MGD to 15 MGD. Process water effluent estimates range up to 2,200 gpm for the large use dry and liquid bulk options, these quantities equate as much as 3.2 MGD. Additional coordination with the City will be required to verify conveyance capacity within the existing system. Alternatively, process water treatment and discharge to the CDID#1 ditch network or directly to the Columbia River will require further coordination between the future tenant, the Port and the City.

5.0 SANITARY SEWER

Sanitary sewer demand directly corresponds to the domestic water demand (see Section 4.2 and Figure 6). The total design flow rate for the dry bulk option is approximately 19.1 gpm. The total design flow rate for the liquid bulk option is 16.9 gpm.

The existing sanitary sewer system near the site is routed to the Three Rivers Regional Wastewater Treatment Plant. The treatment plant has capacity for the anticipated domestic flows discharged from the site. See Section 4.3 for information regarding the treatment plant.

5.1 OFF-SITE CONNECTION OPTIONS

The City of Longview does not have existing sanitary sewer lines near Barlow Point. However, there are three possible connection points within a reasonable distance. These connection points were identified

and analyzed as a part of this study. See Figure 3 for a map of the possible connection points.

The closest City gravity sanitary infrastructure is located east of the site and north along 38th Ave to Prudential Blvd where it eventually connects to the Prudential Pump Station. The sanitary sewer line for Barlow Point could run east along SR432 and follow the same route as the adjacent parcel's 3-inch diameter line and connecting to the City gravity line at Prudential, approximately 7,600 feet from the site. However, preliminary information from the City indicates that it is not likely the gravity system has the capacity to accommodate our anticipated flows.

Another option is to install force main pipe from the site east along SR 432 to the intersection Prudential Blvd, approximately 7,000 feet from the site. The City maintains two 21-inch diameter force mains which run east along SR 432 from the Prudential Pump Station. This option would minimize pipe length and prevent inundating any of the nearby systems.

A third option would be to lay new force main pipe west along SR 432 and north on Mt Solo Road and connect into the infrastructure in Ocean Beach Highway approximately 10,500 feet from the site. According to the City, the existing systems in Mt. Solo Road is undersized and likely would not be capable of supporting the Ports needs as currently configured. It is possible that there is opportunity for the Port to partner with the City to have this work done.

5.2 ON-SITE OPTIONS

Due to the elevation of the site and the distance to the nearest possible connections to the City sewer system, the sanitary sewer system will be a pump and force main system. The system will likely be a combination of individual pumps and gravity lines for each tenant which would feed a central point to allow for a single master pump system to convey the discharge to the City's system located east or west of the site. Pump station design is not included in this report. Due to the overall length of the site distance to off-site sanitary infrastructure, a gravity only system is not feasible.

6.0 COMMUNICATIONS

Connection for communications can be made adjacent to the site at SR 432. CenturyLink, Comcast and Cascade Networks, Inc. among others have franchise rights for the City of Longview and are capable of supplying service to Barlow Point. Contact was made with each of the three providers listed above and each indicated that service could be provided to the site. The preferred installation for communication lines would be an underground duct system which would follow the backbone road to each tenant, similar to the sanitary sewer routing. See the Power Utilities Assessment report located in Appendix K of the main report for further discussion regarding communications on site.

7.0 NATURAL GAS

The nearest off site connection point for natural gas is near the intersection of SR 432 and Memorial Park Drive approximately 2,600 feet from the potential new entrance to the site (see Figure 4). A small diameter feed for the property could be placed along SR 432 to the site and routed along the access road to the anticipated connection points for each tenant. However, based on analysis information provided by Sophometrics, it may be more economically practical to use electricity or a heat pump for non-process loads use on site. This is due to the relatively small building demands for each tenant, and the length of the new infrastructure required. See the Energy Utilities Assessment in Appendix K of the main report for more information.

Some of the tenant processes in the dry and liquid bulk options have high natural gas demands for their production process. This would require a large diameter, high capacity natural gas line to be extended to the site. It is assumed that the permitting and design process associated with the large diameter natural gas line would be the responsibility of the tenant and occur after the Port “backbone infrastructure” was construction. See the Riverfront Environmental and Other Regulatory Considerations report located in Appendix D of the main report for more information on the permitting process of a large diameter natural gas line. In preparation for utility, a utility corridor adjacent to the access road could be held clear to allow for the future installation of a large diameter natural gas line without requiring major reconstruction of the access road or other site major utilities.

8.0 CPNCLUSION

As part of the due diligence process, general utility requirements were evaluated for the conceptual dry and liquid bulk concepts. This included an investigation of the existing site, identifying initial permitting and stake holder requirements, and a high level analysis of critical site utility components based on the conceptual site layouts and requirements.

The existing site evaluation included reviewing available published information and performing a field investigation to ascertain the general condition of the site and potential utility connection points to the City systems. Local authorities were also contacted to determine if there was any availability or capacity issues associated with the respective utility supply or discharge capacity.

The analysis accounts for the future needs of potential tenants, while focusing on the Port controlled backbone infrastructure. Each utility could be routed along the backbone road for supply to each tenant and pier structure. Preliminary investigation shows there is availability for each utility except for process water, and a natural gas connection is not recommended. Further design and coordination with perspective tenants will be needed to determine actual demand. Additional utility system summaries are below.

- There is availability for domestic and fire water supply within the City water system. Connection could be made adjacent to the site within the SR 432 right-of-way. The preferred route for each would be a loop system following the backbone road and allowing for connection to each tenant at a convenient location.
- Due to the high instantaneous flow rate and volume demand for process water, the existing 12 inch diameter line in SR432 likely cannot supply the demand. Other sources for process water include groundwater, surface water intake, or new supply line from the City.
- Sanitary sewer connection could be made at a number of locations with each more than a mile away from the site. Due to the distance and elevation of the site, a pump system will likely be required. On site collection could be routed to a central location to allow for a single pump station to pump off-site.
- A natural gas connection to the site is likely not economical for heating due to low demand of administrative buildings and the amount of new infrastructure required. The nearest connection point for natural gas is within SR 432 approximately 1/2 mile away.
- Process tenants with a high natural gas demand will require a new, large diameter natural gas line. It is recommended that a utility corridor be left for future natural gas connection by the tenant.
- Communications is available to the site from a number of purveyors, who either have lines adjacent to the site in SR 432 or are close enough to make the connection.

9.0 REFERENCES

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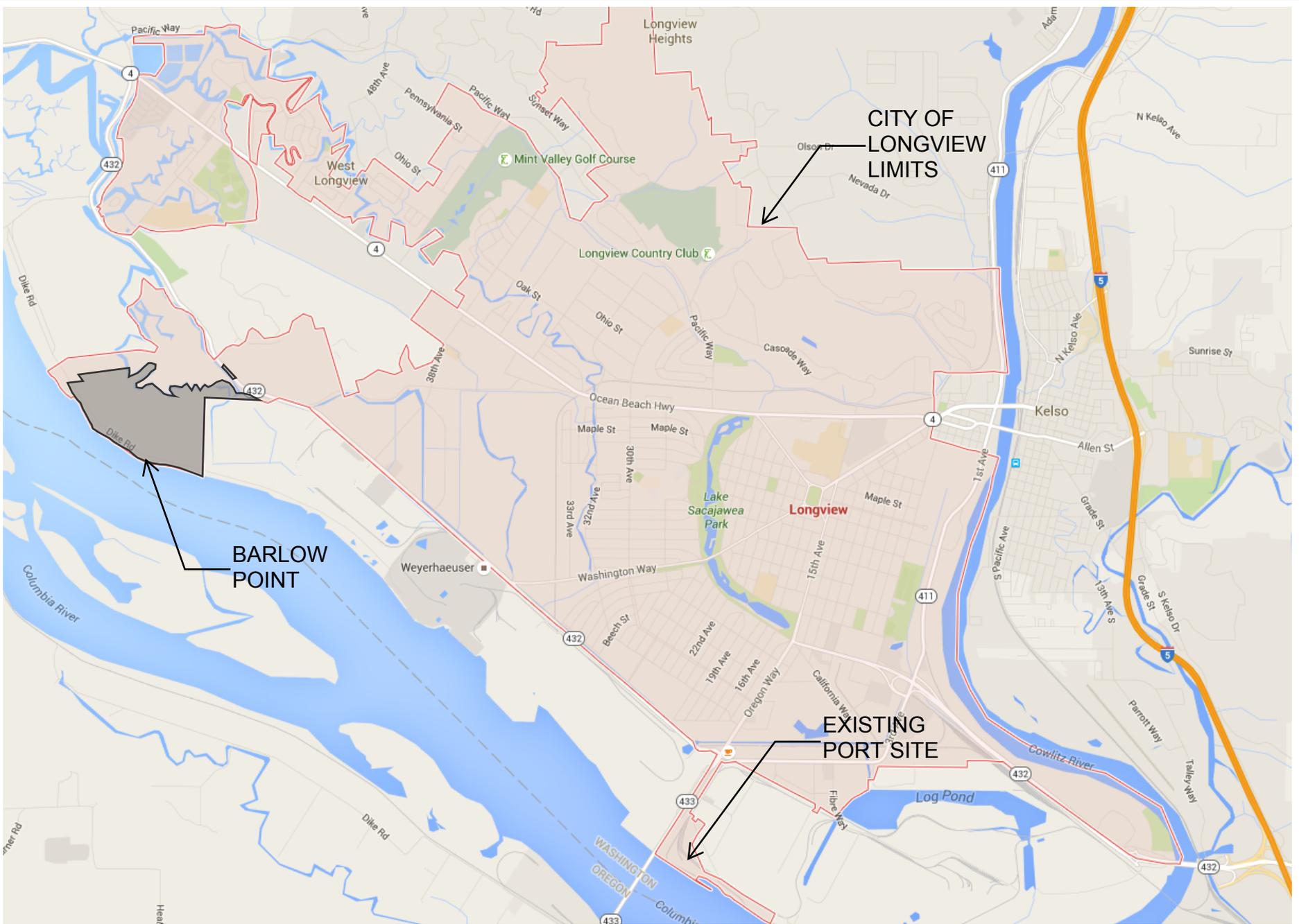
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FIGURE 1:
SITE PLAN

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NOT TO SCALE

 PORT OF LONGVIEW

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Engineers

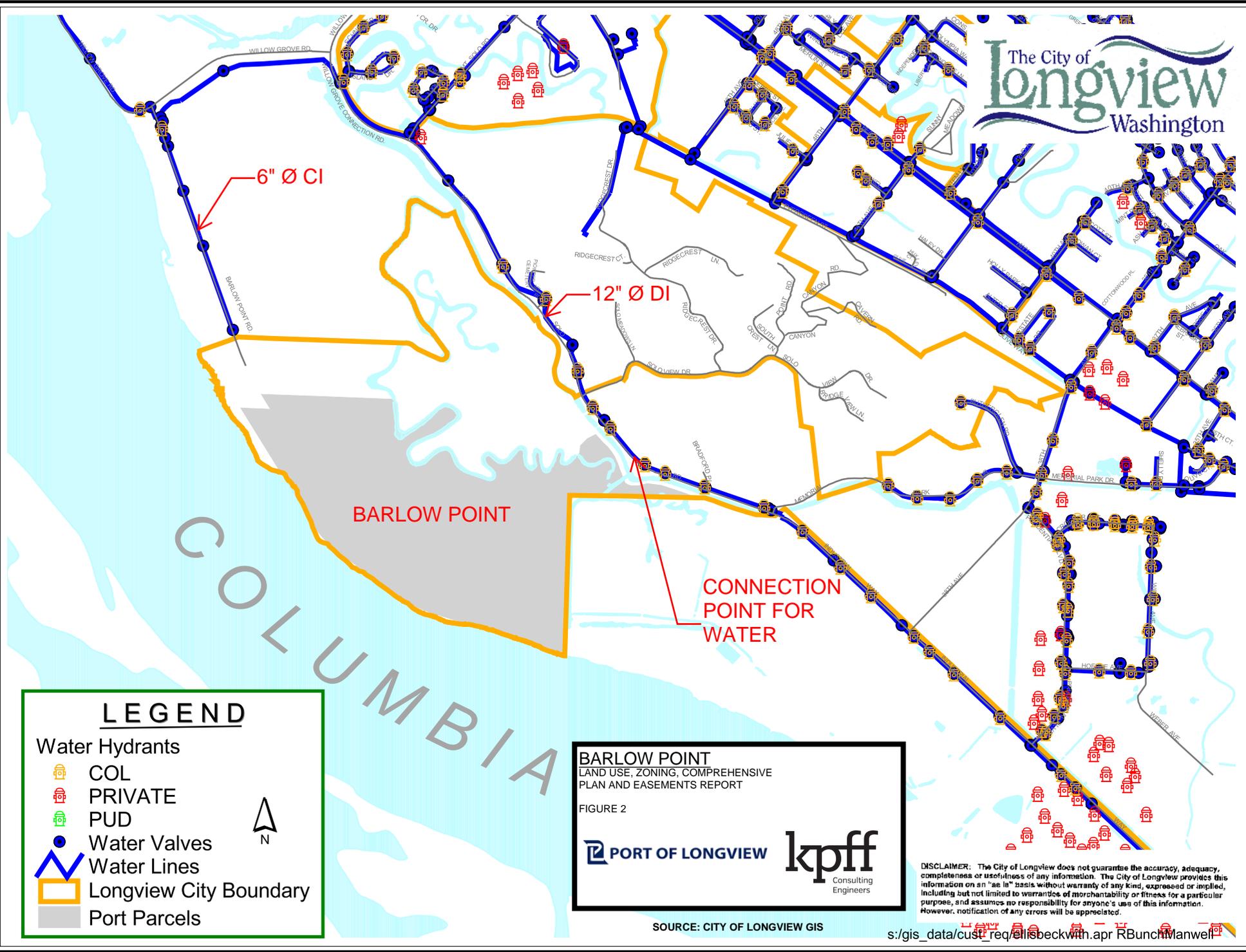
BARLOW POINT
PORT OF LONGVIEW
FIGURE 1
LOCATION MAP

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FIGURE 2:

CITY OF LONGVIEW GIS MAP - WATER

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LEGEND

- COL
- PRIVATE
- PUD
- Water Valves
- Water Lines
- Longview City Boundary
- Port Parcels

N

BARLOW POINT
LAND USE, ZONING, COMPREHENSIVE
PLAN AND EASEMENTS REPORT

FIGURE 2

PORT OF LONGVIEW **kpff**
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FIGURE 3:
CITY OF LONGVIEW GIS MAP –
SANITARY SEWER

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COLUMBIA

POSSIBLE CONNECTION WEST OF SITE

BARLOW POINT

NEIGHBORING INDUSTRIAL PROPERTY
3" Ø FORCE MAIN

PRUDENTIAL LIFT STATION

POSSIBLE CONNECTION TO 21" Ø FORCE MAINS (2)

POSSIBLE CONNECTION TO GRAVITY SEWER

LEGEND

-  Longview City Boundary
-  Port Parcels
-  Sewer Lines
-  Sewer Manholes



BARLOW POINT
LAND USE, ZONING, COMPREHENSIVE
PLAN AND EASEMENTS REPORT

FIGURE 3



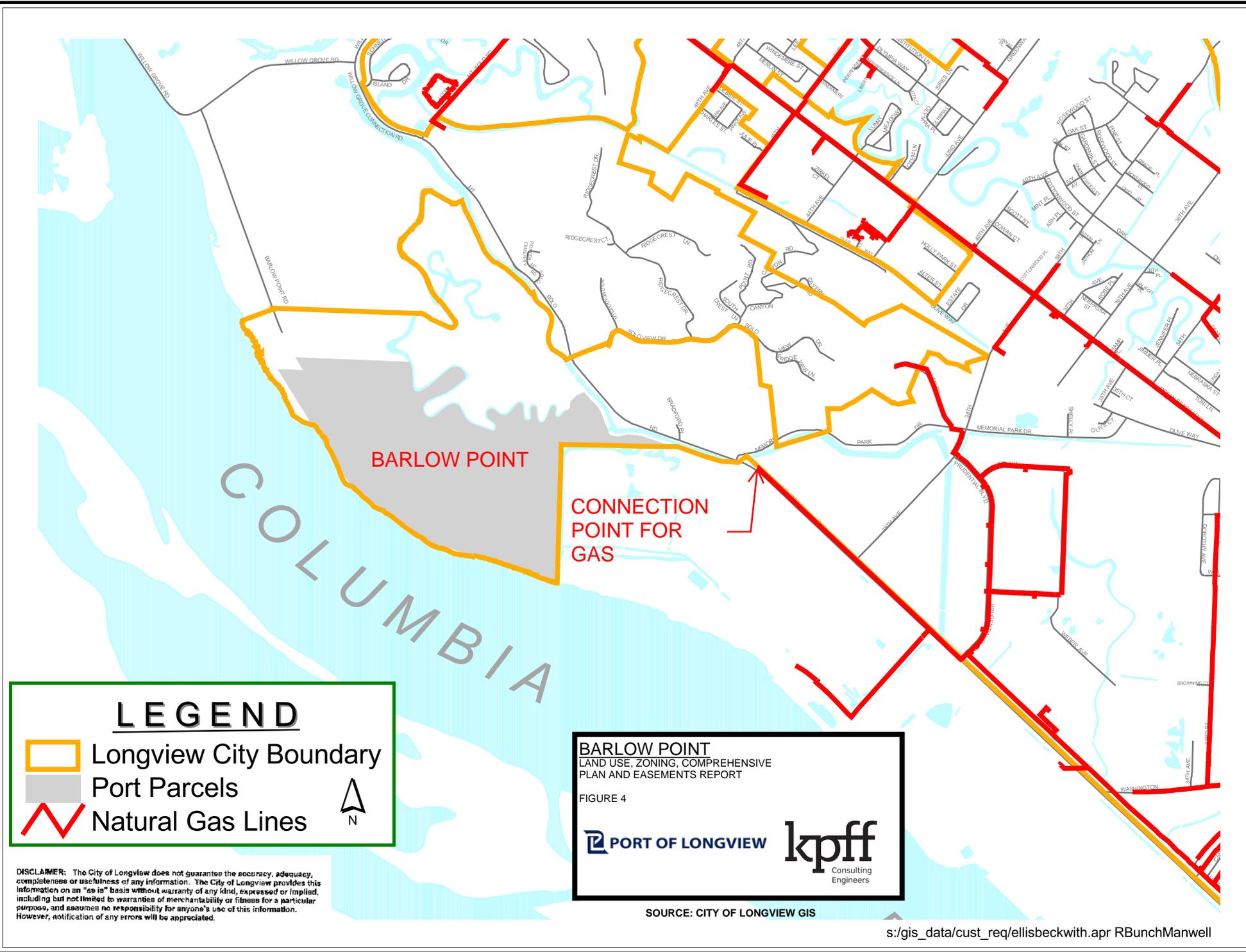

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FIGURE 4:

CITY OF LONGVIEW GIS MAP - GAS

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LEGEND

-  Longview City Boundary
-  Port Parcels
-  Natural Gas Lines



BARLOW POINT
 LAND USE, ZONING, COMPREHENSIVE
 PLAN AND EASEMENTS REPORT

FIGURE 4



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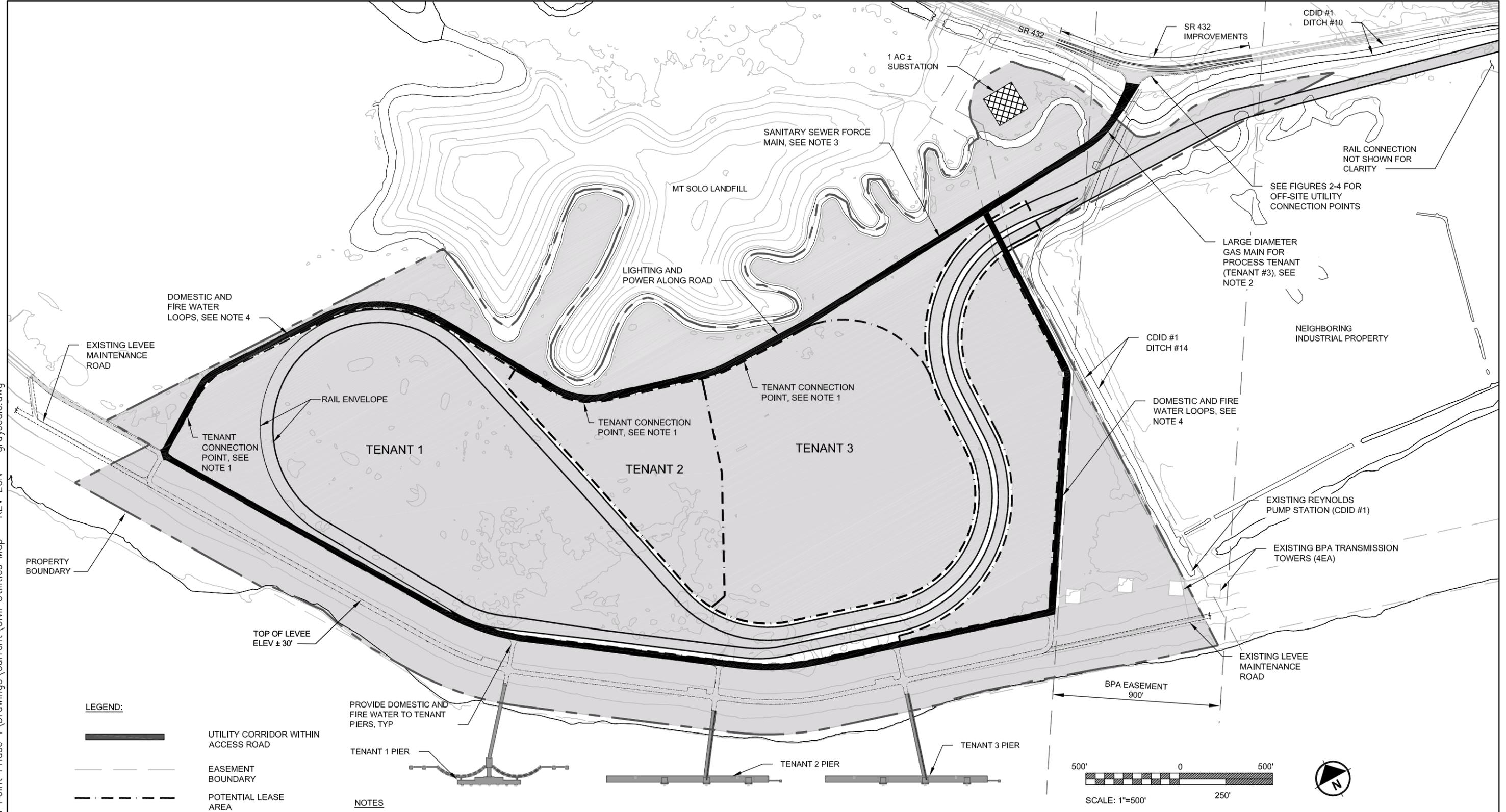
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FIGURE 5:
PRELIMINARY UTILITY CONCEPT

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 M:\2014\114180 Barlow Point Phase 1\Drawings\Civil Utilities Map - REV ECN - grayscale.dwg



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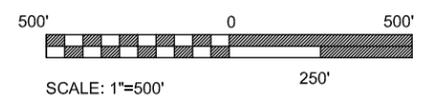
-  UTILITY CORRIDOR WITHIN ACCESS ROAD
-  EASEMENT BOUNDARY
-  POTENTIAL LEASE AREA
-  RAIL LINE ENVELOPE
-  PROPERTY LIMITS

PROVIDE DOMESTIC AND FIRE WATER TO TENANT PIERS, TYP



NOTES

1. TENANT UTILITY CONNECTION POINTS TO BE LOCATED ALONG THE ACCESS ROAD AND BETWEEN PROPERTY LINES. FURTHER COORDINATION IS REQUIRED.
2. FOLLOWING CONSTRUCTION OF THE BACKBONE INFRASTRUCTURE, THE PROCESS TENANT CAN BUILD A LARGE DIAMETER GAS MAIN IN A UTILITY CORRIDOR SOUTH OF THE ACCESS ROAD TO MINIMIZED IMPACTS TO ROAD.
3. ROUTE SANITARY SEWER ALONG THE ACCESS ROAD AS NEEDED TO TENANT UTILITY CONNECTION POINTS.
4. ROUTE 12"Ø± FIRE WATER AND 4"Ø± DOMESTIC WATER LOOPS AROUND THE SITE IN THE ACCESS ROAD.



**PORT OF LONGVIEW - BARLOW POINT
 CIVIL UTILITIES MAP**

DATE: 2016-02-05	SCALE: AS SHOWN
DRAWN BY: ESB	FIGURE 5

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FIGURE 6:

UTILITY DEMAND MATRIX

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kpff 1601 5th Avenue, Suite 1300 Seattle, Washington 98101 p (206) 382-0600	Project: Barlow Point Due Diligence Study	Date: 2/5/2016
	Location: Barlow Point, Longview, Washington	Sheet #: 6 of 6
	Client: Port of Longview	Job #: 114180
	By: ESB	

Figure 6: Utility Demands Matrix

	Fire Water ¹ (gpm)	Domestic Water ² (gpm)	Sanitary Sewer ² (gpm)	Cold Ironing ³ (MW)	Process Power ³ (MW/d)	Process Water - IN ³ (gpm)	Process Water - OUT ³ (gpm)	Process Nat. Gas ³ (mmcf/d)
Option 1 - Dry Bulk								
Potash	6,000	5.7	5.7	0.4				
Wood Pellets	3,000	10.5	10.5	0.4				
Urea (process)	3,000	2.9	2.9	0.4	35	6,500	2,200	100
Subtotal	6,000	19.1	19.1	1.2	35	6,500	2,200	100
Option 2 - Liquid Bulk								
Crude	3,000	2.9	2.9	0.5				
Biodiesel (process)	3,000	10.4	10.4	0.5	15			
Methanol (process)	4,500	3.6	3.6	0.5	20	760	250	100
Subtotal	4,500	16.9	16.9	1.5	35	760	250	100
Totals	gpm	gpm	gpm	MW	MW/d	gpm	gpm	mmcf/d
Option 1 Total	6,000	19.1	19.1	1.2	35	6,500	2,200	100
Option 2 Total	4,500	16.9	16.9	1.5	35	760	250	100
Backbone Port Areas	3,000	0.0	0.0					
Option 3 - Single Tenant⁴						8,300		

Notes:

- 1) Fire flow based on Table B105.1 of the International Fire Code 2012 and anticipated building sizes and types.
- 2) Domestic water and sanitary sewer flow rates from the DOE Water System Design Manual and anticipated crew sizes.
- 3) Demands are approximate and are based on preliminary information from industry representatives, the Port, and Perspective tenants.
- 4) Only process water was considered for Option 3 to determine water rights availability. For more information on water rights, see the Riverfront Environmental and Other Considerations Report located in Appendix D of the main report.

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