DRAFT

Draft Engineering Design Report (EDR), Area B2 Storm Drain Repairs, and Areas C2 and C3 Fencing/Signage

Everett Smelter Site, Lowland Area
Everett, Washington

for
Washington State Department of Ecology

June 29, 2018

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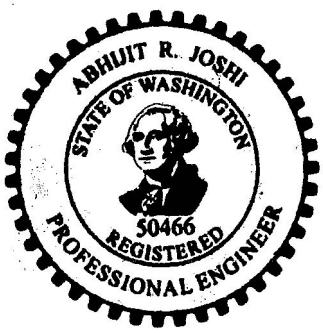

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ACRONYMS AND ABBREVIATIONS

Area B2	Remedial Action Area B2
Area B2 Report	Baseline Testing for Pilot-Scale PRB and Groundwater/Storm Drain Investigation at Area B2 report
Area C2	Remedial Action Area C2
Area C3	Remedial Action Area C3
ARI	Analytical Resources, Inc.
ASARCO	American Smelting and Refining Company
ASTM	ASTM International
bgs	below ground surface
BMPs	best management practices
BNSF	Burlington Northern Santa Fe
CAP	Cleanup Action Plan
CCTV	closed-circuit television
CDF	controlled density fill
CFR	Code of Federal Regulations
City	City of Everett
CIPP	cured-in-place pipe
CPP	corrugated polyethylene pipe
DAHP	Department of Archaeology and Historic Preservation
DEA	David Evans and Associates, Inc.
DNS	Determination of Non-Significance
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EIM	Ecology's Environmental Information Management
FS	Feasibility Study
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
H:V	horizontal to vertical
ID	identification
IHSs	indicator hazardous substances
Lowland or Lowland Area	Everett Smelter Site Lowland Area
mg/kg	milligrams per kilogram

µg/L	micrograms per liter
mg/L	milligrams per liter
MHHW	mean higher high water
MTCA	Model Toxic Control Act
NAVD88	North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
OSHA	Occupational Safety and Health Administration
Port	Port of Everett
PUD	Public Utility Department
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
OSHA	Occupational Safety and Health Administration
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
ROW	right-of-way
SEPA	State Environmental Policy Act
SRI	Supplemental Remedial Investigation
TESC	temporary erosion and sediment control
TCLP	toxicity leaching characteristic procedure
WAC	Washington Administrative Code
WISHA	Washington Industrial Safety and Health Act
WSDOT	Washington State Department of Transportation

1.0 INTRODUCTION

This Engineering Design Report (EDR) presents engineering concepts and design criteria that will be used for the design of the remedial actions at Remedial Action Areas B2, C2 and C3 (Areas B2, C2 and C3) of the Everett Smelter Site Lowland Area (Lowland Area). The remedial actions proposed for Areas B2, C2 and C3 are summarized in the Washington State Department of Ecology (Ecology) approved Lowland Area Cleanup Action Plan (CAP; GeoEngineers 2016a). The focus of this EDR is storm drain repairs at Area B2 and fencing and signage at Areas C2 and C3. As identified in the CAP, storm drain repairs are proposed for Area B2 to eliminate infiltration of contaminated media (groundwater and/or soil) and transport of contaminants in the storm drain system to the Snohomish River. Fencing and signage are proposed for Area C2 and C3 to eliminate and/or minimize human health exposure risk to contaminated soil located within these areas. The Lowland Area, including Areas B2, C2 and C3, is being remediated by Ecology as part of a bankruptcy settlement agreement with the prior owner of the smelter – American Smelting and Refining Company (ASARCO).

The Lowland Area, including Areas B2, C2 and C3, are located in the northern portion of Everett, Washington. Area B2 is located adjacent to the Snohomish River and east of Highway 529 (portion of Highway 529 also known as Pacific Highway). Areas C2 and C3 are located north of Highway 529 (portion of Highway 529 also known as West Marine View Drive) and are part of a steep northeast-facing slope that separates Upland and Lowland areas of the Everett Smelter Site. A vicinity map showing approximate locations of Areas B2, C2 and C3 is presented on Figure 1. The approximate locations of Areas B2, C2 and C3 in relation to the Everett Smelter Site Upland and Lowland Area, and former Everett smelter are shown on Figure 2.

This EDR is organized as follows:

- Section 1.0 presents an introduction for Areas B2, C2 and C3 remedial actions and organization of the EDR.
- Section 2.0 summarizes background information for Areas B2, C2 and C3 including historical use and sources of contamination, property ownership, current and future land uses, previous environmental investigations, existing conditions and nature and extent of contamination.
- Section 3.0 summarizes the cleanup requirements for the Lowland Area that are detailed in the CAP.
- Section 4.0 identifies preliminary plans and specifications prepared for remedial action work at Areas B2, C2 and C3.
- Section 5.0 describes the storm drain repair activities at Area B2.
- Section 6.0 describes fencing and signage installation activities at Areas C2 and C3.
- Section 7.0 presents compliance monitoring activities for the remedial actions described in this EDR.
- Section 8.0 summaries quality assurance/quality control (QA/QC) requirements.
- Section 9.0 presents a general schedule for the remedial actions described in this EDR.
- Section 10.0 presents post-construction reporting requirements.
- Section 11.0 presents the limitations of the EDR.
- Section 12.0 provides references for reports, documents, and publications that were referred to in preparing the EDR.

2.0 BACKGROUND INFORMATION

2.1. History and Sources of Contamination

Lead smelting operations began in 1894 and was the primary product produced at the smelter facility. Arsenic extraction was added in 1898. During the time of smelter operations, Area B2 (as well as majority of Lowland Area) was an estuarine wetland area influenced by riverine processes of the Snohomish River. Surface soils throughout Area B2 consisted of fine-grained alluvial deposits of silt and clay as well as peat except in areas where these finer grained materials were replaced by channel deposits consisting of coarser grained silty sands and sandy silts. Alluvium comprised predominantly of sand is present beneath the silt, clay, peat and channel deposits. The historical surface (also identified as historical native surface) at Area B2 was approximately 7 to 12 feet lower than the present-day ground surface. The present surface elevation in Area B2, is the result of multiple episodes of filling. The predominant source of the fill, especially deeper fill, is material dredged from the Snohomish River (Hydrometrics 1995) consisting fine to coarse sands. Other fill, especially closer to the present-day ground surface, includes gravely sand, crushed rock, and bark, and is up to 5 feet thick.

Two aquifers are present in the Lowland Area, including Area B2: a shallow, water-table aquifer that is present in the fill placed on the historic native surface and a deep confined aquifer that is in the alluvium. The aquifers are separated by an aquitard that is comprised of the silt, clay, and peat deposits.

The sources of contamination within Area B2 include 1) fallout [fine particulates] from smelter stack emissions that was deposited on the historical native surface, 2) slag [dark and vitreous material similar to ballast that is a byproduct of smelting operation] used during filling activities, and 3) contaminated shallow aquifer groundwater that is flowing from the location of historic smelter towards Snohomish River.

Unlike the remaining portion of the Lowland Area, the steep northeast-facing slopes, including Areas C2 and C3, that separates the Upland and Lowland Areas of the Everett Smelter Site likely remained relatively unaltered since the operation of the smelter and no significant fill is known to have been placed on these slopes. The source of contamination within Areas C2 and C3 consists of fallout (fine particulates) from smelter stack emissions that was deposited on the surface.

Smelter operations, including operation of the arsenic extraction facility, were discontinued in 1912. After closure of the smelter, most of the aboveground smelter facilities were dismantled. During 1920s through 1930s, ASARCO sold the smelter facility properties and the area was subsequently redeveloped predominantly for residential use. In 1956, the interchange of Marine View Drive and Highway 529 was constructed by the City of Everett (City) within the boundary of the former smelter facility. The Everett Smelter Site was identified in October 1990 when soil and groundwater samples were collected near East Marine View Drive that contained elevated metals concentrations (Ecology 1999). The Everett Smelter Site was studied extensively since its discovery and cleanup activities consisting of remedial excavation and capping were completed for a portion of the Upland Area (known as the fenced area) in mid-2000s. A detailed history of smelter operations and Lowland Area development is presented in the Supplemental Remedial Investigation/Feasibility Study Report (SRI/FS Report; GeoEngineers 2016b).

2.2. Property Ownership, and Current and Future Land Use

Area B2 includes the portions of the parcels owned by the Port of Everett (Port) (Parcel Numbers: 29050800402000, 29050900300800, 29050800402700 and 29050800402800), and Marshal and

Katherine Cymbaluk (Parcel Number: 29050800402100). Area B2 is primarily comprised of paved surface streets (Riverside Road) in the western and southern portion, International Motor Trucks building and associated parking lot in the central portion and paved pedestrian pathway along the shoreline in the northeastern portion. One stormwater detention pond is located in the northern portion of Area B2 and second stormwater detention pond is located south of Area B2. The Snohomish River is located adjacent to Area B2 in the northeast, and Burlington Northern Santa Fe's (BNSF's) right-of-way (ROW) is located adjacent to Area B2 in the west. The properties located south of Area B2 are owned by the Port and are currently being redeveloped as part of Port's Riverside Business Park. The future use of Area B2 is expected to be consistent with the current use.

Area C2 includes portion of parcels owned by the City and Everett Delta Power Company LLC (Parcel Number: 2905080020110). Area C3 includes portions of parcels owned by Snohomish County Public Utility Department (PUD) (Parcel Number: 29050800400300), Shadow Development (Parcel Number: 29050800402200), Everett Delta Power Company LLC (Parcel Number: 2905080020110) and Washington State Department of Transportation's (WSDOT's) ROW. Areas C2 and C3 primarily consist of steep forested slopes which are undeveloped. Two paved roads cut across Area C3 including an access road from Highway 529 to Snohomish County PUD substation and Bridge Way that connects Highway 529 to adjacent properties to the east. Highway 529, which is a WSDOT ROW, is located along the uphill portion of Areas C2 and C3 and, BNSF railroad ROW and a Snohomish County PUD substation are located along the downhill portion of Areas C2 and C3. The future use of Areas C2 and C3 are expected to be consistent with the current use.

Property ownership and parcel boundaries at Areas B2, C2 and C3 are shown on Figure 3.

2.3. Previous Environmental Investigations

Multiple investigations have been conducted at the Everett Smelter Site between 1995 and 2014 that produced data, which was used in developing SRI/FS Report (GeoEngineers 2106a) and CAP (GeoEngineers 2016a). The SRI/FS Report summarizes the results of investigations performed between 1995 and 2014.

Storm drain contamination at Area B2 was identified as a result of a sample collected from the outfall located in the southeast corner of Area B2 during the supplemental remedial investigation in 2013. Additional investigation was completed in 2017 to confirm contamination in the storm drain system by sampling and analyzing water from selected catch basins and manholes. The results of additional investigation in 2017 confirmed the presence of contamination and are summarized in the Baseline Testing for Pilot-Scale PRB and Groundwater/Storm Drain Investigation at Area B2 report (Area B2 Report; GeoEngineers 2018).

The investigation identifying contamination at Areas C2 and C3 was performed as part of the supplemental remedial investigation in 2013. The results of investigation of Areas C2 and C3 are summarized in the SRI/FS Report.

2.4. Existing Conditions

The following sections present the existing conditions of the storm drain system located in/adjacent of Area B2. Additional information regarding existing conditions of Area B2, in general, are presented in the SRI/FS Report and Area B2 Report. The existing conditions of Areas C2 and C3 are summarized in Section 2.2.

A topographic survey was completed for the general area of Area B2 by David Evans and Associates, Inc. (DEA) in February 2017 (Appendix A). The survey presents existing surface topography; surface features including roads, curbs, parking areas, buildings and shoreline area; and existing utilities including storm drains located in/adjacent to Area B2. The survey was completed to provide the basis for preparing remedial design drawings for remedial actions to be performed in Area B2.

The information presented below is based on the Area B2 Report (GeoEngineers 2018) and additional field observations and video survey activities that were completed in March 2018 to support the design of the storm drain repairs.

2.4.1. Storm Drain System Details

The drainage area of the storm drain system in Area B2 includes the paved areas of Riverside Road and parking lot of the International Motor Trucks, Inc. building and unpaved areas including the Snohomish River shoreline area and embankments of Riverside Road bridge abutment. Stormwater in the unpaved areas, including the shoreline area and the embankments of Riverside Road, likely infiltrates into the subsurface or sheet flows to the adjacent areas.

The existing storm drain system in Area B2 consists of storm drain lines (gravity and force main lines), catch basins, manholes, two pump stations, two detention ponds (north and south) and an outfall, as shown on Figure 4. Table 1 summarizes the details for storm drain system structures including invert elevations of storm lines within the catch basins and manholes, slope and length of the storm line pipes between catch basins and/or manholes, and storm line pipe material and diameter.

The classification of a storm drain structure as a catch basin or manhole is based on observations made during a field visit. Structures observed to have grated lids are identified as catch basins and structures observed to have closed lids are identified as manholes. Based on review of the video survey, it appears that some of the catch basins would allow human access similar to a manhole.

Based on the Port's Record Drawings (Appendix B), each of the two detention ponds consists of one detention cell and one wetland treatment cell for flow control and water quality treatment. Both detention ponds are lined with a Bentomat® geosynthetic clay liner consisting of granulated bentonite between two geotextile layers that is intended to prevent infiltration from the detention pond to the underlying soils. The additional construction details of the detention ponds are provided in Appendix B.

The stormwater inflow network to the south detention pond consists of 19 gravity storm drain segments (S1 through S19) measuring approximately 1,620 feet long that are connected via 18 catch basins (CB6 through CB18 and CB28 through CB32) and a pump station. All of the 18 catch basins appear to collect stormwater runoff from Riverside Road and conveys it to the pump station, where the water is pumped to the south detention pond via an approximately 25-foot long force main storm drain line.

Additional force main storm drain lines exist within the south detention pond inflow network based on review of the City's mapping data (Interactive Everett Map on City of Everett website [https://everettwa.gov]) including a force main storm drain line running east-west and located south of the detention pond, and a force main storm drain line running north-south and located southwest of the detention pond (Figure 4). The force main storm drain line running east-west and located south of the detention pond doesn't appear to be collecting or discharging any water to the pond and was likely installed to provide connection for future site development. The force main storm drain line running north-south and located southwest of the pond collects water from the Riverside Road located further south of Area B2.

The stormwater inflow network to the north detention pond consists of 18 gravity storm drain segments (N1 through N18) measuring approximately 1,890 feet long that are connected via 18 catch basins (CB25 through CB27, CB36 through CB47 and CB51 through CB53) and a pump station. Six of the 18 catch basins (CB25 through CB27 and CB51 through 53) appear to collect stormwater runoff from the Riverside Road and the remaining 12 catch basins (CB36 through CB47) appear to collect stormwater runoff from the parking lot associated with International Motor Trucks and convey it to the pump station, where the runoff is pumped to the north detention pond via an approximately 180-foot long force main storm drain line.

The stormwater outflow network consists of 17 gravity storm drain segments (U1 through U17) measuring approximately 2,100 feet long that are connected via two catch basins (CB24 and CB47), 11 manholes (CB19 through CB23, CB33 through CB35, and CB48 through CB50) and include the south and north detention ponds. The outflow network primarily collects overflow water from the south and north detention pond outlets and conveys it to the outfall located in the southeastern portion of Area B2. When the water level in the south and north detention ponds reach the maximum storage level, water spills into the outlet at each pond and into the stormwater outflow network. Additionally, stormwater runoff from the roof of the International Motor Trucks Inc.'s building is conveyed to the outflow network via the storm drain segment U5 connected from the roof drain to manhole CB50 and catch basin CB24 potentially collects stormwater runoff from the grassy areas surrounding this catch basin.

The storm drain segment U3 located between catch basin CB47 and manhole CB48 directly connects the inflow network to the north detention pond with the outflow network as shown on Figure 4. Catch basin CB47 is part of the inflow network to the north detention pond unless the volume of stormwater in the system exceeds pump station capacity. Then, based on review of the video survey, it appears that segment U3 acts as a bypass/overflow line. It is suspected that when the storm water runoff inflow exceeds the north detention pond pump station capacity, water backs up until the invert elevation of the storm drain segment U3 at catch basin CB47 is reached. Beyond this point, the excess water outflows under gravity through storm drain segment U3 and ultimately discharges to the river (bypassing the north detention pond) via the rest of the downgradient outflow network.

The majority of the storm drain segments are constructed of corrugated polyethylene pipe (CPP). The remaining storm drain segment are made of polyvinyl chloride (PVC) pipe or steel pipe. The storm drain pipe diameter ranges from 6 inches to 24 inches. Most of the storm drain segments that convey runoff to the detention ponds are 12-inch diameter pipes. Between the detention ponds and outfall, the storm drain segments are mainly 24 inches in diameter.

The slope of the storm drain segments were evaluated by reviewing available pipe invert elevations inside catch basins and manholes provided by the topographic survey. All of the storm drain segments with available invert elevations had positive drainage with the exception of four storm drain segments; S4, S11, N4 and N5. Positive drainage, indicated by a positive value in Table 1, indicates that flow in the storm drain segment is toward the outfall for outflow network and towards detention ponds for inflow networks. A negative slope value indicates that the flow direction in the storm drain segment is not toward the outfall (i.e., outflow network) or detection ponds (inflow network). A negative slope in a storm drain might have been caused by soil erosion, settlement or sagging. The negative slope values between the identified storm drain segments ranged between -0.4 to -0.5 percent. The downgradient invert in these storm drain segments was 0.1 feet higher than the upgradient invert. This difference is approximately 0.8 percent of

the diameter of the storm drain segments. Based on Seattle Public Utilities, minor sag (i.e., less than 25 percent of the pipe diameter) typically does not cause negative effects on the storm sewer[1].

2.4.2. Storm Drain Conditions

The conditions of the storm drain segments at Area B2 were evaluated to identify where infiltration of groundwater and possibly soil could be occurring and causing transport of contaminants from Area B2 to the outfall into the Snohomish River. Video surveys were completed to assess the physical condition of the storm drain segments and identify any defects including broken, fractured or deformed pipe; cracks; joint separation; sagging; or evidence of infiltration that may allow infiltration of media into the storm drain segments (Section 2.4.2.1). The locations of the storm drain segments in relation to the seasonal high groundwater level were also evaluated to identify storm drain segments that are below the groundwater level and potentially subject to groundwater infiltration (Section 2.4.2.2). Additionally, tidal influence and the extent to which the tide water backflows into the storm drain segments through the outfall was also evaluated (Section 2.4.2.3). The conditions of storm drain segments are described in the following sections.

2.4.2.1. Storm Drain Video Survey Results

The storm drain video survey activities were completed in three events. The first event was completed on November 21 and 22, 2016, the second event was completed on December 15 and 16, 2016 and the third event was completed on March 21, 2018. Video surveying activities were completed by Pro-Vac of Orting, Washington (or Everson's Econo-Vac, Inc. of Sumner, Washington owned by Pro-Vac) using a closed-circuit television (CCTV) camera. The second and third events were completed to survey storm drain segments that could not be surveyed during the prior event(s). Video surveying of all the storm drain segments could not be completed during an event because some of the storm drain segments could not be accessed due to construction activities occurring in the vicinity or the storm drain segments or the segment were inundated with water. At the end of the third event, all the storm drain segments located at/near Area B2 were either partially or completely surveyed with the exception of three segments; N5, U9 and U10. These three segments could not be accessed using survey equipment since they remained inundated with water. Video survey activities for some of the segments could only be partially completed due to presence of defects or deposits (debris or sediment) as described below.

The results of storm drain video survey are summarized in Table 2 and Figure 5. A detailed inspection report for each segment of the video survey prepared by Pro-Vac is presented in Appendix C. Pro-Vac's inspection report identifies the nature of defects or deposits (debris or sediment) if observed and distance at which defects/deposits were observed for each segment of the video survey. The following summarize the observations from the video survey:

- **Inflow network to the south detention pond:** Video survey attempts were made on all of the 19 storm drain segments located within the inflow network of the south detention pond. Of the 19 segments surveyed, videos for five segments were only partially completed and abandoned due to the presence of debris or broken pipes. These five segments include S10 through S12, S14 and S19. The video surveying activities identified a defect or defects in seven segments including S2, S3, S7, S8, S10, S12, and S18 and deposits in 13 segments including S3 through S5, S7, S8, S10 through S16 and S19. Four segments were observed to contain neither defects nor deposits including S1, S6, S9, and S17.

[1] Per Seattle Public Utilities Web Site regarding sagging pipes:
http://www.seattle.gov/util/MyServices/DrainageSewer/YourPropertysSideSewer/Saggingpipes/index.htm

- **Inflow network to the north detention pond:** One segment, N5, located within the inflow network of the north detention pond could not be surveyed as it remained inundated with water during the time of the survey. Video survey attempts were made on the rest of the 17 storm drain segments located within the inflow network of the north detention pond. Of the 17 segments surveyed, video for one segment, N2, was partially completed and abandoned since the camera encountered debris and water causing poor or no visibility. The video surveying activities identified a defect or defects in five segments including N2 through N4, N7, and N14 and deposits in five segments including N1 through N4 and N10. Eleven segments were observed to contain neither defects nor deposits including N5, N6, N8, N9, N11 through N13, and N15 through N18.
- **Outflow network:** Two segments, U9 and U10, located within the outflow network could not be surveyed as they remained inundated with water during the time of the survey. Video survey attempts were made on rest of the 15 storm drain segments located within the outflow network. Of the 15 segments surveyed, videos for two segments, U8 and U12, were partially completed and abandoned. Video survey for segment U12 was abandoned due to debris. This segment is identified to be plugged in the Port's Record Drawings (Appendix B). The majority of the length of segment U8 was surveyed. However, since this segment was partially or fully inundated with water its conditions could not be assessed due to poor visibility. As shown on Figure 5, three segments U8, U9 and U10, are located in sequence near the outfall to the Snohomish River and it is suspected that due to a sag in this portion of the storm drain, water sits in the line and does not completely drain out. Based on the diameter (24 inch) and total length (400 feet) of these three segments, it is estimated that they can contain a maximum of approximately 9,400 gallons of water when full. During 2018 video survey, an attempt was made to dewater these three segments so that a video survey could be completed. Approximately 9,100 gallons were dewatered. However, reduction in the water level in these segments was observed to be insignificant (less than a few inches of water level drop). Dewatering activities were performed at the time when tide levels were below the invert of the outfall and therefore, water in these three segments was not influenced by tide water backflow. Additionally, the influx of water into these segments from upgradient pipes was observed to be minor at the time of dewatering (water flow was approximately an inch above the upgradient pipe inverts). Therefore, it is suspected that soil surrounding segments U8, U9 and U10 may be highly saturated and contributing to the influx of water into these segments when dewatering was performed.

  The video surveying activities identified a defect or defects in seven segments including U1, U3, U6, U7, U13, U16 and U17 and deposits in four segments including U7, U8, U10 and U12. Six segments were observed to contain neither defects nor deposits including U2, U4, U5, U11, U14 and U15.

2.4.2.2. Storm Drain Lines and Seasonal High Groundwater Level

The seasonal high groundwater level in Area B2 encompassing the storm drain lines has been observed to range between 8.2 to 9.5 feet North American Vertical Datum of 1988 (NAVD 88) based on depth to groundwater measured in groundwater monitoring wells during the four quarters of monitoring completed in 2017 and described in the Area B2 Report (GeoEngineers 2018). The available invert elevations of the storm drain lines in catch basins and manholes from the topographic survey summarized in Table 1 were reviewed to identify the storm drain lines that are located below the seasonal high groundwater level and have the potential to allow groundwater infiltration. The following sections identify the stormwater lines estimated to be below the seasonal high groundwater levels.

- **Inflow network to the south detention pond:** Within the inflow network to the south detention pond, five storm drain segments are estimated to be located below the seasonal high groundwater levels including S3 through S7.
- **Inflow network to the north detention pond:** Within the inflow network to the north detention pond, six storm drain segments are estimated to be located below the seasonal high groundwater levels including N2, N3 and N5 through N8.
- **Outflow network:** Within the outflow network, 16 storm drain segments are estimated to be located below the seasonal high groundwater levels including U1 through U4 and U6 through U17.

2.4.2.3. Tidal Influence on Storm Drain Lines

An evaluation of tidal influence on the storm drain lines was performed in response to observations made during Pro-Vac's initial storm drain video survey which indicated tidal influence within the outflow network. A site visit was completed by GeoEngineers in March 2018 to evaluate tidal influence. The observations made during the site visit indicated that the storm drain segments with invert elevations lower than the tide level are influenced by the tide. Based on this observation it is likely that the one-way gate at the outfall is malfunctioning and thus allowing tide water to backflow into the storm drains as the tide rises above the invert elevation of the outfall (i.e. 2.6 feet NAVD88). Based on National Oceanic and Atmospheric Administration (NOAA) station datum 9447717 the mean higher high water (MHHW) level for Everett is approximately 9.1 feet NAVD88 and based on NOAA's 2018 tide predictions, the highest tide level in Everett was estimated to be at approximately 11.3 NAVD88. Invert elevations of storm drain segments in catch basins and manholes in relation to these tide levels were evaluated to determine tidal influence. The following sections summarize tidal influence on the storm drain segments.

- **Inflow network to the south detention pond:** None of the storm drain lines located within the inflow network of the south detention pond were identified to be tidally influenced and were not expected to be influenced by tidal water since this inflow network is not directly connected to the outfall.
- **Inflow network to the north detention pond:** Eleven storm drain segments within the inflow network of the north detention pond are potentially influenced by tidal water including N1 through N10 and N14. Tide water that infills the outflow network reaches the storm drain segments located within the inflow network of the north detention pond through the bypass/overflow storm drain segment U3.

  Based on observations made during March 2018 site visit, it is likely that the tide water that reaches the north detention pond pump station is pumped into the north detention pond. This tide water would ultimately cycle through the north detention pond and the outflow network to the outfall when the north detention pond reaches is maximum storage capacity and overflows.
- **Outflow network:** All of the storm drain segments located within the outflow network are estimated to be tidally influenced with the exception of the storm drain segment U5 located between the roof drain of the International Motor Trucks Inc.'s building and CB50.

2.5. Nature and Extent of Contamination

2.5.1. Area B2

This section summarizes the contamination present within the storm drain system at Area B2. Additional information regarding Area B2 contamination is presented in the SRI/FS Report (GeoEngineers, Inc. 2016b) and Area B2 Report (GeoEngineers 2018).

As identified in Section 2.3, investigations to evaluate contamination present in the storm drain system were completed in 2017. Four quarters of water sampling and analysis activities were completed in 2017 from eight catch basins/manholes (CB22 through CB24, CB33, CB35, and CB48 through CB50) located within the outflow network to evaluate if contamination is infiltrating and getting discharged into the Snohomish River. Water samples were analyzed for total and dissolved arsenic and lead. The results indicated presence of arsenic at concentrations greater than the cleanup level of 5 micrograms per liter (µg/L) in all of the eight catch basins/manholes during one or more sampling events. The range of arsenic concentrations above cleanup level was 7.71 to 84.8 µg/L. Lead was not detected above cleanup level in all of the water samples collected during the four quarters of sampling and analysis in 2017. Figure 6 summarizes the results of four quarters analysis completed from the eight catch basins/manholes identified above. Detailed summary and laboratory reports for this data are presented in the Area B2 Report (GeoEngineers 2018).

In March 2018, a sample was collected from CB11 located within the inflow network to south detention pond as a result of an observation made during a site visit. The site visit was made to confirm that no groundwater was infiltrating into the storm drain segments that are expected to be above groundwater table. Section 2.4.2.2 and Figure 5 identify storm drain segments that are expected to be above seasonal high groundwater table. Water was not observed in storm drain segments that are expected to be above groundwater table with the exception of segments S14 located between CB9 and CB10 and S15 located between CB10 and CB11. Debris and standing water was observed within CB9 and CB10, and a trickle of water was observed flowing into CB11. It appeared that there was a blockage in segment S14 which was causing a backup of water in CB10 and up till CB9. A water sample was collected from CB11, the downgradient most catch basin from segments S14 and S15 to characterize the backed-up water. The water sample was analyzed for total and dissolved arsenic and lead. The results for both arsenic and lead were below the cleanup level. The results are summarized on Figure 6. The laboratory analytical report is presented in Appendix D.

The results of samples collected from the eight catch basins/manholes located within the outflow network indicate that contaminated groundwater and/or soil is infiltrating into the storm drain segments in Area B2. The results of samples collected from CB24, the catch basin immediately upgradient of the outfall, indicates that water with arsenic concentrations greater than the cleanup level is being discharged from the outfall into the Snohomish River.

2.5.2. Areas C2 and C3

As identified in Section 2.1, the source of contamination within Areas C2 and C3 consists of fallout (fine particulates) from smelter stack emissions that was deposited on the surface. Soil investigations were completed as part of the SRI in May 2013 to characterize surface soil within Areas C2 and C3. Surface soil (0 to 1 foot below ground surface [bgs]) samples were collected from four locations, LLS-05 through LLS-08, as shown on Figure 7. Samples were analyzed for arsenic, lead and mercury.

Arsenic exceeded the cleanup level of 20 milligrams/kilograms (mg/kg) in all of the four locations with concentrations ranging from 27.1 to 82.2 mg/kg. Lead exceeded the cleanup level of 118 mg/kg in one of the four locations (LLS-07). The concentration of lead at LLS-07 was 194 mg/kg. Mercury was detected at concentrations less than the cleanup level in all of the four locations. Figure 7 summarizes arsenic, lead and mercury results for Areas C2 and C3. A detailed summary of the results and the laboratory reports for this data are presented in the SRI/FS Report (GeoEngineers 2016b).

3.0 CLEANUP REQUIREMENTS

3.1. Indicator Hazardous Substances and Cleanup Standards

Indicator hazardous substances (IHSs) and cleanup standards for the Lowland Area were developed as part of the SRI/FS Report (GeoEngineers 2016b) in accordance with Model Toxic Control Act (MTCA; Washington Administrative Code [WAC] 173-340-700). Under MTCA, "indicator hazardous substances" refer to the subset of hazardous substances present at a site that contribute to a large percentage of the overall threat to human health and the environment. IHSs are selected by Ecology for the purposes of defining site cleanup requirements. Cleanup standards consist of cleanup levels that are protective of human health and the environment and the points of compliance at which the cleanup levels must be met. The cleanup standards applicable to the Lowland Area are detailed in the SRI/FS Report and summarized in the CAP (GeoEngineers 2016a). The following sections summarize cleanup standards applicable to water in storm drain system at Areas B2, and soil within Areas C2 and C3.

3.1.1. Area B2

Water within the storm drain system of Area B2 is evaluated against the cleanup levels protective of surface waters of the Snohomish River since the storm drains discharge into the Snohomish River. The following table summarizes the cleanup levels for IHSs and point of compliance applicable to water in the storm drain system:

CLEANUP LEVELS AND POINT OF COMPLIANCE APPLICABLE TO STORM DRAIN WATER

Indicator Hazardous Substances (IHSs)	Cleanup Levels (µg/L)	Point of Compliance
Arsenic	5	Water discharging from the outfall
Lead	8.1	Water discharging from the outfall
Mercury	0.025	Water discharging from the outfall

3.1.2. Areas C2 and C3

Soil within Areas C2 and C3 is evaluated against the Lowland Area soil cleanup levels. The following table summarizes the cleanup levels for IHSs and point of compliance applicable to soil.

SOIL CLEANUP LEVELS AND POINTS OF COMPLIANCE

Indicator Hazardous Substances (IHSs)	Cleanup Levels (mg/kg)	Point of Compliance (feet bgs)
Arsenic	20	0 to 1
	88	1 to 6
	88	6 to 15
Lead	118	0 to 1
	118	1 to 6
	1,000	6 to 15
Mercury	5.5	0 to 1
	5.5	1 to 6
	1,100	6 to 15

In accordance with MTCA (WAC 173-340-740[6][f]), remedial actions that involve capping/containment of hazardous substances typically do not have to meet the soil cleanup levels at the points of compliance. As described in the CAP, the selected remedial action at Area C2 and C3 is fencing and signage (i.e. containment) and therefore, above mentioned cleanup levels are not required to be met at the points of compliance.

3.2. Applicable Regulatory Requirements

In addition to the cleanup standards developed through the MTCA process described in the preceding section, other regulatory requirements must be considered during implementation of the remedial action (WAC 173-340-710). Because the cleanup action is being performed by Ecology, the cleanup action is exempt from the procedural requirements of certain laws and all local permits (WAC 173-340-710[9][a]). However, the cleanup action must comply with the substantive requirements of these laws and permits. The applicable regulatory requirements for the remedial action at Areas B2, C2 and C3 are described in the following sections.

3.2.1. Washington State Environmental Policy Act (SEPA)

The Washington State Environmental Policy Act (SEPA) provides a way to identify possible environmental impacts that may result from governmental decisions. Information provided during the SEPA review process helps agency decision-makers, applicants, and the public understand how a project will affect the environment. SEPA is intended to ensure that state and local government officials consider environmental values when making decisions or taking an official action.

To meet this requirement, Ecology (SEPA lead agency for the project) completed a SEPA checklist and has made a Determination of Non-Significance (DNS) for the planned remedial actions at the Lowland Area including Areas B2, C2 and C3. The public review period for the SEPA checklist and DNS was completed on September 20, 2016. The SEPA checklist and DNS are included in Appendix E.

3.2.2. City of Everett and WSDOT Permit(s)

The remedial actions at Areas B2, C2 and C3 involve trench excavation and filling work within the City's and WSDOT's streets (Riverside Road and Highway 529 [W Marine View Drive]) and ROW. The contractor will be required to obtain these permits from these agencies.

3.2.3. Historical and Cultural Resources

The National Historic Preservation Act (Section 106) and the Federal Archaeological and Historical Preservation Act (16 USC 496a-1) will be applicable if any materials of archaeological interest are discovered during excavation activities. The Cultural Resources Assessment Report (Appendix F; Columbia 2015) completed for the Lowland Area identified that there is the potential for archaeological and/or cultural resources to be present at the native surface (top of weathered glacial till). Any excavation activities at the fill/native contact will be monitored by a professional archeologist. The Cultural Resources Assessment Report presents monitoring requirements and reporting procedures for inadvertent discovery of archeological and/or cultural resources. These procedures are summarized in Section 5.3.3.

4.0 PRELIMINARY PLANS AND SPECIFICATIONS

Preliminary plans and specifications have been prepared for the remedial actions at Areas B2, C2 and C3 described in this EDR. The preliminary plans and specifications are presented in Appendix G. It shall be

noted that these plans and specifications are not ready for bidding or construction. The plans are considered to be 90 percent complete and specifications are considered to be 60 percent complete. The plans and specifications will need to be completed to 100 percent and reviewed by Ecology prior to project bidding and use for construction.

The remedial action construction work at Areas B2, C2 and C3 is depicted on preliminary plans G1, CD-1 through CD-12, CF-1 through CF-4, and D-1 through D-3 as summarized below.

PRELIMINARY PLANS

Plan Number	Plan Title
G1.	Cover Sheet
CD-1	Area B2 Project Overview
CD-2	Area B2 Existing Site Conditions Photographs
CD-3	Area B2 Existing Site Plan (1 of 2)
CD-4	Area B2 Existing Site Plan (2 of 2)
CD-5	Area B2 Existing Storm Drain System
CD-6	Area B2 Storm Drain Defects - Inflow Network to South Detention Pond
CD-7	Area B2 Storm Drain Defects - Inflow Network to North Detention Pond
CD-8	Area B2 Storm Drain Defects - Outflow Network to Outfall
CD-9	Area B2 Site Preparation and TESC Plan (1 of 2)
CD-10	Area B2 Site Preparation and TESC Plan (2 of 2)
CD-11	Area B2 Storm Drain Point Repairs Plan
CD-12	Area B2 Storm Drain CIPP Rehabilitation Plan
CF-1	Areas C2 and C3 Project Overview
CF-2	Areas C2 and C3 Existing Site Conditions Photographs
CF-3	Areas C2 and C3 Fence Construction Plan (1 of 2)
CF-4	Areas C2 and C3 Fence Construction Plan (2 of 2)
D-1	Temporary Facilities and TESC Details
D-2	Trenching and Pavement Patching Details
D-3	Chain Link Fence Details

Preliminary specifications prepared for remedial action work at Areas B2, C2 and C3 include division 01 (General Requirements), division 02 (Existing Conditions), division 31 (Earthwork), division 32 (Exterior Improvements) and division 33 (Utilities). A complete list of specifications that are part of these divisions is provided in Appendix G.

5.0 REMEDIAL ACTION AT AREA B2

The remedial action consisting of storm drain repairs is being completed in Area B2 to eliminate infiltration of contaminated media (groundwater and/or soil) and transport of contaminants in the storm drain system

to the Snohomish River. The storm drain repairs primarily consists of completing point repairs at the locations of the defects and installing cured-in-place pipe (CIPP) lining as discussed in following sections. Point repairs primarily consist of excavating an access trench, replacing the defective portion of the pipe and backfilling as described in Section 5.3. CIPP is a trenchless rehabilitation method and consists of a jointless and seamless liners which are installed in the existing pipe and cured to form pipe-within-a-pipe as described in Section 5.4. In addition to repairs to the storm drains, the structures of manholes and catch basin will also be repaired by the contractor to seal any defects (e.g. cracks) that has a potential to allow infiltration of contaminated groundwater. A pre-installation video to be performed by the contractor (Section 5.2) will be reviewed to identify defects within the manholes and catch basin structures that require repair.

Table 3 summarizes storm drain repairs that will be completed for each segment. CIPP lining will be installed in all storm drain segments located below the seasonal high groundwater table (identified on Figure 5 and Table 3) to eliminate infiltration of contaminated groundwater. Additionally, for segments located below seasonal high groundwater table, point repairs will be completed (prior to installing CIPP) for defects that cannot be addressed using CIPP. For storm drain segments located above seasonal high groundwater table, either CIPP and/or point repairs will be completed depending on type and location of defect, and length of the segment. For example, if the segment is located across the street and the defect can be addressed using CIPP, then CIPP will be preferred since, unlike point repair, it does not require excavation and thus causing less disruption to the street. If the segment length is long such that point repair will be more economical then installing CIPP then point repair will be preferred. Table 3 identifies storm drain segments above seasonal high groundwater table that will be repaired. No storm drain repairs are proposed for segments that are located above seasonal high groundwater table and have no defects.

The storm drain repairs are proposed based on information available from the video surveys dated 2016/2018. Additional storm drain repairs may be necessary based on results of contractor performed pre-installation video survey (Section 5.2). Moreover, contractor may also propose an alternative repair method for Ecology's approval other than the method proposed herein.

The key elements of storm drain repairs at Area B2 are summarized in the bulleted list below and described in the following sections:

- Perform site preparation activities including setting up contractor staging areas and installing temporary site controls. In preparation for storm drain repairs, temporarily stop the storm water inflow and outflow through the storm drain system and pressure clean the entire system including storm drain segments, manholes and catch basins.
- Grout and plug the abandoned storm drain segment U12.
- Perform pre-installation CCTV video inspection and reporting of the inflow and outflow networks, manholes and catch basins after the pressure cleaning is completed.
- Perform point repairs identified in plans and any other point repairs that are identified as a result of contractor performed pre-installation video survey and approved by Ecology.
- Perform repairs on manholes and catch basins that are identified as a result of contractor performed pre-installation video survey and approved by Ecology.

- Install CIPP lining on the storm drain segments identified in plans and any additional segments approved by Ecology.
- Perform post-installation video inspection of the inflow and outflow networks, manholes and catch basins to document as-built conditions.
- Remove temporary covers on catch basins, plug on the outfall and bypasses that were installed as part of the site preparation activities.
- Restore site to pre-existing conditions.

5.1. Site Preparation

5.1.1. Contractor Staging Areas

Two contractor staging areas are currently identified—one east of the north detention pond and second northeast of the south detention pond. The contractor staging areas are designated areas for construction vehicles, supplies, and equipment storage. Plans CD-9 and CD-10 (Appendix G) present approximate locations of the contractor staging areas. The availability of these areas for contractor staging is subject to the approval from the Port, who is the property owner. The contractor will be responsible for coordinating with the Port to obtain access agreement. The contractor may request additional/alternative areas for staging for Ecology's approval.

5.1.2. Temporary Site Controls

Temporary site controls including site security fencing, temporary traffic controls, and temporary erosion and sediment control (TESC) will be provided around the contractor staging and active work areas (e.g. point repair trench excavation, pressure cleaning work, etc.) as appropriate. The contractor staging areas will contain perimeter temporary chain-link and silt fencing, and stabilized construction entrance/exit (as necessary). Plans CD-9 and CD-10 (Appendix G) present the site security fencing and TESC requirements for the contractor staging areas. Plan D-1 (Appendix G) presents standard details for temporary chain-link fence, silt fence, and stabilized construction entrance/exit.

The contractor will be required to prepare a temporary traffic control plan and TESC plan for active working areas in accordance with the requirements of the plans and specification, and requirements of the City and/or other agencies having jurisdiction.

5.1.3. Preparing Storm Drain System for Repairs

To prepare the storm drain system for repairs, the storm water inflow and outflow of the storm drain system will be temporarily stopped and the system will be pressure cleaned.

Catch basins located within the Area B2 storm drain system will be covered with impermeable inserts to stop runoff from entering the system. The storm drain repair work is planned to be completed in the summer time and therefore, little or no water is expected to be accumulated on streets as a result of inoperative catch basins. Nevertheless, the contractor will be required to have equipment on hand such that they can pump water that may collect on the streets during the time when catch basins are not operational. Collected water will be temporarily stored on site in tanks, tested, treated (if required) and disposed/discharged in accordance with the regulatory requirements. Additionally, the outfall will be plugged to stop Snohomish River tidal water from backflowing into the outflow network.

The north and south detention pond outlets will also be plugged to stop water from the ponds from flowing through the outflow network. The ponds are not suspected to overflow during the time of storm drain repair as the work is planned to be completed in the summer months. Nevertheless, a bypass will be installed from the north and south detention ponds to the location of the outfall (bypassing the outflow network) to convey stormwater discharge from the detention ponds (if any) to the Snohomish River. The discharge point will be located in the immediate vicinity of the existing outfall. The contractor will be responsible for obtaining permits (if applicable). Approximate alignment of the bypass line is shown on plans CD-9 and CD-10 (Appendix G). The contractor may propose an alternative alignment for the temporary bypass lines for Ecology's approval.

Pressure cleaning will be completed on all of the storm drain segments, manholes and catch basins located within Area B2 storm drain system with the exception of abandoned storm drain segment U12 designated to be grouted and plugged. The intent of pressure cleaning is to remove debris from storm drain system so that pre-installation video survey can access every segment and assess the conditions and get the system ready for repairs. To facilitate pressure cleaning, manholes and catch basins lids will be temporarily opened to access the interiors and storm drain segments. Manholes and catch basins lids (with their impermeable inserts) will be placed back following the completion of pressure cleaning.

Pressure cleaning of storm drain segments will be performed by pressure jetting water through the upgradient end and collecting wastewater and debris exiting the downgradient end. Pressure cleaning of manholes and catch basins will be performed by jetting the sides and bottom of the structures. A vacuum truck suction hose will be placed in the sump of the catch basin/manhole and/or at the downgradient end of the segment to collect wastewater and debris during cleaning. As part of the pressure cleaning activities, segments that are known to remain permanently inundated with water (N5, U8, U9 and U10) will be dewatered. Dewatering activities for these segments will be continued until these segments are sufficiently dried out such that pressure cleaning and pre-installation CCTV video surveying activities (Section 5.2) can be performed. Collected water will be temporarily stored on site in tanks, tested, treated (if required) and disposed/discharged in accordance with the regulatory requirements.

5.2. Pre-installation Video Inspection and Reporting

A CCTV video inspection will be performed on storm drain segments, manholes and catch basins following the completion of cleaning activities. The contractor will be required to verify conditions of the storm drain segments including defects shown on the contract documents, identify any additional defects that may be present, identify defects in manholes and catch basin structures, prepare and submit documentation including descriptions, videos and photographs of all of the defects, and propose repair methods to Ecology for review and approval.

5.3. Point Repairs

Point repairs will be completed to repair 14 defects located within nine segments as summarized in the table below. Point repair locations are shown on plan CD-11 (Appendix G). Table 3 presents the rationale for selecting point repairs at these locations.

SUMMARY OF POINT REPAIRS

Point Repair No.	Storm Drain Network	Storm Drain Segment ID	Defect Type and Approximate Location
1	North Pond	N2	Fracture at 146 feet from CB27
2	North Pond	N2	Broken at 90 feet from CB27
3	Outflow	U1	Broken at 56 feet from CB49
4	Outflow	U7	Broken at 40 feet from CB33
5	Outflow	U7	Broken at 53 feet from CB33
6	South Pond	S7	Deposit at 21 feet from CB16
7	South Pond	S10	Fracture at 154 feet from CB12
8	South Pond	S12	Broken at 19 feet from CB11
9	Outflow	U16	Fracture at 27 feet from CB19
10	Outflow	U16	Fracture at 86 feet from CB19
11	Outflow	U13	Broken at 86 feet from CB22
12	Outflow	U13	Broken at 157 feet from CB22
13	Outflow	U13	Broken at 171 feet from CB22
14	South Pond	S18	Joint Separation at 242 feet from CB6

Point repairs will be completed by demolishing surface features and excavating a trench at the repair location to expose the section of the pipe with defect(s), saw cutting and replacing the defective pipe section with new section, backfilling, compacting and restoring the surface features. Excavated soil will be directly loaded into shipping containers for disposal characterization, transportation and disposal. Dewatering will be performed to maintain the trench sufficiently dry such that the repairs can be performed, and the water will be managed in accordance with regulatory requirements. The following sections describes key components of point repairs.

5.3.1. Demolition

Concrete sidewalks, curbs and asphalt surfaces of the street within and adjacent to the point repair excavation trench will be demolished as necessary to facilitate excavation of underlying material. Demolition debris will be transported to an appropriate construction debris recycling/disposal facility approved by Ecology.

5.3.2. Trench Excavation, Disposal Characterization, Transport and Disposal

Trench excavations will be performed in accordance with the City standard drawing 614 shown on plan D-2 (Appendix G). Trench width for pipes with diameter of 15 inches or less will be at a maximum 40 inches (approximately 3.3 feet). For pipes with diameter of 18 inches or greater, maximum width of the trench will be equal to 1.5 times the diameter plus 18 inches (i.e. Width = 1.5 * Pipe Diameter + 1.5 feet). The largest diameter pipes within Area B2 storm drain system are 24 inches. The maximum trench width for a 24-inch pipe is calculated to be 4.5 feet. Excavation shoring (trench box or similar) will be installed to support trench walls for excavation deeper than 4 feet in accordance with Occupational Safety and Health Administration (OSHA) requirements. Trench excavation sidewalls not supported by shoring will be sloped in accordance

with OSHA requirements. No side slopes will be steeper than 1H:1V (horizontal to vertical). The length of the trench will be determined based on the length of the defective section that needs replacement and depth of the pipe, which will govern the length of the longitudinal excavation side slopes. The depth of trench will be determined based on the depth of the invert of the defective pipe section that needs replacement. For the identified point repairs, the invert of the pipes ranges from approximately 3 feet to 13 feet bgs. Utilities, other than storm drains, encountered during trench excavation will be protected in place.

Excavated soil will be directly loaded into shipping containers (with an approximate size of 20 cubic yards) for disposal characterization, transportation and disposal. Shipping containers will be lined with plastic sheeting prior to loading soil. Shipping containers with loaded soil will be stored on site until disposal characterization is complete. The contractor will be responsible for obtaining containers that can be shipped to either Subtitle D or C landfill. After completion of disposal characterization, the containers will be loaded onto trucks and the soil will be transported and disposed at a disposal facility approved by Ecology as discussed below. Shipping containers will be covered during the transport and when they are temporarily stored on site pending disposal characterization.

Soil sampling and analysis will be performed to complete disposal characterization. QA/QC procedures that will be implemented during soil sampling and analysis are presented in the Quality Assurance Project Plan (QAPP; Appendix H). Soil sampling from each container will be performed as soon as the quantity of stored soil reaches container's maximum storage capacity. Three samples will be collected from each container. Sample locations will be evenly spaced. Two samples will be collected from soil adjacent to each longitudinal end of the container and one sample will be collected from soil in the center of the container. The depth of the sample will be approximately the midpoint of the total height of the stored soil in the container.

Soil samples will be collected with the help of the excavator bucket. Contractor will safely bring the excavator bucket with soil to the ground where Ecology's representative can perform soil sampling. Care will be taken by the contractor to avoid spillage of soil. Plastic sheeting will be placed on the ground along the path of the excavator bucket to collect any accidental spilled soil and spilled soil (if any) will be collected and placed back into the container. Samples will be collected from the portion of the soil not in contact with the walls of excavator bucket to avoid cross-contamination. Each soil sample will be collected by hand using a fresh pair of nitrile gloves and the soil will be placed in laboratory-prepared sample containers. Soil sample containers will be stored in a cooler with ice prior to and during transport to the laboratory.

Soil samples will be analyzed for arsenic, lead and mercury (site IHSs) as described below. Chemical analysis will be performed at Analytical Resources, Inc. (ARI) of Tukwila, Washington, an Ecology accredited laboratory. Chain-of-custody forms will be used to document the transfer of samples for transport and submittal of samples to the laboratory. Chemical analysis will be performed on a 2-day turn-around time to support decision making concerning soil disposal.

Based on the results of chemical analysis, the federal and state hazardous/dangerous waste designation process will be completed for disposal characterization purposes. Disposal characterization will be completed as required by Federal Resource Conservation and Recovery Act (RCRA) regulations (40 Code of Federal Regulations [CFR] parts 260 through 273), Washington State Dangerous Waste regulations (WAC 173-303) and the waste-profiling requirements of the selected disposal facility. The Federal and state hazardous/dangerous waste designation process for soil includes the following.

- Federal RCRA Hazardous Waste: The 1998 Smelter Area Investigation Report (ASARCO 1998) identified that arsenic and lead concentrations have the potential of exceeding the Toxicity Characteristics Leaching Procedure (TCLP) standard (5 milligrams per liter [mg/L]) at or above 3,000 mg/kg. Using the 20-times rule, arsenic and lead concentrations have the potential of exceeding the TCLP standard at or above 100 mg/kg. If the 1998 report results are acceptable to the disposal facility, stockpile soil samples with arsenic and/or lead concentrations greater than 3,000 mg/kg will be analyzed for a follow-up TCLP test to determine hazardous characteristics of the material. If the 1998 report results are not acceptable to the disposal facility, then samples with arsenic and/or lead concentrations greater than 100 mg/kg will be analyzed for a follow-up TCLP test. Using the 20-times rule, mercury concentrations have the potential of exceeding the TCLP standard (0.2 mg/L) at or above 4 mg/kg. Thus, stockpile soil samples with mercury concentrations greater than 4 mg/kg will be analyzed for a follow-up TCLP test to determine hazardous characteristics of the material. Material represented by TCLP concentrations exceeding 5 mg/L for arsenic and lead and 0.2 mg/L for mercury will be designated as federal hazardous waste for disposal purposes.
- State Dangerous Waste: The results of a bioassay study reported in the 1998 Smelter Area Investigation Report (ASARCO 1998) indicate state dangerous waste levels for arsenic are at or above 10,000 mg/kg. A bioassay study for lead was not completed in the 1998 Smelter Area Investigation Report. However, using the book designation method (WAC 173-303-100[5][b]), the 1998 report identified that the state dangerous waste concentration for lead is also at or above 10,000 mg/kg. The book designation method identifies the state dangerous waste concentration for mercury at 10 mg/kg. The results of arsenic, lead and mercury analysis performed on soil samples will be evaluated based on these criteria to determine their state dangerous waste designation.

Container soil with one or more sample results greater than the federal/state criteria identified above will be characterized as either federal hazardous or state dangerous waste, and the container will be shipped to RCRA Subtitle C landfill for disposal. Container soil with all three sample results less than the federal/state criteria identified above will be characterized as non-hazardous/non-dangerous waste, and the container will be shipped to RCRA Subtitle D landfill for disposal. The design team will coordinate with the Ecology-approved permitted disposal facility(s) selected by the contractor to obtain disposal authorization. The design team coordination with disposal facility(s) will include filling out waste profile forms and submitting representative soil sample results necessary for obtaining disposal authorization. The contractor will be responsible for coordinating directly with disposal facility(s) for billing purposes.

Material designated as hazardous/dangerous waste will be handled in accordance with the requirements of applicable federal and state regulations including labeling each container with the words “dangerous waste” or “hazardous waste”, accumulation date and RCRA Site Identification (ID) number for the site. The RCRA Site ID number for the site is WAD 988512638. Containers will be transported by waste haulers in accordance with applicable state and federal solid waste handling and transportation regulations. Transportation contractor(s) will be required to provide documentation that demonstrates that they are properly licensed and are in compliance with applicable WSDOT regulations, as well as a copy of their contingency and spill control plans describing measures to be implemented in the event of spills or discharges during material handling and transport.

5.3.3. Procedures for the Inadvertent Discovery of Archeological/Cultural Resources

As discussed in Section 3.2.3, excavation activities completed at the fill and native interface will be monitored by a professional archaeologist for the presence of any potential archaeological and/or cultural resources. The depth of fill below ground surface ranges from approximately 6.5 to 8 feet (elevation 6.5 to

5 feet NAVD88) along the western side of Area B2 (along the Riverside Road), approximately 9.5 feet (4.5 feet NAVD88) along the northern and central portion of Area B2 shoreline and 12 feet (1.5 feet NAVD88) in the southern portion of Area B2 shoreline. Trench excavations performed for point repairs at these applicable depths will be monitored by a professional archaeologist.

As identified in the Cultural Resources Assessment Report (Appendix F), if any archaeological and/or cultural resources are discovered during excavation activities work will be stopped immediately and Ecology, Department of Archaeology and Historic Preservation (DAHP) and applicable tribe(s) will be notified at the contacts provided below. Work will remain halted at the discovery location until appropriate consultation and investigations have been carried out. The archaeologist will document the discovery and provide a professionally documented site form and report to the appropriate parties. In the event of any discovery of human remains, work will be immediately halted in the discovery area, the remains will be covered and secured against further disturbance, and the Everett Police Department and Snohomish County Medical Examiner will be immediately contacted, along with Ecology, DAHP and applicable tribe(s). A treatment plan by the archaeologist will be developed in consultation with the above-listed parties consistent with Revised Code of Washington (RCW) 27.44 and RCW 27.53 and implemented according to WAC 25-48.

Contact information for key personnel for the inadvertent discovery of archeological/cultural resources are provided in the following table.

CONTACT LIST FOR THE INADVERTENT DISCOVERY OF CULTURAL RESOURCES

Contact Name	Organization	Title	Contact Number
Sandra Matthews (Primary Contact)	Ecology	Project Manager	(o) 425.649.7206 (c) 425.223.1999
Iain Wingard (Alternate Contact)	GeoEngineers, Inc.	Project Manager	(o) 253.722.2417 (c) 206.595.7402
Abhijit Joshi (Alternate Contact)	GeoEngineers, Inc.	Project Engineer/Field Coordinator	(o) 206.728.2674 (c) 425.223.9028
Brett Lenz	Columbia Geotechnical Associates	Project Archaeologist	(o) 206.855.9020
Rob Whitlam	DAHP	State Archaeologist	(o) 360.586.3080 (c) 360.890.2615
Michael Evans	Snohomish Tribe	Tribe Chairman	(o) 425.671.1387
Shawn Yanity	Stillaguamish Tribe	Tribe Chairman	(o) 360.652.7362 Ext.228
Larry Campbell	Swinomish Tribe	Tribal Historical Preservation Officer	(o) 360.466.7352
Richard Young	Tulalip Tribe	Preservation Officer	(o) 360.716.2652

5.3.4. Dewatering and Water Management

Construction dewatering will be necessary only if water is observed to collect within the trench excavation. Dewatering is required to maintain trench sufficiently dry such that the repairs can be performed. The contractor will be required to temporarily store, sample and treat (if necessary), and appropriately dispose water as approved by Ecology.

The construction documents will not include dewatering and water treatment design but will provide minimum requirements for collection, temporary storage, sampling, testing and proper disposal of the water. The contractor will be responsible for developing dewatering and water treatment systems to comply with applicable disposal requirements.

The contractor may elect to either directly transport collected water to an off-site permitted treatment and disposal facility or dispose water into City's sanitary sewer. The contractor will be responsible for collecting representative samples of the collected water for disposal characterization purposes and coordinating with the disposal facility and other entities (ex. City), as applicable, for obtaining necessary permits and approvals. Discharge into the City's sanitary sewer will require a temporary sewer discharge permit and City approval. The disposal of construction water will be completed in accordance with applicable laws and regulations.

5.3.5. Replacing Defective Pipe Section

After the defective pipe section is exposed through trench excavation, additional pipe length and space around the pipe will be uncovered (as necessary) to allow for performance of the repair work. The defective pipe section will be saw-cut so that the ends of the pipe section are straight, smooth and free of cracks or chips. The defective pipe section will be removed from the trench and transported to an appropriate construction debris recycling/disposal facility approved by Ecology. Replacement pipe section will be placed to the same line and grade of the existing pipe and will be of the same material as the existing pipe. Replacement pipe section will be connected to the existing pipe with an approved coupling to provide a watertight connection. Repaired pipe will be cleaned and tested in conformance with regulatory (City) requirements prior to backfilling. Any repair that fails the test, will be replaced as directed by Ecology.

5.3.6. Backfill and Compaction of Trench

Backfilling and compaction of the trench will be completed in accordance with City standard drawings 614 and 615 as shown on plan D-2 (Appendix G). The pipe zone, which consists of the entire portion of the trench 6 inches below and 12 inches above the pipe will be filled with bedding material consisting of crushed surfacing base course or similar as approved per City requirements. Existing soil below the pipe zone may be excavated and backfilled with approved foundation material per City requirements, if the existing soil is observed to be geotechnically unsuitable. Area of trench above the pipe zone will be backfilled by imported gravel borrow unless the trench is located within the roadway. In which case, controlled density fill (CDF) will be used instead of gravel borrow. Compaction of backfill will be performed in accordance with the City requirements as specified in the contract documents including plan D-2 (Appendix G). Field density testing will be conducted to confirm necessary compaction is achieved. Material will be imported from a WSDOT approved source (e.g. quarry) and the contractor will be required to provide Ecology with verification that imported backfill materials have been tested and certified to be free of contaminants in accordance with backfill testing requirements summarized in Table 4.

5.3.7. Surface Restoration

Ground surfaces within and adjacent to the trench excavation that are disturbed or demolished will be restored. Paved surfaces including streets, sidewalks, curbs and curb ramps will be restored in accordance with City requirements. Typical details for restoration of asphalt and cement concrete and payment patching are presented on plan D-2. Any landscaped areas that are disturbed will be restored in-kind.

5.4. Cured-in-place Pipe (CIPP)

As discussed in Section 5.0, CIPP linings will be installed in all storm drain segments located below seasonal high groundwater table to eliminate infiltration of groundwater with the exception of the outflow network segment U12. This segment is located below the seasonal high groundwater table. However, this line is abandoned and will be grouted and plugged and therefore, CIPP is not applicable to this segment. CIPP linings will be installed following the implementation of point repairs (Section 5.3). Additional point repairs (other than the ones mentioned in Section 5.3) may be necessary prior to installing CIPP based on the results of contractor performed pre-installation video survey. The following 26 segments are located below seasonal high groundwater table and will be lined with CIPP:

- South Pond Inflow Network: Five segments including S3 through S7.
- North Pond Inflow Network: Six segments including N2, N3 and N5 through N8.
- Outflow Network: 15 segments including U1 through U4, U6 through U11, and U13 through U17.

In addition to the segments mentioned above, the following four segments that are located above seasonal high groundwater table will also be lined with CIPP for the reasons identified below.

- South Pond Inflow Network Segment S2: CIPP will be installed to address the defect (joint separation) instead of point repair. This segment is located across the street (Riverside Road) and therefore, CIPP is preferred since, unlike point repair, it does not require excavation and thus causing less disruption to the street.
- South Pond Inflow Network Segment S8: CIPP will be installed to address the defects observed in this segment (fracture, join offset and sag). The segment is located across the street and therefore CIPP is preferred since, unlike point repair, it does not require excavation and thus causing less disruption to the street.
- South Pond Inflow Network Segment S12: Point repairs to address multiple defects (cracks and deformity) observed in this segment will likely result in significant excavation and associated disposal cost. It appears that CIPP can address these defects and will cause less disruption to the adjacent street (Riverside Road). Thus, CIPP will be installed for this segment.
- North Pond Inflow Network Segment N4: CIPP will be installed to address the defect (joint separation) instead of point repair. This segment is located across the street (Riverside Road) and therefore CIPP is preferred since, unlike point repair, it does not require excavation and thus causing less disruption to the street.

5.4.1. Materials and Design

CIPP consists of a flexible liner tube made of one or more layers of absorbent non-woven felt or fiber reinforced fabric. The liners are impregnated (saturated) with a polymer resin, which when cured forms a close-fitting liner pipe within the host pipe. The liners are saturated with resin using vacuum, gravity or other applied pressure. The resin is corrosion resistant polyester or vinyl ester and includes a catalyst/hardener to facilitate curing. The outermost layer of the liner tube is coated with an impermeable membrane to protect the liner during handling and installation, and contains and allows resin impregnation. The CIPP liners and resin used will meet the applicable ASTM International (ASTM) standards.

The CIPP will be of a size such that when installed will tightly fit the internal circumference of the original pipe. CIPP will be of sufficient thickness such that when cured it can sustain the loads imposed by external groundwater, internal service pressure, and soil and traffic acting on the pipe.

5.4.2. Installation

Impregnated CIPP liners will be installed using either inversion or a pull-in method in accordance with applicable ASTM standards. The inversion method employs a scaffold tower to apply water pressure to turn the liner inside out and push it along the host pipe. The pull-in method employs a power winch or similar to pull the liner through the host pipe. The liners are installed through an existing manhole/catch basin or other access point and fully extend to the next designated manhole/catch basin or other termination point.

5.4.3. Curing and Testing

Installed liners are cured through heating. Heat is supplied using hot water under hydrostatic pressure or steam (air) pressure. The heat source equipment (e.g. boilers are used to heat inversion water) deliver hot water or steam throughout the section of the pipe to uniformly raise the temperature required for curing of the resin. Temperature gauges installed between the liner and host pipe monitor temperatures during the cure cycle. Temperature gauges installed on the heat source equipment monitors incoming and outgoing heat supply (for water curing) and outgoing heat supply (for steam curing). The cure period will be in accordance with the recommendation of the resin manufacturer. Once the pipe cures, the liner is allowed to cool down. Cooling may be accomplished by the introduction of cool water or air to replace hot water or pressurized steam. The ends of the liner are then removed, flush with the pipe ends, and sealed where necessary. The trimmings cut from the liner are removed for safe disposal.

Finally, samples of the cured liner will be tested to make sure it meets ASTM standards and project specifications. A sample of the CIPP may be taken from pipe ends or from a cured mold. A visual inspection of the CIPP will also be performed per ASTM standards.

6.0 REMEDIAL ACTION AT AREAS C2 AND C3

The remedial action consisting of fencing and signage is being completed in Areas C2 and C3 to eliminate and/or minimize human health exposure risk to contaminated soil located within these areas. Fencing will be permanent, constructed of chain-link and 6 feet tall. The posts for the fencing will have approximately 3 feet deep concrete footings. Fencing details and construction will meet WSDOT Standard Specification 8-12 as shown on plan D-3 (Appendix G). Soil generated from excavation of the footings will be stored, sampled, handled, transported and disposed of in accordance with the requirements specified in Section 5.3.2 (Trench Excavation, Disposal Characterization, Transport and Disposal). Warning signage will be constructed and installed in accordance with the requirements of Ecology. The purpose of signage is to provide an advisory to the public to not access Areas C2 and C3 due to the presence of contamination. The contractor will be required to stake out the location of new fence (in accordance with the limits shown on plans) for Ecology's approval prior to installation of the fence.

Areas C2 and C3 are steep forested areas and the primarily access to these areas is from the West Marine View Drive and two access roads (Bridge Way to the properties located northeast and access road to the Snohomish County PUD substation) that cut across Area C3. Fencing and signage will be installed along the entire uphill side of Areas C2 and C3 adjacent to West Marine View Drive with the exception of where

the existing retaining wall and railing (located in the southern portion of Area C3) provide the same function as fencing. Fencing will also be installed on both side of the access roads where these roads cut across Area C3 with the exception on the portion of the Bridge Way that is a bridge and thus this portion does not provide a public access. Prior to installing fencing, existing guardrails (if necessary) will be temporarily removed to provide access and will be safely stored for re-installation after new fence is installed. Additionally, there is approximately 1,880 feet of existing fence along the uphill side of Area C2 and northern portion of Area C3 adjacent to West Marine View Drive. This existing fence is 4 feet tall and does not provide adequate height to eliminate and/or minimize public access. This existing fence will be removed and transported to an Ecology approved recycling/disposal facility and the new fence will be installed at the same location.

The north and south ends of Areas C2/C3 are very steep and forested, which limits installation of fencing across the slope. Fencing will be extended approximately 400 feet further north of the northern end of Area C2 along the West Marine View Drive to limit public access to Area C2. On the south end, fencing will be extended approximately 130 feet south of the southern end of Area C3 where the fencing can be installed across the slope. The entire downhill side of Area C2 and half of the downhill side of Area C3 is adjacent to BNSF railroad and does not provide public access. Moreover, the topography is steep adjacent to railroad and does not provide safe space or terrain for installation of fence. Therefore, fencing won't be installed in this portion. However, fencing will be installed along the downhill side of Area C3 that is adjacent the Snohomish County PUD substation as there is a potential for public access in this area. Signage will be installed every 50 feet (or as required by Ecology) along the fence. Gated entrances will be provided as appropriate along the fence to provide access for maintenance in the future. The approximate limits of fencing are shown on plans CF-3 and CF-4 (Appendix G). The total length of fencing is estimated to be approximately 4,350 feet.

7.0 COMPLIANCE MONITORING

WAC 173-340-410 identifies three types of compliance monitoring applicable to a cleanup action including protection monitoring, performance monitoring, and confirmational monitoring.

- Protection monitoring is performed to confirm that human health and the environment are adequately protected during the construction phase of the cleanup action.
- Performance monitoring is performed to confirm that the cleanup action has attained cleanup standards.
- Confirmational monitoring is performed to confirm the long-term effectiveness of the cleanup action.

7.1. Protection Monitoring

Protection monitoring activities that will be implemented during remedial action construction at Areas B2, C2 and C3 are summarized below. Protection monitoring will include monitoring of worker health and safety and environmental protection practices such as stormwater, erosion and sediment controls. The purpose of protection monitoring is to confirm that human health and the environment are adequately protected during the cleanup action.

7.1.1. Worker Health and Safety

Construction activities will be performed in accordance with the requirements of the Washington Industrial Safety and Health Act (WISHA; RCW 49.17) and the Federal Occupational Safety and Health Act (29 CFR 1910, 1926). These regulations include requirements that workers are to be protected from exposure to contaminants.

A site Health and Safety Plan (HASP) describing actions that will be taken to protect the health and safety will be prepared by Ecology's consultant providing design and construction oversight support. The contractor will be required to prepare and submit a separate HASP for use by contractor personnel. Personnel engaged in work that involves contaminated/hazardous material excavation and handling will comply with MTCA safety and health provisions in WAC 173-340-810 and will be Hazardous Waste Operations and Emergency Response (HAZWOPER), OSHA, and WISHA certified as required.

7.1.2. Environmental Protection

Environmental protection measures consisting of Best Management Practices (BMPs) for stormwater, sediment, drainage, and erosion control; spill prevention and pollution control; and all other controls needed to protect environmental quality will be implemented. Environmental protection measures including installation, inspection and maintenance necessary for stormwater management, control of surface water runoff, and temporary erosion and sediment control measures will be described by the Contractor prior to commencing construction activities. If Ecology determines that the contractor's environmental protection measures are inadequate to meet the intent of applicable regulations, the contractor will be required to implement additional stormwater runoff, erosion control, or spill prevention and control measures to address the deficiencies.

7.2. Performance Monitoring

Performance monitoring is applicable to the remedial action at Area B2. However, it is not applicable to Areas C2 and C3 as the remedial action (fencing and signage) are not intended to achieve cleanup standards but rather eliminate and/or minimize human health exposure to the contamination. Performance monitoring at Area B2 is expected to include sampling and analysis of water discharging the outfall for arsenic, lead and mercury (IHSs) for four quarters. A compliance monitoring plan will be prepared at a later date (prior to finishing the implementation of the remedial action) to detail performance monitoring activities for the storm drain repairs at Area B2.

7.3. Confirmational Monitoring

Confirmational monitoring is considered applicable to storm drain repairs at Area B2 and fencing and signage at Areas C2 and C3. Confirmational monitoring at Area B2 is expected to include sampling and analysis of water discharging the outfall for arsenic, lead and mercury (IHSs) over a longer period of time following the completion of performance monitoring. Confirmational monitoring at Areas C2 and C3 is expected to include long-term monitoring of the conditions of fencing and signage. A compliance monitoring plan will be prepared at a later date (prior to finishing the implementation of the remedial action) to detail confirmational monitoring activities.

8.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This section describes general QA/QC procedures to be implemented during the cleanup action, including contractor quality control, construction monitoring and field documentation, and analytical QA/QC.

8.1. Contractor Quality Control

The contractor will be required to prepare plans and submittals describing their means and methods for completing the construction of the remedial action. The contractor plans and submittals will include quality control procedures that will be utilized and the project management structure. The contractor's plans and submittals will be subject to review and approval by Ecology to ensure that the construction is completed in accordance with the contract requirements and EDR.

The contractor will maintain QC records for the duration of the construction. These records will include evidence that the required inspections or tests have been performed, including the type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, proposed corrective action, and corrective actions taken.

In addition to the contractor's QC activities, Ecology and/or Ecology's representatives will perform independent oversight of the contractor's activities.

8.2. Construction Monitoring and Field Documentation

Construction monitoring will be performed by Ecology and its representatives. A comprehensive record of field activities will be maintained. Field documentation for this project will include field notes, field forms, field reports, and chain-of-custody forms for samples submitted for analytical testing. The field documentation will record construction, sampling, and monitoring activities, as well as decisions, corrective actions, and/or modifications to the project plans and procedures discussed in this report. Field documentation procedures are described in the QAPP (Appendix H).

8.3. Analytical QA/QC

Analytical QA/QC is described in the QAPP (Appendix H). The QAPP describes sampling, analysis, and QC procedures that will be implemented to produce chemical and field data that are representative, valid, and accurate for use in evaluating the effectiveness of the cleanup action.

9.0 SCHEDULE

The schedule for remedial actions at Areas B2, C2 and C3 is currently unknown and depends on funds available to Ecology to perform these actions. Pending Ecology approvals, Areas B2, C2 and C3 remedial actions described in this EDR are anticipated to be completed in the summer of 2019. The construction duration is estimated to occur over a period of two months.

10.0 REPORTING

Upon completion of remediation-related construction activities, a construction completion report summarizing the remediation activities will be prepared in accordance with WAC 173-340-400. A draft version of the construction completion report will be submitted to Ecology for review and comment prior to

finalization. Chemical analytical data generated during the remedial action will be provided to Ecology in the electronic format required by Ecology's Environmental Information Management (EIM) Policy 840.

11.0 LIMITATIONS

We have prepared this EDR for use by Ecology to support development of the remedial actions for Remedial Action Areas B2, C2 and C3 of the Everett Smelter Site Lowland Area. This EDR and all of its attachments are draft (not for construction) including tables, figures, and appendices including Appendix G that provides draft plans and specifications. As discussed in Section 4.0 the plans are considered to be 90 percent complete and specifications are considered to be 60 percent complete. This EDR and its attachments are being submitted for Ecology review and comment. It is assumed that an engineering consultant hired by Ecology in the future will be responsible for completing the EDR, plans and specifications by addressing any Ecology comments to prepare the final EDR that includes 100 percent plans and specifications for bidding and construction purposes.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

12.0 REFERENCES

ASARCO, 1998, "Smelter Area Investigation Report, Everett Smelter Site, Everett, Washington," prepared by Asarco Incorporated for Washington Department of Ecology, dated October 7, 1998.

Columbia Geotechnical Associates, Inc., 2015, "A Cultural Resource Assessment for the Everett Smelter Site Lowland Project, Everett, Washington," December 2015.

Ecology, 1999. "Everett Smelter Site, Integrated Final Cleanup Action Plan and Final Environmental Impact Statement for the Upland Area." November 19, 1999.

GeoEngineers, Inc., 2016a, "Final Cleanup Action Plan, Everett Smelter Site, Lowland Area, Everett, Washington," For the Washington State Department of Ecology, GEI File No. 0504-068-02, November 10, 2016.

GeoEngineers, Inc., 2016b, "Supplemental Remedial Investigation and Feasibility Study Report, Everett Smelter Lowland Area, Everett, Washington," For the Washington State Department of Ecology, GEI File No. 0504-068-01, March 31, 2016.

GeoEngineers, Inc., 2018, "Results of Baseline Testing for Pilot-Scale PRB and Groundwater/Storm Drain Investigation at Area B2, Everett Smelter Site, Lowland Area, Everett, Washington," For the Washington State Department of Ecology, GEI File No. 0504-068-02, January 25, 2018.

Hydrometrics 1995, "Remedial Investigation, Everett Smelter Site, Everett, Washington," prepared by Hydrometrics, Inc. for ASARCO Incorporated, September 1995.

Table 1

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Storm Drain System Details[1]

Everett Smelter Lowland Area - Remedial Action Area B2

Everett, Washington

Storm Drain Segment ID	Upgradient Structure Type[2] and Identification	→	Downgradient Structure Type[2] and Identification	Approximate Length (feet)	Invert Elevation (feet NAVD88)		Slope (%)	Pipe Diameter (inches)	Pipe Material
					Upgradient	Downgradient			
Inflow Network to South Detention Pond									
S1	Catch Basin CB32	→	Catch Basin CB31	7	10.7	10.2	7.1	6	PVC
S2	Catch Basin CB31	→	Catch Basin CB30	24	10.2	9.0	5.0	12	CPP
S3	Catch Basin CB30	→	Catch Basin CB29	202	9.0	8.3	0.3	12	CPP
S4	Catch Basin CB29	→	Catch Basin CB28	24	8.4	8.5	-0.4	12	CPP
S5	Catch Basin CB28	→	South Pond Pump Station	50	8.5	--	--	12	CPP
S6	Catch Basin CB16	→	South Pond Pump Station	21	6.6	--	--	18	CPP
S7	Catch Basin CB17	→	Catch Basin CB16	61	9.2	6.7	4.1	18	CPP
S8	Catch Basin CB18	→	Catch Basin CB17	54	9.3	9.2	0.2	12	CPP
S9	Catch Basin CB15	→	Catch Basin CB16	43	9.2	8.8	0.9	12	CPP
S10	Catch Basin CB12	→	Catch Basin CB15	200	10.9	9.4	0.8	12	CPP
S11	Catch Basin CB14	→	Catch Basin CB12	28	10.9	11.0	-0.4	12	CPP
S12	Catch Basin CB11	→	Catch Basin CB12	230	12.7	10.9	0.8	12	CPP
S13	Catch Basin CB13	→	Catch Basin CB11	29	12.9	12.7	0.7	12	CPP
S14	Catch Basin CB10	→	Catch Basin CB11	49	12.9	12.7	0.4	12	CPP
S15	Catch Basin CB9	→	Catch Basin CB10	36	13.0	12.9	0.3	12	CPP
S16	Catch Basin CB8	→	Catch Basin CB9	64	13.7	13.1	0.9	12	CPP
S17	Catch Basin CB7	→	Catch Basin CB8	196	24.7	13.6	5.7	12	PVC
S18	Catch Basin CB6	→	Catch Basin CB7	265	37.7	24.8	4.9	12	PVC
S19	Pipe upgradient of Catch Basin CB6	→	Catch Basin CB6	>38	--	38.9	--	12	PVC
Inflow Network to North Detention Pond									
N1	Catch Basin CB25	→	Catch Basin CB26	41	9.4	9.1	0.7	12	CPP
N2	Catch Basin CB26	→	Catch Basin CB27	201	9.0	7.6	0.7	12	CPP
N3	Catch Basin CB52	→	Catch Basin CB27	216	9.6	7.6	0.9	12	CPP
N4	Catch Basin CB51	→	Catch Basin CB52	24	9.5	9.6	-0.4	12	CPP
N5	Catch Basin CB27	→	Catch Basin CB53	22	7.6	7.7	-0.5	12	CPP
N6	Catch Basin CB53	→	North Pond Pump Station	2	--	--	--	12	CPP
N7	Catch Basin CB47	→	North Pond Pump Station	24	8.1	--	--	6	PVC
N8	Catch Basin CB46	→	Catch Basin CB47	39	8.7	8.2	1.3	15	CPP
N9	Catch Basin CB41	→	Catch Basin CB46	113	9.6	8.8	0.7	15	CPP
N10	Catch Basin CB42	→	Catch Basin CB41	115	10.7	9.6	1.0	15	CPP
N11	Catch Basin CB43	→	Catch Basin CB42	196	12.1	10.7	0.7	12	CPP
N12	Catch Basin CB44	→	Catch Basin CB43	60	--	12.1	--	12	CPP
N13	Catch Basin CB45	→	Catch Basin CB44	108	13.3	--	--	12	CPP
N14	Catch Basin CB39	→	Catch Basin CB41	99	10.4	9.6	0.8	15	CPP
N15	Catch Basin CB40	→	Catch Basin CB39	113	12.7	10.7	1.8	12	CPP
N16	Catch Basin CB38	→	Catch Basin CB39	121	11.5	10.7	0.7	12	CPP
N17	Catch Basin CB37	→	Catch Basin CB38	184	12.6	11.5	0.6	12	CPP
N18	Catch Basin CB36	→	Catch Basin CB37	211	14.0	12.6	0.7	12	CPP
Outflow Network									
U1	North Pond Outlet	→	Manhole CB49	148	9.78*	6.8	2.0	24	CPP
U2	Manhole CB49	→	Manhole CB48	78	6.9	6.7	0.3	24	CPP
U3	Catch Basin CB47	→	Manhole CB48	37	--	--	--	15	CPP
U4	Manhole CB48	→	Manhole CB50	236	6.7	5.3	0.6	18	CPP
U5	Roof Drain of Motor Trucks Building	→	Manhole CB50	62	--	12.5	--	6	PVC
U6	Manhole CB50	→	Manhole CB33	234	5.4	5.1	0.1	18	CPP
U7	Manhole CB33	→	Manhole CB34	136	5.1	4.41*	0.5	18.000	CPP
U8	Manhole CB34	→	Manhole CB35	136	4.41*	--	--	--	--
U9	Manhole CB35	→	Manhole CB23	167	--	--	--	--	--
U10	Manhole CB23	→	Catch Basin CB24	92	--	4.1	--	24	STEEL
U11	Catch Basin CB24	→	OUTFALL	26	4.1	2.6	5.8	24	STEEL
U12	Southern Pipe upgradient of Catch Basin CB24	→	Catch Basin CB24	>51.5	--	--	--	12	CPP
U13	Manhole CB22	→	Manhole CB23	224	4.9	--	--	24	CPP
U14	Manhole CB21	→	Manhole CB22	30	5.3	5.0	1.0	24	CPP
U15	Manhole CB20	→	Manhole CB21	201	7.45*	5.8	0.8	24	CPP
U16	Manhole CB19	→	Manhole CB20	173	9.2	7.45*	1.0	24	CPP
U17	South Pond Outlet	→	Manhole CB19	64	9.78*	9.4	0.6	24	CPP

Notes:

[1] Based on David Evans and Associates, Inc.'s (DEA's) Topographic Survey dated February 2017 (Appendix A), data available from the City of Everett Snohomish County Geographic Information System (GIS) and/or Pro Vac's Video Survey dated November/December 2016 and March 2018 (Appendix C).

[2] Based on observations made by GeoEngineers during a field visit. The structures with grated lids are identified as catch basins and the structures with closed lids are identified as manholes.

CPP = Corrugated Polyethylene Pipe

PVC = Polyvinyl Chloride Pipe

"--" = not available or not known

"*" = estimated based on Port of Everett record drawings

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Table 2

Storm Drain Conditions

Everett Smelter Lowland Area - Remedial Action Area B2

Everett, Washington

Storm Drain Segment ID	Upgradient Structure Type[2] and Identification	→	Downgradient Structure Type[2] and Identification	Approximate Length (feet)	Video Survey Completed? (Yes/No/ Abandoned)	Survey Year	Storm Pipe Physical Conditions Based on Video Survey[1]							
							Defects[3]						Deposits (Debris or Sediment)	Remarks
							Broken/ Fracture	Deformed	Cracks	Joint Separation	Sag	Evidence of Infiltration		
Inflow Network to South Detention Pond														
S1	Catch Basin CB32	→	Catch Basin CB31	7	Yes	2016								Video survey started at CB31 and finished at CB32. No defects or debris were observed.
S2	Catch Basin CB31	→	Catch Basin CB30	24	Yes	2016				X				Video survey started at CB31 and finished at CB30.
S3	Catch Basin CB30	→	Catch Basin CB29	202	Yes	2016		X					X	Video survey started at CB30 and finished at CB29.
S4	Catch Basin CB29	→	Catch Basin CB28	24	Yes	2016							X	Video survey started at CB28 and finished at CB29.
S5	Catch Basin CB28	→	South Pond Pump Station	50	Yes	2016							X	Video survey started at CB28 and finished at South Pond Pump Station.
S6	Catch Basin CB16	→	South Pond Pump Station	21	Yes	2016								Video survey started at CB16 and finished at the pump station. No defects or debris were observed.
S7	Catch Basin CB17	→	Catch Basin CB16	61	Yes	2016						X	X	Video survey started at CB16 and finished at CB17.
S8	Catch Basin CB18	→	Catch Basin CB17	54	Yes	2016 & 2018	X			X	X		X	2016 video survey started at CB18 and abandoned at 11 feet due to debris. 2018 video started at CB18 and finished at CB17.
S9	Catch Basin CB15	→	Catch Basin CB16	43	Yes	2016								Video survey started at CB15 and finished at CB16. No defects or debris were observed.
S10	Catch Basin CB12	→	Catch Basin CB15	200	Abandoned	2016			X				X	Two video surveys completed. First video survey started at CB12 and abandoned at 188.9 feet due to debris. Second video survey started at CB15 and abandoned at 9.9 feet due to debris.
S11	Catch Basin CB14	→	Catch Basin CB12	28	Abandoned	2016							X	Two video surveys completed. First video survey started at CB12 and abandoned at 13.5 feet due to debris. Second video survey started at CB14 and abandoned at 6.1 feet due to debris.
S12	Catch Basin CB11	→	Catch Basin CB12	230	Abandoned	2016	X	X	X				X	Two video surveys completed. First video survey started at CB11 and abandoned at 19.3 feet due to broken pipe. Second video survey started at CB12 and abandoned at 212.5 feet due to broken pipe.
S13	Catch Basin CB13	→	Catch Basin CB11	29	Yes	2016							X	Video survey started at CB11 and finished at CB13.
S14	Catch Basin CB10	→	Catch Basin CB11	49	Abandoned	2016 & 2018							X	Video survey started at CB11 and abandoned at 10.5 feet due to debris in 2016. Line re-surveyed in 2018 and the video survey abandoned at 9.6 feet from CB11 due to debris. Video survey could not be performed from CB10 in 2018 since pipes were completely underwater at CB10.
S15	Catch Basin CB9	→	Catch Basin CB10	36	Yes	2016							X	Video survey started at CB9 and finished at CB10.
S16	Catch Basin CB8	→	Catch Basin CB9	64	Yes	2016							X	Video survey started at CB8 and finished at CB9.
S17	Catch Basin CB7	→	Catch Basin CB8	196	Yes	2016								Video survey started at CB7 and finished at CB8. No defects or debris were observed.
S18	Catch Basin CB6	→	Catch Basin CB7	265	Yes	2016		X		X				Video survey started at CB6 and finished at CB7.
S19	Pipe upgradient of Catch Basin CB6	→	Catch Basin CB6	>38	Abandoned	2016							X	Video survey started at CB6 and abandoned at 38.3 feet due to debris.
Inflow Network to North Detention Pond														
N1	Catch Basin CB25	→	Catch Basin CB26	41	Yes								X	Video survey started at CB26 and finished at CB25.
N2	Catch Basin CB26	→	Catch Basin CB27	201	Abandoned	2016 & 2018	X	X			X		X	2016 video survey started at CB26 and abandoned at 39.3 feet due to camera underwater and poor visibility. 2018 video survey started at CB27 and abandoned at 149.1 feet due to debris and camera underwater. 2018 video survey also started at CB26 and abandoned at 37.6 feet due to debris and camear underwater.
N3	Catch Basin CB52	→	Catch Basin CB27	216	Yes	2018		X		X	X		X	Video survey started at CB27 and finished at CB52.
N4	Catch Basin CB51	→	Catch Basin CB52	24	Yes	2018				X			X	Video survey started at CB51 and finished at CB52.
N5	Catch Basin CB27	→	Catch Basin CB53	22	No	NA								Video survey was not completed. Storm pipe could not be accessed in 2016 due to on site construction activities at the time of the survey. In 2018, this pipe was observed to be completely under water.
N6	Catch Basin CB53	→	North Pond Pump Station	2	Yes	2018								Video survey started at CB53 and finished at the Pump Station. No defects or debris were observed.
N7	Catch Basin CB47	→	North Pond Pump Station	24	Yes	2018					X			Video survey started at CB47 and finished at the Pump Station.
N8	Catch Basin CB46	→	Catch Basin CB47	39	Yes	2016								Video survey started at CB46 and finished at CB47. No defects or debris were observed.
N9	Catch Basin CB41	→	Catch Basin CB46	113	Yes	2016								Video survey started at CB41 and finished at CB46. No defects or debris were observed.
N10	Catch Basin CB42	→	Catch Basin CB41	115	Yes	2016							X	Video survey started at CB41 and finished at CB42.
N11	Catch Basin CB43	→	Catch Basin CB42	196	Yes	2016								Video survey started at CB43 and finished at CB42. No defects or debris were observed.
N12	Catch Basin CB44	→	Catch Basin CB43	60	Yes	2016								Video survey started at CB43 and finished at CB44. No defects or debris were observed.
N13	Catch Basin CB45	→	Catch Basin CB44	108	Yes	2016								Video survey started at CB45 and finished at CB44. No defects or debris were observed.
N14	Catch Basin CB39	→	Catch Basin CB41	99	Yes	2016					X			Video survey started at CB39 and finished at CB41.
N15	Catch Basin CB40	→	Catch Basin CB39	113	Yes	2016								Video survey started at CB39 and finished at CB40. No defects or debris were observed.
N16	Catch Basin CB38	→	Catch Basin CB39	121	Yes	2016								Video survey started at CB39 and finished at CB38. No defects or debris were observed.
N17	Catch Basin CB37	→	Catch Basin CB38	184	Yes	2016								Video survey started at CB37 and finished at CB38. No defects or debris were observed.
N18	Catch Basin CB36	→	Catch Basin CB37	211	Yes	2016								Video survey started at CB37 and finished at CB36. No defects or debris were observed.

Storm Drain Segment ID	Upgradient Structure Type[2] and Identification		Downgradient Structure Type[2] and Identification	Approximate Length (feet)	Video Survey Completed? (Yes/No/ Abandoned)	Survey Year	Storm Pipe Physical Conditions Based on Video Survey[1]							
							Defects[3]						Deposits (Debris or Sediment)	Remarks
							Broken/ Fracture	Deformed	Cracks	Joint Separation	Sag	Evidence of Infiltration		
Outflow Network														
U1	North Pond Outlet	→	Manhole CB49	148	Yes	2016	X	X						Video survey started at CB49 and finished at North Pond Outlet.
U2	Manhole CB49	→	Manhole CB48	78	Yes	2016								Video survey started at CB49 and finished at CB48. No defects or debris were observed.
U3	Catch Basin CB47	→	Manhole CB48	37	Yes	2016 & 2018					X			Video survey started at CB48 and finished at CB47. Sag not observed during 2016 survey, however, was observed in 2018 survey.
U4	Manhole CB48	→	Manhole CB50	236	Yes	2016								Video survey started at CB48 and finished at CB50. No defects or debris were observed.
U5	Roof Drain of Motor Trucks Building	→	Manhole CB50	62	Yes	2018								Video survey started at CB50 and finished at the cleanout at the base of the building. No defects or debris were observed.
U6	Manhole CB50	→	Manhole CB33	234	Yes	2016	X		X			X		Video survey started at CB33 and finished at CB50.
U7	Manhole CB33	→	Manhole CB34	136	Yes	2016	X						X	Video survey started at CB33 and finished at CB34.
U8	Manhole CB34	→	Manhole CB35	136	Abandoned	2018							X	Video survey could not be completed from CB34 or CB35 since the storm pipe was inundated with water in 2016. In 2018, video survey was started at CB34 and abandoned at 124.2 feet due to camera underwater.
U9	Manhole CB35	→	Manhole CB23	167	No	NA								Video survey could not be completed from CB35 or CB23 since the storm pipe was inundated with water both during 2016 and 2018 survey.
U10	Manhole CB23	→	Catch Basin CB24	92	No	NA							X	Video survey could not be completed from CB23 since the storm pipe was inundated with water both during 2016 and 2018 survey. A video survey was attempted from CB24 in 2016; however, could not be performed and abandoned in 3 feet due to debris.
U11	Catch Basin CB24	→	OUTFALL	26	Yes	2016								Video survey started at CB24 and finished at the Outfall gate. No defects or debris were observed.
U12	Southern Pipe upgradient of Catch Basin CB24	→	Catch Basin CB24	>51.5	Abandoned	2016							X	Video survey started at CB24 and abandoned at 51.5 feet due to debris.
U13	Manhole CB22	→	Manhole CB23	224	Yes	2016	X	X				X		Video survey started at CB22 and finished at CB23.
U14	Manhole CB21	→	Manhole CB22	30	Yes	2016								Video survey started at CB21 and finished at CB22. No defects or debris were observed.
U15	Manhole CB20	→	Manhole CB21	201	Yes	2016								Video survey started at CB21 and finished at CB20. No defects or debris were observed.
U16	Manhole CB19	→	Manhole CB20	173	Yes	2016	X		X		X			Two video surveys completed. First video survey started at CB19 and abandoned at 158.5 feet due to camera underwater. Second video survey started at CB19 and finished at CB20.
U17	South Pond Outlet	→	Manhole CB19	64	Yes	2016					X			Video survey started at CB19 and finished at South Pond Outlet.

Notes:

[1] Detailed observations made during the November/December 2016 and March 2018 video survey are provided in Pro Vac's inspection report presented in Appendix C.

[2] Based on observations made by GeoEngineers during a field visit. The structures with grated lids are identified as catch basins and the structure with closed lids are identified as manholes.

[3] Photographic documentation of defects is presented on plans (Appendix G).

CPP = Corrugated Polyethylene Pipe

PVC = Polyvinyl Chloride Pipe

"--" = not available or not known

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Table 3

Storm Drain Repairs

Everett Smelter Lowland Area - Remedial Action Area B2

Everett, Washington

Storm Drain Segment ID	Segment Above/Below Seasonal High Groundwater Table?	Defects[1,2]						Storm Drain Repair[3,4]	Comments
		Broken/ Fracture	Deformed	Cracks	Joint Separation	Sag	Evidence of Infiltration		
Inflow Network to South Detention Pond									
S1	Above							None	--
S2	Above				X			CIPP	CIPP will be installed to address the defect observed. The segment is located across the street and therefore CIPP is preferred since, unlike PR, it does not require excavation and thus causing less disruption to the street.
S3	Below		X					CIPP	CIPP will be installed to address the defect and since the segment is located below the seasonal high GW table.
S4	Below							CIPP	CIPP will be installed since the segment is located below seasonal high GW table.
S5	Below							CIPP	CIPP will be installed since the segment is located below seasonal high GW table.
S6	Below							CIPP	CIPP will be installed since the segment is located below seasonal high GW table.
S7	Below						X	PR, CIPP	PR will be performed to address the defect observed. CIPP will be installed since the segment is located below seasonal high GW table.
S8	Above	X			X	X		CIPP	CIPP will be installed to address the defects observed. The segment is located across the street and therefore CIPP is preferred since, unlike PR, it does not require excavation and thus causing less disruption to the street.
S9	Above							None	--
S10	Above			X				PR	PR will be performed to address the defect observed as this segment is located above seasonal high groundwater table and it will be more economical to perform PR rather than CIPP, as this segment is 200 feet long.
S11	Above							None	--
S12	Above	X	X	X				PR, CIPP	PR will be performed to address broken pipe as it can't be addressed through CIPP. Point repairs to address cracks and deformity observed in this segment will likely result in significant excavation and associated disposal cost. It appears that CIPP can address these defects and will cause less disruption to the adjacent street. Thus, CIPP will be installed for this segment.
S13	Above							None	--
S14	Above							None	--
S15	Above							None	--
S16	Above							None	--
S17	Above							None	--
S18	Above		X		X			PR	PR will be performed to address joint seperation. The deformity observed does not appear to pose a threat of infiltration of contaminated media and therefore no repairs are proposed for it.
S19	Above							None	--
Inflow Network to North Detention Pond									
N1	Above							None	--
N2	Below	X	X			X		PR, CIPP	PR will be performed to address broken/fractured pipe. CIPP will be installed to address the remaining defects and since the segment is located below the seasonal high GW table
N3	Below		X		X	X		CIPP	CIPP will be installed to address the defects and since the segment is located below the seasonal high GW table.
N4	Above				X			CIPP	CIPP will be installed to address the defect observed. The segment is located across the street and therefore CIPP is preferred since, unlike PR, it does not require excavation and thus causing less disruption to the street.
N5	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
N6	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
N7	Below					X		CIPP	CIPP will be installed to address the defect and since the segment is located below the seasonal high GW table.
N8	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
N9	Above							None	--
N10	Above							None	--
N11	Above							None	--
N12	Above							None	--
N13	Above							None	--
N14	Above					X		None	The defect observed does not appear to pose a threat of infiltration of contaminated media and therefore no repairs are proposed.
N15	Above							None	--
N16	Above							None	--
N17	Above							None	--
N18	Above							None	--

Storm Drain Segment ID	Segment Above/Below Seasonal High Groundwater Table?	Defects[1,2]						Storm Drain Repair[3,4]	Comments
		Broken/ Fracture	Deformed	Cracks	Joint Separation	Sag	Evidence of Infiltration		
Outflow Network									
U1	Below	X	X					CIPP	CIPP will be installed to address the defects and since the segment is located below the seasonal high GW table.
U2	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
U3	Below					X		CIPP	CIPP will be installed to address the defects and since the segment is located below the seasonal high GW table.
U4	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
U5	Above							None	--
U6	Below	X		X			X	CIPP	CIPP will be installed to address the defects and since the segment is located below the seasonal high GW table.
U7	Below	X						PR, CIPP	PR will be performed to address the defect. 'CIPP will be installed since the segment is located below the seasonal high GW table.
U8	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
U9	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
U10	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
U11	Below							CIPP	'CIPP will be installed since the segment is located below the seasonal high GW table.
U12	Below							None	This segment is abandoned. The Port of Everett Record Drawings dated 2001 identify this segment to be plugged. However, the video survey indicate that this segment is not plugged. Therefore this segment will be grouted and plugged.
U13	Below	X	X				X	PR, CIPP	PR will be performed to address broken/fractured pipe. CIPP will be installed to address the remaining defects and since the segment is located below the seasonal high GW table
U14	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
U15	Below							CIPP	CIPP will be installed since the segment is located below the seasonal high GW table.
U16	Below	X		X		X		PR, CIPP	PR will be performed to address broken/fractured pipe. CIPP will be installed to address the remaining defects and since the segment is located below the seasonal high GW table
U17	Below					X		CIPP	CIPP will be installed to address the defects and since the segment is located below the seasonal high GW table.

Notes:

[1] Detailed observations made during the November/December 2016 and March 2018 video survey are provided in Pro Vac's

[2] Photographic documentation of defects is presented on plans (Appendix G).

[3] Storm drain repairs identified are based on information available from the video surveys dated 2006/2018. Additional storm drain repairs may be necessary based on results of contractor performed pre-installation survey. Contractor may also propose an alternative repair method for Ecology's approval.

[4] Cured In-Place Pipe (CIPP) lining will be installed for all storm drain segments located below the seasonal high groundwater table to eliminate infiltration of contamianted groundwater. Additionally, for segments located below seasonal high groundwater table, point repairs will be completed (prior to installing CIPP) for defects that cannot be addressed using CIPP. For storm drain segments located above seasonal high groundwater table, either CIPP or PR or both will be completed depending on the type and location of defect and lenght of the storm drain as described in the table comments. No storm drain repairs are proposed for segments that are located above seasonal high groundwater table and have no defects.

PR = Point Repair
CIPP = Cured-In-Place Pipe Lining
GW = groundwater
"--" = No Comments

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Table 4

Import Material Chemical Criteria

Everett Smelter Site Lowland Area - Remedial Action Area B2

Everett, Washington

Analyte	Analytical Method	Import Material Chemcial Criteria (mg/kg)
Petroleum Hydrocarbons		
Gasoline-Range	NW-TPH-Gx	5
Diesel-Range	NW-TPH-Dx	25
Oil-Range	NW-TPH-Dx	50
Metals		
Arsenic (As)	EPA 6010	7
Cadmium (Cd)	EPA 6010	1
Chromium (Cr)	EPA 6010	48
Lead (Pb)	EPA 6010	24
Mercury (Hg)	EPA 7471	0.25
Volatile Organic Compounds (VOCs)		
Benzene	EPA 8021 / 8260B	0.02
Ethylbenzene	EPA 8021 / 8260B	0.05
Toluene	EPA 8021 / 8260B	0.05
Xylenes	EPA 8021 / 8260B	0.10
Polycyclic Aromatic Hydrocarbons (PAHs)		
1-Methylnaphthalene	EPA 8270D SIM	0.0067
2-Methylnaphthalene	EPA 8270D SIM	0.0067
Naphthalene	EPA 8270D SIM	0.0067
Acenaphthene	EPA 8270D SIM	0.0067
Acenaphthylene	EPA 8270D SIM	0.0067
Anthracene	EPA 8270D SIM	0.0067
Benzo(g,h,i)perylene	EPA 8270D SIM	0.0067
Fluoranthene	EPA 8270D SIM	0.0067
Fluorene	EPA 8270D SIM	0.0067
Phenanthrene	EPA 8270D SIM	0.0067
Pyrene	EPA 8270D SIM	0.0067
Benzo(a)anthracene	EPA 8270D SIM	0.0067
Benzo(a)pyrene	EPA 8270D SIM	0.0067
Benzo(b)fluoranthene	EPA 8270D SIM	0.0067
Benzo(k)fluoranthene	EPA 8270D SIM	0.0067
Chrysene	EPA 8270D SIM	0.0067
Dibenz(a,h)anthracene	EPA 8270D SIM	0.0067
Indeno(1,2,3-cd)pyrene	EPA 8270D SIM	0.0067
Total cPAHs (TEQ)	EPA 8270D SIM	0.01
Polychlorinated Biphenyls (PCBs)		
Total PCBs	EPA 8082 Low Level	0.050

Notes:

cPAH = carcinogenic polycyclic aromatic hydrocarbons

EPA = United States Environmental Protection Agency

mg/kg = milligrams per kilogram

TEQ = toxicity equivalency

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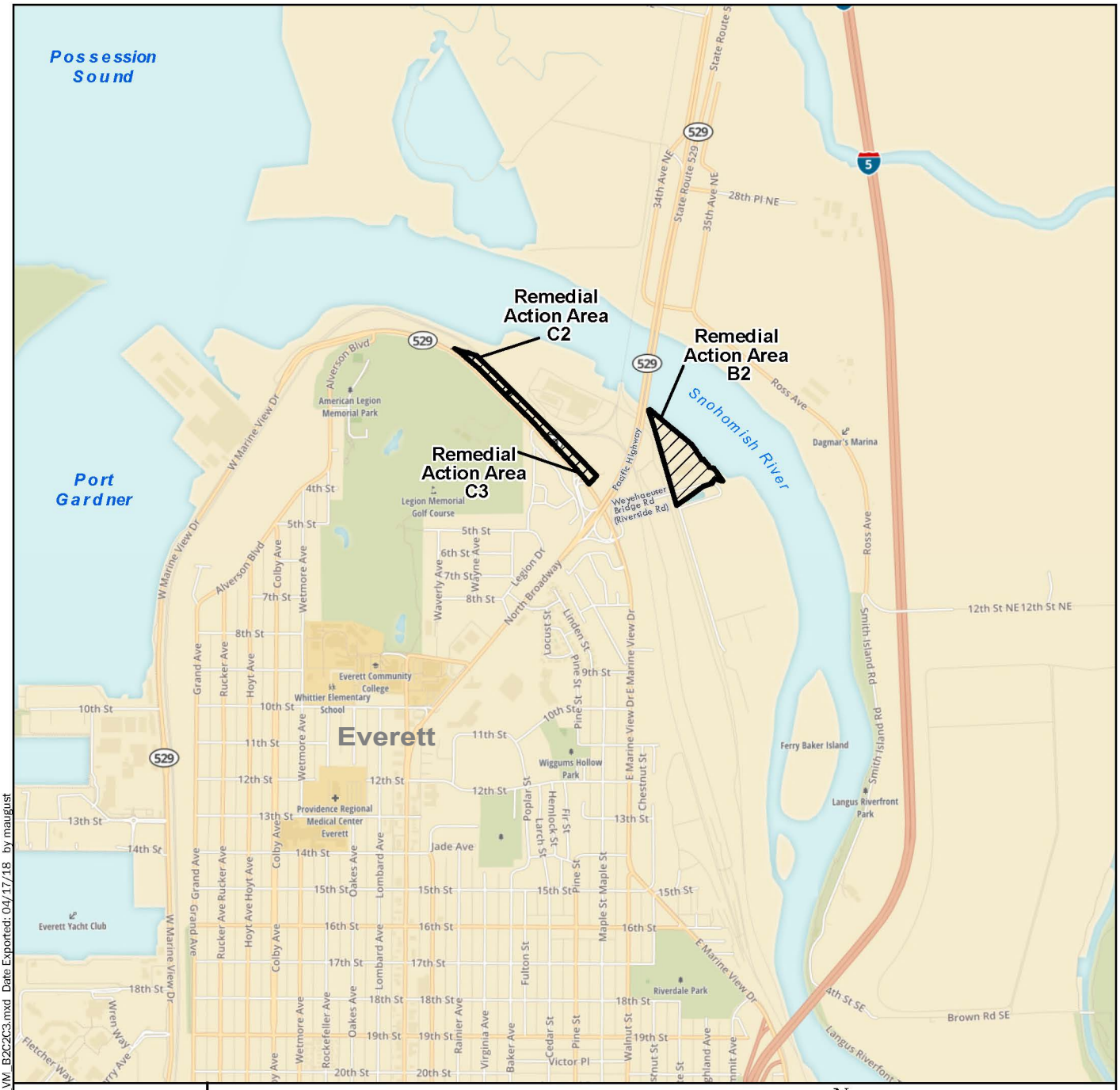

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2015

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Remedial Action Areas B2, C2 and C3
Everett Smelter Site Lowland Area
Everett, Washington

GeoEngineers

Figure 1

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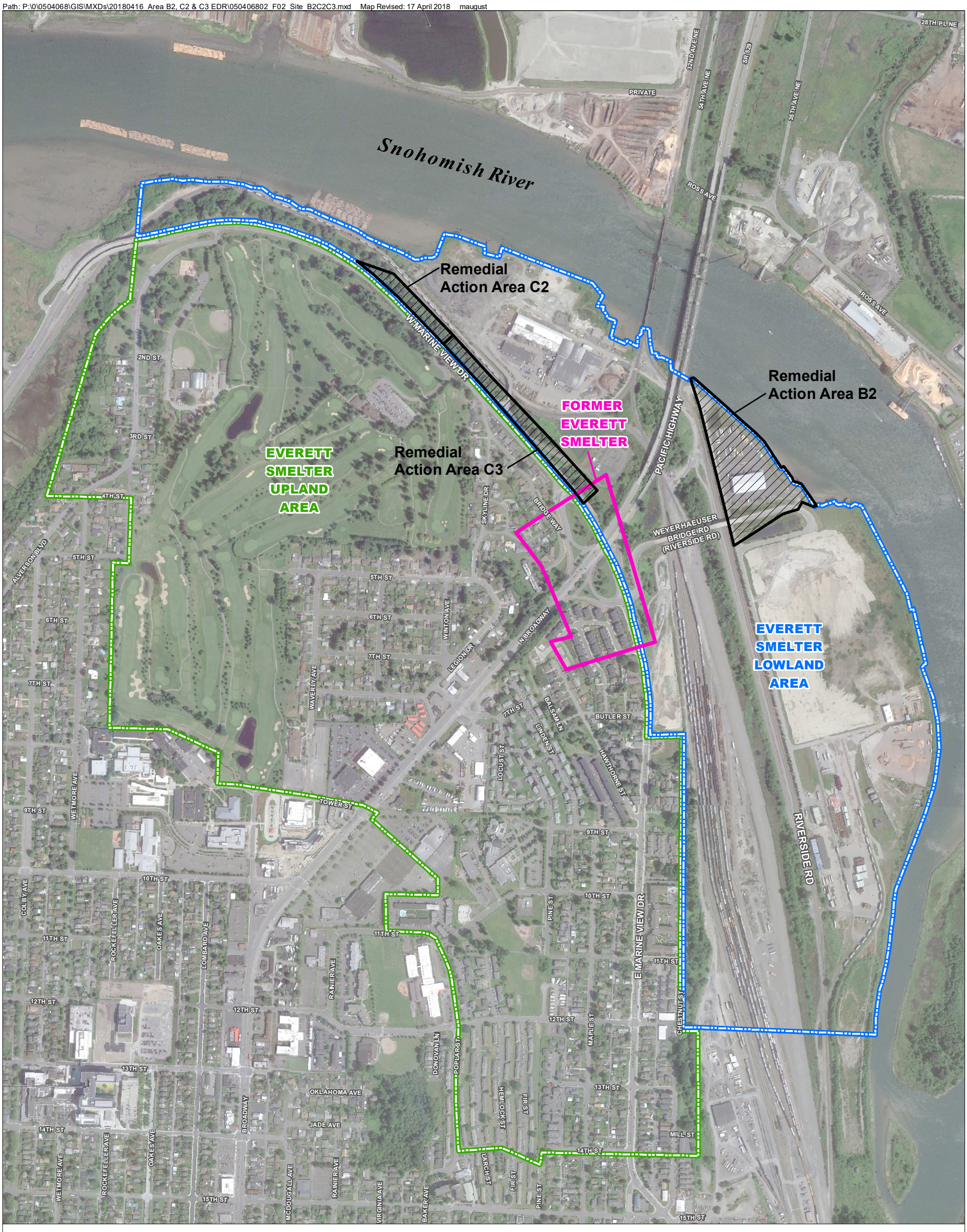

N
W E
S

700 0 700

Feet

Notes:
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Data Source: GoogleEarth Pro, 2013. Snohomish County GIS, 2012.

Everett Smelter Site and Areas B2, C2 and C3

Remedial Action Areas B2, C2, and C3
Everett Smelter Site Lowland Area
Everett, Washington

GeoEngineers

Figure 2

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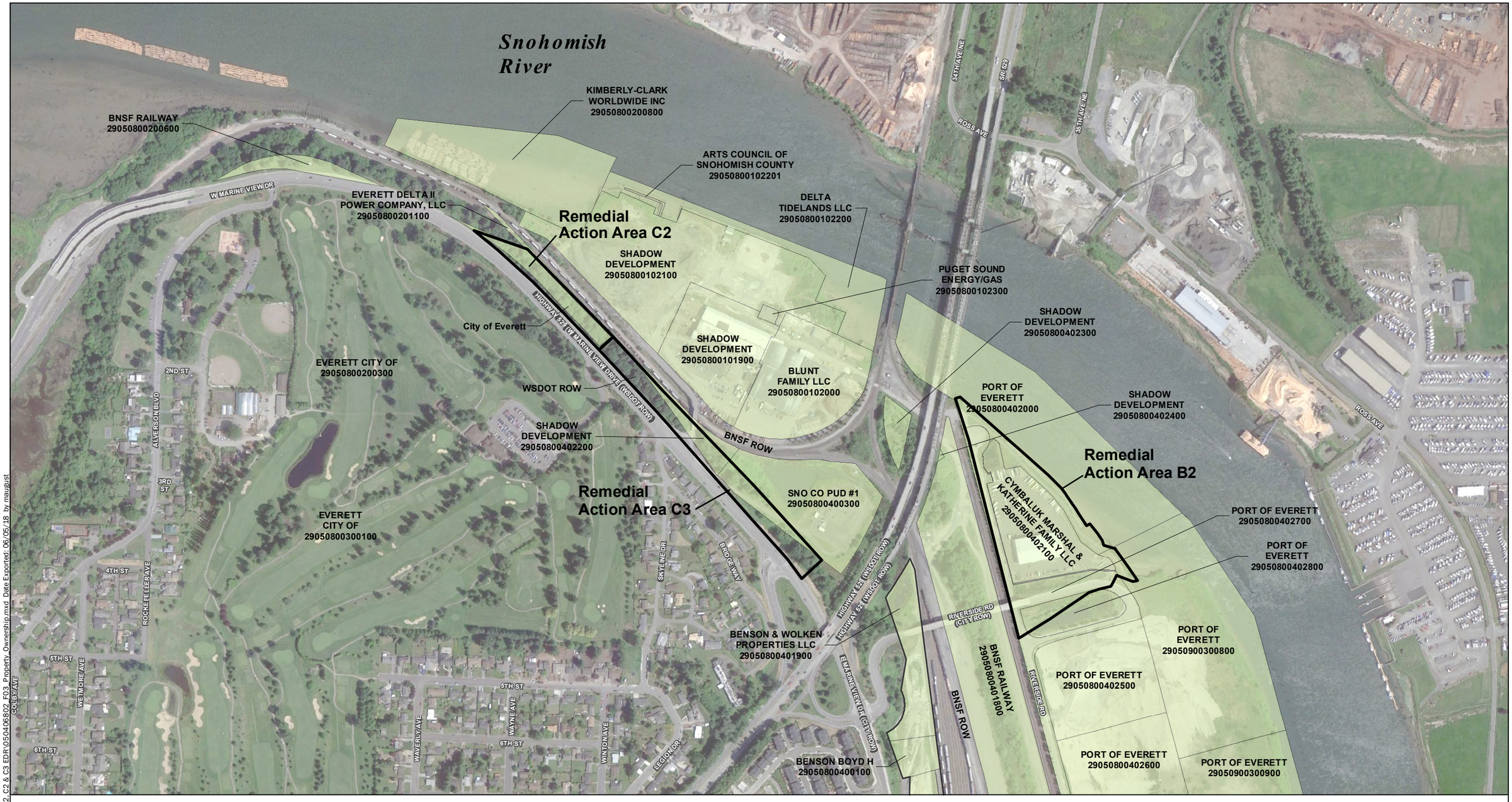

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Notes:
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Data Source:

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Legend

- Remedial Action Area and its Identification
- Snohomish County Parcel Boundary

BNSF = Burlington Northern Santa Fe Railway Company
WSDOT = Washington State Department of Transportation
City = City of Everett
ROW = Right of Way

N W E S

500 0 500
Feet

Property Ownership at and near Areas B2, C2, and C3.

Remedial Action Areas B2, C2, and C3
Everett Smelter - Lowland Area
Everett, Washington

GeoEngineers

Figure 3

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Legend

- Catch Basin[1]
- Manhole[1]
- Storm Drain Line (Gravity Flow)[2] and its Identification (N13)
- Storm Drain Line (Force Main)[3]
- Gravity storm drain line that conveys stormwater runoff to south detention pond.
- Gravity storm drain line that conveys stormwater runoff to north detention pond.
- Gravity storm drain line that conveys water to the outfall.

N W E S

120 0 120

Feet

Notes:

1. The type of storm drain structures (catch basins and manholes) is identified based on observations made by GeoEngineers during a field visit. The structures with grated lids are identiifed as catch basins and closed lids are identified as manholes.
2. Location is based on topographic survey completed by David Evans Associates, Inc. (DEA) in February 2017 and City of Everett, Snohomish County GIS.
3. Location is based on City of Everett, Snohomish County GIS.
4. The locations of all features are approximate.
5. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data source: City of Everett. Snohomish County GIS.
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Storm Drain System Layout

Everett Smelter - Lowland Area
Remedial Action Area B2
Everett, Washington

GeoEngineers

Figure 4

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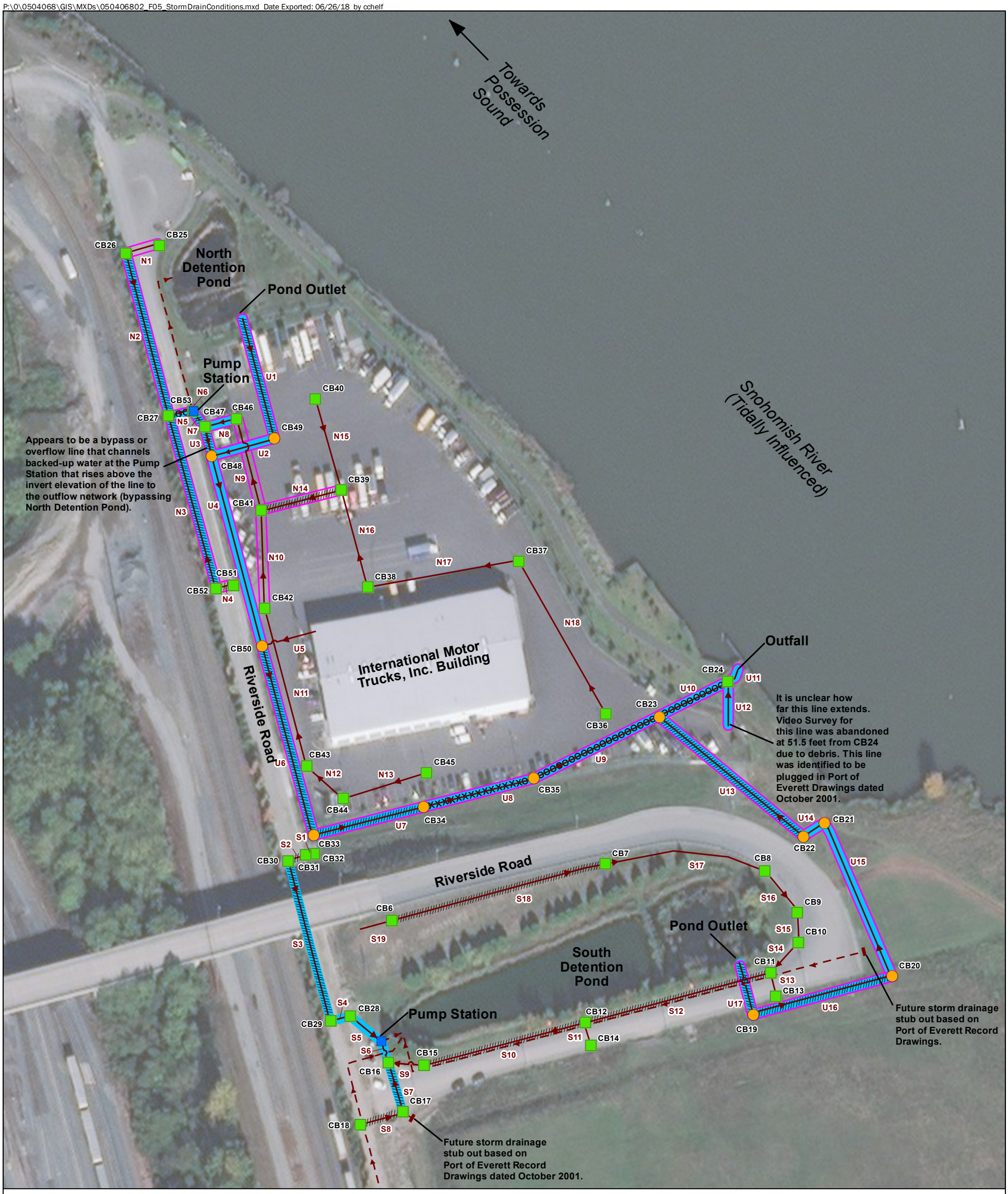

Catch Basin

Manhole

N13 Storm Drain Line (Gravity Flow) and its Identification

Storm Drain Line (Force Main)

Storm drain lines with invert elevations below the seasonal high groundwater level.

Storm drain line that is estimated to be tidally influenced.

Results of Pro-Vac's Video Survey
Dated November and December 2016, and March 2018.

//////////// Storm drain line that contains one or more than one defects (broken, fracture or deformed pipe, cracks, joint separation, sag, or evidence of infiltration).

ooooo Video survey for the storm drain line was not completed as the line remained inundated with water during low tide conditions potentially due to a sag in the line.

xxxxx Video survey performed; however, line was partially/fully inundated with water and therefore conditions cannot be assessed.

N
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S

120 0 120

Feet

Storm Drain Conditions

Everett Smelter - Lowland Area
Remedial Action Area B2
Everett, Washington

GeoEngineers

Figure 5

Notes:

1. The locations of all features are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data source: City of Everett. Snohomish County GIS.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

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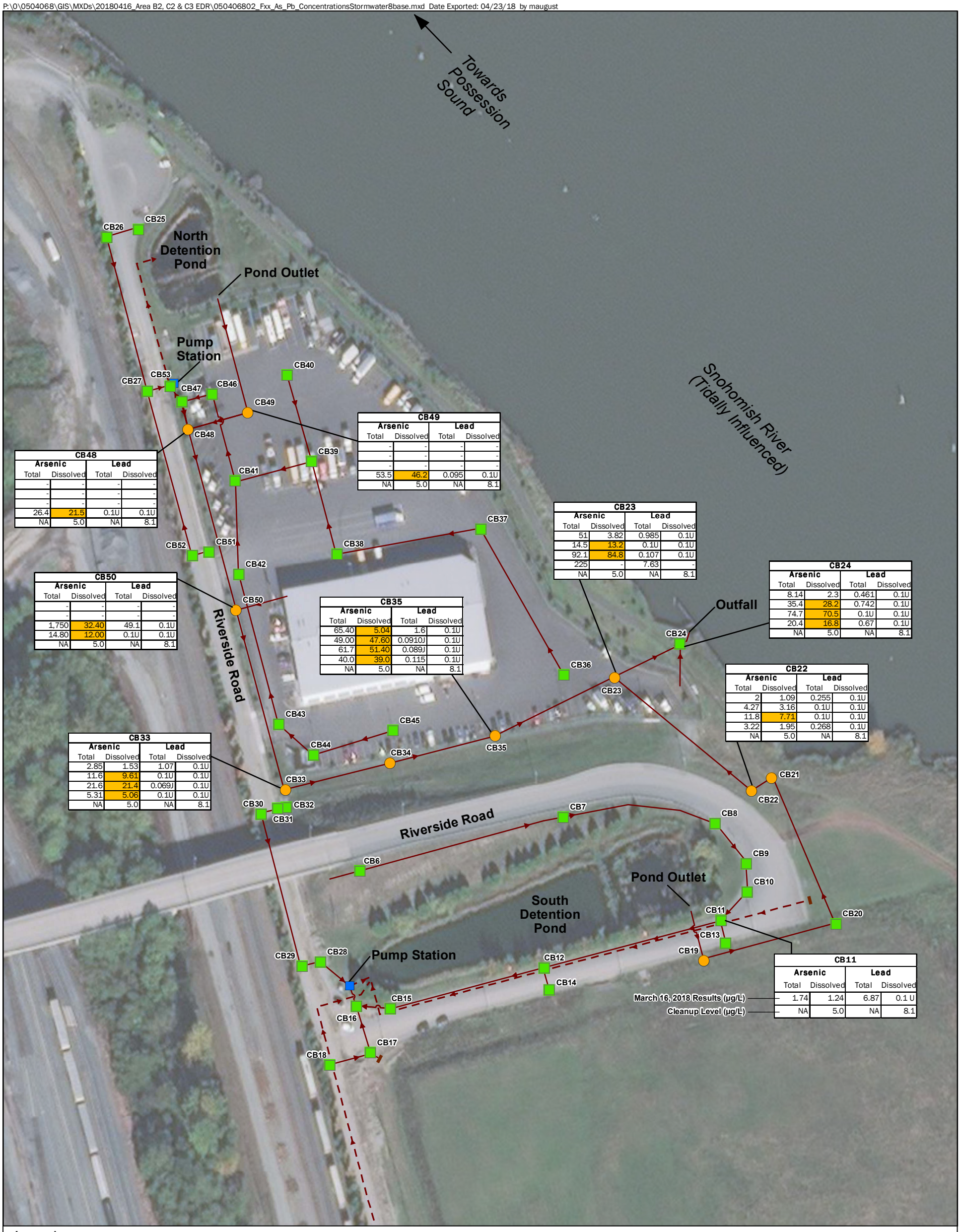

CB49			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
-	-	-	-
-	-	-	-
-	-	-	-
53.5	46.2	0.095	0.1U
NA	5.0	NA	8.1

CB48			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
-	-	-	-
-	-	-	-
-	-	-	-
26.4	21.5	0.1U	0.1U
NA	5.0	NA	8.1

CB23			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
51	3.82	0.985	0.1U
14.5	13.2	0.1U	0.1U
92.1	84.8	0.107	0.1U
225	-	7.63	-
NA	5.0	NA	8.1

CB24			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
8.14	2.3	0.461	0.1U
35.4	28.2	0.742	0.1U
74.7	70.5	0.1U	0.1U
20.4	16.8	0.67	0.1U
NA	5.0	NA	8.1

CB50			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
-	-	-	-
-	-	-	-
1,750	32.40	49.1	0.1U
14.80	12.00	0.1U	0.1U
NA	5.0	NA	8.1

CB35			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
65.40	5.04	1.6	0.1U
49.00	47.60	0.0910J	0.1U
61.7	51.40	0.089J	0.1U
40.0	39.0	0.115	0.1U
NA	5.0	NA	8.1

CB22			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
2	1.09	0.255	0.1U
4.27	3.16	0.1U	0.1U
11.8	7.71	0.1U	0.1U
3.22	1.95	0.268	0.1U
NA	5.0	NA	8.1

CB33			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
2.85	1.53	1.07	0.1U
11.6	9.61	0.1U	0.1U
21.6	21.4	0.069J	0.1U
5.31	5.06	0.1U	0.1U
NA	5.0	NA	8.1

CB11			
Arsenic		Lead	
Total	Dissolved	Total	Dissolved
1.74	1.24	6.87	0.1 U
NA	5.0	NA	8.1

March 16, 2018 Results (µg/L)
Cleanup Level (µg/L)

Legend

- Catch Basin
- Manhole
- Storm Drain Line (Gravity Flow)
- Storm Drain Line (Force Main)
- Orange shading indicates the result is greater than the cleanup level for protection of surface water in the Snohomish River applicable to water in the storm drain lines.

CB24				
Contaminant	Arsenic		Lead	
Phase of Contaminant	Total	Dissolved	Total	Dissolved
February 8, 2017 Results (µg/L)	8.14	2.3	0.461	0.1U
May 25, 2017 Results (µg/L)	35.4	28.2	0.742	0.1U
August 22, 2017 Results (µg/L)	74.7	70.5	0.1U	0.1U
December 5, 2017 Results (µg/L)	20.4	16.8	0.67	0.1U
Cleanup Level (µg/L)	NA	5.0	NA	8.1

N W E S

120 0 120

Feet

µg/L = Micrograms per Liter
U = The analyte was not detected at indicated Reporting Limit
J = The result is an estimate
- = Not Sampled or Not Analyzed

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data source: City of Everett. Snohomish County GIS.
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Summary of Water Contamination in Storm Drain System at Area B2

Everett Smelter - Lowland Area
Remedial Action Area B2
Everett, Washington

GeoEngineers

Figure 6

DRAFT

Path: P:\0\0504068\GIS\MXDs\20180416_Area B2, C2 & C3 EDR\050406802_F07_soil_contamination.mxd Map Revised: 05 June 2018 maugust

LLS-05				
Sample Date	Depth (feet bgs)	Concentration (mg/kg)		
		Arsenic	Lead	Mercury
5/24/2013	0 to 0.5	16.2	25	0.07
5/24/2013	0.8 to 1	27.1	18	0.07
Cleanup Level:		20	118	5.5

LLS-06				
Sample Date	Sample Depth	Concentration (mg/kg)		
		Arsenic	Lead	Mercury
5/24/2013	0 to 1	29.5	74	0.08
Cleanup Level:		20	118	5.5

LLS-07				
Sample Date	Sample Depth	Concentration (mg/kg)		
		Arsenic	Lead	Mercury
5/24/2013	0 to 1	82.2	194	0.16
Cleanup Level:		20	118	5.5

LLS-08				
Sample Date	Sample Depth	Concentration (mg/kg)		
		Arsenic	Lead	Mercury
5/24/2013	0 to 1	30	113	0.23
Cleanup Level:		20	118	5.5

Legend

Remedial Action Area

Soil Investigation Location and its Identification

LLS-05

mg/kg - milligrams/kilogram
bgs - below ground surface

N W E S

200 0 200

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: GoogleEarth Pro, 2013. Snohomish County GIS, 2012. Washington State Department of Ecology

Summary of Soil Contamination at Areas C2 and C3

Everett Smelter - Lowland Area

GeoEngineers

Figure 7