Remedial Investigation Report

Report Version: Draft, V3.

Site Name:	Duwamish Waterway Park
Site Address:	7900 10th Avenue South Seattle, WA 98108
Alternate Location Info:	King County Parcel Number: 732790-1195.

Ecology Facility Site ID No.:	49919
Cleanup Site ID:	15139

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Signature:

Date: 8/20/2021

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ACRONYMS AND ABBREVIATIONS

Acronyms & Abbreviations	Definitions
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
COC	Contaminant/Chemical of Concern
CSID	Cleanup Site Identification number
CSM	Conceptual Site Model
CUL	clean-up levels
Ecology	Washington State Department of Ecology
FSID	Facility Site identification number
MTCA	Model Toxics Control Act
RCW	Revised Code of Washington
TEE	Terrestrial Ecological Evaluation
TPH	total petroleum hydrocarbon
VCP	Voluntary Cleanup Program
WAC	Washington State Administrative Code

EXECUTIVE SUMMARY

Duwamish Waterway Park is located at 7900 10th Avenue South, in Seattle, Washington. The City of Seattle Department of Parks and Recreation (SPR) has operated this park since 1975. Park property is owned by SPR, City of Seattle Department of Transportation (SDOT), the Port of Seattle and until recently, King County. SPR purchased King County's portion in May 2019. During the property transaction, arsenic concentrations in soil were found at concentrations above the Model Toxics Control Act (MTCA) Method A cleanup level of 20 milligrams per kilogram (mg/kg). The exceedances of arsenic were found in soil located in the northeast corner of the park adjacent to the Duwamish Waterway, where the average soil concentration was 42 mg/kg and the highest concentration was 154 mg/kg, primarily in surficial soils. SPR planned renovations for Duwamish Waterway Park in 2020 and 2021, and SPR completed an interim action, targeting soil remediation in the northeast corner of the park, prior to park renovations.

1. INTRODUCTION

Duwamish Waterway Park (the Site) is located at 7900 10^{th} Avenue South, in Seattle, Washington. The City of Seattle Department of Parks and Recreation (SPR) has operated this park since 1975. Park property is owned by SPR, City of Seattle Department of Transportation (SDOT), the Port of Seattle and until recently, King County. SPR purchased King County's portion in May 2019. Property due diligence review discovered elevated arsenic concentrations in park soil. This Remedial Investigation report has been prepared to document the investigations conducted to date at the park and to request Ecology's opinion on the interim action which were conducted concurrent with planned park renovations in 2020 and 2021.

1.1. GENERAL SITE INFORMATION

Site Name:	Duwamish Waterway Park
Address:	7900 10^{th} Avenue South, Seattle, WA 98108
Facility Site Identification Number:	49919
Cleanup Site Identification Number:	15139
Contact:	Crystal Thimsen/Jean Lee City of Seattle Parks and Recreation 300 Elliott Avenue West, Suite 100 Seattle, WA 98119 206-684-4119 crystal.thimsen@seattle.gov jeanh.lee@seattle.gov

Duwamish Waterway Park is a 1.26-acre park located in the City of Seattle's South Park neighborhood on parcel number 732790-1195. It is adjacent to the Duwamish Waterway. The neighborhood is zoned as an industrial buffer zone, described in the City of Seattle municipal code as areas that provide buffer between industrial areas and adjacent residential zones. The legal land description is the northeast quarter of Section 32, Township 24, Range 04, Willamette Meridian (**Figure 1**).

1.2. SITE HISTORY

SPR has operated Duwamish Waterway Park since 1975. Prior to SPR's purchase in May 2019, the largest portion of the park was owned by King County. Based on a review of the aerial photographs from 1936 to 2015 included in the 2018 Phase I Site Investigation conducted as due diligence performed for the property transaction, previous uses of the site appear to have been primarily residential. The site appeared largely undeveloped with only one residential structure on the northeast corner of the park property near the Duwamish River; this structure first appears in 1936 and was demolished sometime between 1985 and 1990. The Phase 1 report is included as **Appendix A**. The properties adjacent to the park were agricultural and residential until more industrial properties appear in the 1950s and 1960s. The park is also located in an area that may have been impacted by the former Asarco Smelter plume as well as aerial deposition from other nearby industrial properties.

1.3. SITE USE

The site is currently used as a park. Park features include a walking trail, beach access, picnic areas with a barb-e-que, and benches along the riverside. There are mature trees along the eastern and western sides of the park. Due to its location adjacent to the Duwamish Waterway, park users utilize the beach access provided by the park for water recreation activities. The park is an important asset to the community who use the park each year for the Duwamish River Festival. SPR plans to maintain this location as a park in perpetuity. Park renovations conducted in 2020 and 2021 include adding a play area, more picnic areas, and upgrading and extending the walking path.

2. FIELD INVESTIGATIONS

2.1. PREVIOUS ENVIRONMENTAL INVESTIGATIONS/SITE CHARACTERIZATION

Although SPR operated the park for the last 45 years, King County owned most of the park for the past 44 years. There were no known environmental investigations conducted in the park until 2014, as described below.

- Eco Compliance Corporation (ECC) conducted limited soil sampling in July 2014 to characterize surface soils prior to constructing a gravel path in the park. Each sample was a composite of three separate samples which were collected from the upper three inches of soil at three locations along the planned path. These samples were analyzed for metals. A composite of the three individual composites was also analyzed for carcinogenic polynuclear aromatic hydrocarbons (cPAHs) and dioxins/furans as 2,3,7,8-tetrachlorodibenzo-p-dioxin).
- ECC completed a Phase 1 Site Assessment in May 2018 (**Appendix A**); ECC suggested that the arsenic contamination in surface soils detected in 2014 was due to the former Asarco Smelter plume; this area is identified on the Washington State Department of Ecology's (Ecology) website to have arsenic concentrations below 20 mg/kg.
- In January 2019, ECC collected soil samples at various depths from seven borings located throughout the site to further delineate the surface contamination encountered in the samples collected in 2014. These samples were analyzed for PAHs and arsenic as well as seven additional metals.
- In March 2019, 65 samples were collected from a grid across the entire park to further characterize the arsenic concentrations in surface soils and to confirm that arsenic concentrations in surface soils at the park were largely below the Model Toxics Control Act (MTCA) Method A unrestricted land use cleanup level of 20 mg/kg. Most of the samples were collected from 0 to 6 inches below ground surface, with samples collected from 7 to 12 inches below ground surface in 12 of these samples. Each sample was composited from three locations inside the grid and samples were analyzed for arsenic. In 2020, the laboratory also provided lead results, analyzed in 2019 but not previously reported.
- In July 2020, additional surface samples were collected in the northeast meadow to characterize soils that were not included in the March 2019 investigation. Samples were collected from 0 to 6 inches below ground surface, and 7 to 12 inches below ground surface. One sample was collected from each grid and samples were analyzed for arsenic and lead.
- In October 2020, prior to park renovations, an interim action was completed involving soil removal from the northeast meadow at depths ranging from 12 inches to 7 feet below ground surface. Additionally, soil from the root zones of the trees was

removed with an air-knife. Confirmation samples were collected beneath excavation areas , and clean soil was imported into the areas with soil removal. As park renovations proceeded in the remaining areas of the park, additional soils were removed off site and backfilled with clean imported soils. Soil samples were collected from the bottom of utility trenches throughout the park. Samples were primarily analyzed for arsenic and lead, with select samples from the northeast meadow also analyzed for TPH, PAHs, and polychlorinated biphenyls (PCBs). Sampling from the utility trenches continues into the summer of 2021.

- In April 2021, Ecology sampled soils on the Port of Seattle property. A total of six borings were installed and samples were collected at the surface, and at various one foot intervals from each boring. Samples were analyzed for PCBs, metals, PAHs, TPH, semivolatile organic compounds (SVOCs), and total organic carbon (TOC).

Because there was no historical industrial activity found on the site, previous investigations focused on analyzing samples for metals, PAHs, and dioxins and furans as these are the most common contaminants that would be found in surface soils from ambient air pollutants due to the proximity to industrial activities and the former Asarco Smelter plume . Arsenic and lead were the only metals that were detected at concentrations above the screening level, and most exceedances were limited to the northeast meadow. Concentrations were compared to MTCA Method A cleanup levels during these phases of site investigation because the site meets the definition of a site with relatively few hazardous substances that would be undergoing a routine cleanup action in WAC 173-340-704.

2.1.1. SITE GEOLOGY

The site geology is historically predominately alluvial fill composed of upstream fluvial sediments deposited from the White, Green, and Black Rivers. This fill included beds of fine silts and sands deposited as riverine and floodplain deposits, with coarser sands and gravels deposited near the water's edge. The Duwamish River valley was inhabited by Native American tribal communities who fished, hunted and gathered, and farmed in this area. In the late 1800s and early 1900s, after arrival of people of European origin to the area, the river was extensively modified. Tide flats and floodplains were filled to straighten the river channel, resulting in the abandonment of almost 3.7 miles of the original meandering riverbed. Current side slips in the Duwamish Waterway are remnants of these old river meanders (LDWG, 2010), one of which is across the river and to the north of the Duwamish Waterway Park. Tribal fishing activities continue to the present day.

The river channel has been frequently dredged for navigational purposes, and the excavated material was used to fill the old channel areas and the lowlands to bring them above flood levels. Subsequent filling of the lowlands for continued development results in a surficial layer of fill over most of the lower Duwamish Valley. Historic maps of the Duwamish River indicate that the Duwamish Waterway Park is located on the landward side of a historic oxbow.

Soils were not classified using the standard United States Geological Survey Soil Classification system during the soil boring investigation conducted in 2019. However, field observations indicate a gravel fill in the sample collected in the northeast corner of the Site. This fill was not observed in the borings collected in remaining park areas.

2.1.2. SITE HYDROGEOLOGY

Groundwater was encountered in soil borings advanced during the January 2019 investigation at 8 to 9 feet below ground surface. Localized groundwater flow is likely toward the Duwamish Waterway.

2.1.3. OTHER SITE INFORMATION

A search of Ecology's Environmental Information Management (EIM) database found one beach sediment sample collected in 2018, the concentration of arsenic in this sample ranged from 2.33 to 2.41 mg/kg. Data were also downloaded for sediment samples collected from the Duwamish Waterway in 2004, 2005, and 2006. Concentrations of arsenic in these sediment samples did not exceed 9 mg/kg. These sample locations are shown on Figure 2 and results are summarized in **Table 1**.

2.2. SAMPLING/ANALYTICAL RESULTS.

Soil samples collected during the investigations described above in 2014 and 2019 were submitted to Analytical Resources, Inc., an Ecology-certified laboratory using United States Environmental Protection Agency (EPA) analytical methods. ECC's sampling reports are included in **Appendix B.** A formal data validation was not completed during the previous investigations.

In 2014, three composite surface soil samples were collected to characterize surface soils prior to constructing a gravel path (**Figure 2**). The composite samples were analyzed for arsenic, barium, cadmium, chromium, lead, selenium, and silver by EPA Method 6010C; mercury by EPA Method 7471A; carcinogenic PAHs (benzo(a)anthracene, chrysene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and total benzofluoranthenes); and dioxins and furans by EPA 1613B. Sample results were compared to the MTCA Method A cleanup levels for unrestricted land use, except where not available, when the MTCA Method B screening level was used. As shown in **Table 2**, arsenic was the only compound detected in the soil samples at concentrations above MTCA cleanup and/or screening levels. The PAH and dioxin and furan results were reported from a composite sample that was composed of all three previously composited samples. The composited site sample results are not used to evaluate nature and extent of contamination in this RI.

In January 2019, ECC conducted an additional soil investigation to evaluate potential soil contamination prior to the property purchase. Four borings were installed in the northern portion of the site using direct push methods; samples from these borings were collected from approximately 3 to 4 and 8 to 9 feet below ground surface (ft bgs). The top of the soil/groundwater interface was noted at the 8- to 9-foot interval. Borings were terminated at approximately 10 ft bgs. Three additional borings were installed with a hand auger on the southern portion of the site; soil samples were collected from 0.5 to 1 ft bgs and from 2 to 2.5 ft bgs in all three locations (**Figure 2**). Samples were analyzed for the same list of metals as the 2014 soil samples by EPA Methods 6010C and 7471B and for PAHs by EPA Method 8270D with Selected Ion Monitoring (SIM). A formal data validation was not performed. Sample results were compared to MTCA Method A, except where not available, when MTCA Method B was used. As shown in **Table 3**, arsenic and lead were detected at concentrations above the MTCA Method A cleanup level in the soil sample collected from 3 to 4 ft bgs, from boring B-4 and arsenic was also slightly above the MTCA Method A cleanup level is the soil sample collected from 2 to 2.5 ft bgs from boring 2A. All other metals and PAHs concentrations were below MTCA cleanup/screening levels.

In February 2019, ECC collected surface soil samples throughout the site to delineate the arsenic concentrations in surface soils. Sampling was conducted in a grid pattern (**Figure 3**). Three-point composite samples were collected from 0 to 6 inches at each of the 65 grid locations, with deeper samples collected from 7 to 12 inches at 12 of the 65 locations. Samples were analyzed for arsenic by EPA Method 6010C. Though lead was not initially analyzed for these samples; the laboratory was able to re-report the results with lead included. A formal data validation was not performed. As shown in **Table 4** and **Figures 4 and 5**, arsenic and lead concentrations were uniformly below the MTCA Method A cleanup levels except for soils collected in the northeast corner of the site.

In July 2020, ECC collected surface soil samples from the remaining, unsampled portion of the northeast corner of the park, using a grid pattern similar to the February 2019 sampling; however, the samples collected in July 2020 were not composited. Sample locations are shown on Figures 4 and 5 and results are included in **Table 4**. Samples were analyzed for arsenic and lead by EPA Method 6010C. A formal data validation was not performed. As shown in **Table 4** and **Figure 4**, arsenic concentrations in surface soils throughout the northeast corner exceed MTCA Method A cleanup levels.

In April 2020, Ecology collected soil samples from the Port of Seattle property that had not been previously characterized. Sample locations and results are presented in Appendix D. Samples were analyzed for the following:

- PCBs by EPA Method 808A
- Metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc) by EPA Methods 6010 and 7473
- TPH by Ecology Method NWTPH-Dx
- PAHs by EPA Method 8270D with select ion monitoring
- SVOCs by EPA Method 8270D
- TOC by EPA Method 9060

Sample results were validated, though the formal validation report is not included in Appendix D. The only sample with metals concentrations similar to those found in the adjacent park soils were found in the samples collected from 0 to 2 feet bgs from boring 4, located on the southwest side of the bench close to the property line. While there were some exceedances in the remaining samples; the concentrations were lower than those observed in soils collected from the northeast meadow.

3. CONCEPTUAL SITE MODEL

Based on previous investigations and historical site use, arsenic and lead are present in concentrations above MTCA cleanup levels in the soils in the northeast corner of the site, and may be attributed to fill material brought in sometime between 1977 and 1980 based on aerial photo review and known historical site use. Arsenic and lead concentrations in the remaining areas of the Park are consistent with concentrations of these metals in surface soils throughout Puget Sound and are not indicative of a release due to industrial activity.

Arsenic is naturally occurring throughout soil in the Puget Sound, and is relatively immobile under oxidizing conditions. Arsenic in soil, either naturally occurring or from anthropogenic releases, forms insoluble complexes with iron, aluminum, and magnesium oxides found in soil surfaces, and in this form, is relatively immobile. However, under reducing conditions, arsenic can be released from the solid phase, resulting in soluble forms of arsenic, which may potentially leach into groundwater or result in runoff of arsenic into surface waters. Because many arsenic compounds tend to partition to soil under oxidizing conditions however, leaching usually does not transport arsenic. Arsenic is largely immobile in agricultural soils; therefore, it tends to concentrate and remain in upper soil layers indefinitely (ATSDR, 2020).

Lead can also occur naturally in in the Earth's crust; however, it is rarely found naturally. Lead use increased during 1950 through 2000 due to it's use in paint, battery manufacturing, ammunition, and in leaded gas. Once in contact with soil, lead sticks strongly to soil. Small amounts of lead can enter rivers, lakes, or streams when rainwater moves soil particles. Leaching of lead in soil to groundwater is unlikely, unless the rain falling on the soil is acidic (ATSDR, 2021).

The main transport mechanisms for arsenic and lead at the site are:

- Leaching of metals in the vadose zone soil to the underlying saturated zone soils and/or groundwater
- Leaching of metals in the saturated zone soil to groundwater
- Erosion of surface soils to beach sediment along the Duwamish Waterway
- Erosion of surface soils to surface water (Duwamish Waterway)

Potential receptors at risk from exposure at the Site are human and ecological receptors. The human receptors include direct exposure of park users during recreational activities, workers during park construction or maintenance activities, and human exposure via drinking water and surface water consumption; the ecological receptors are terrestrial wildlife (birds and burrowing animals) and freshwater aquatic species.

The objective of the preliminary exposure assessment is to assess the completeness of exposure pathways from environmental media of potential concern and associated contaminant fate and transport mechanisms for the potential receptors. The conceptual site model (CSM) is presented graphically on **Figure 6** and discussed below.

3.1. SOIL

Arsenic and lead concentrations in soil exceeding applicable MTCA Method A cleanup levels (CULs) present a potential risk to human receptors.

The main fate and transport mechanisms for soil at the Site include adsorption, leaching, advection, dispersion, diffusion, and biodegradation. Leaching of metals from the soil by dissolution and desorption to groundwater is discussed below. The exposure pathway for soil at the site includes direct contact with soil or inhalation of airborne soil particles. The potential exposure pathways for soil are discussed below:

- Direct Contact: Arsenic and lead concentrations in soil exceed MTCA CULs primarily in the northeast corner of the site. Though the area is covered with grass and park users do not come into direct contact, this pathway is complete to 8 feet bgs for environmental field personnel and construction and utility workers who may come in contact with contaminated soil during excavation activities. The direct contact pathway is considered complete for park users despite being covered with grass. Soil removal activities and park renovations including hard surfaces will eliminate the direct contact pathway for future park users, and for any contaminated soil that remains, a restrictive covenant can limit activities that would result in future direct contact.

- Inhalation: The release mechanism for this exposure pathway is the inhalation of airborne soil particles during excavation and construction activities on the Property. This exposure pathway could be complete for environmental field personnel and construction and utility workers during redevelopment, but it is not complete for park users because the soil is primarily covered with grass.
- Erosion: The release mechanism for this exposure pathway is erosion to the adjacent beach and the Duwamish River. This pathway is incomplete because arsenic and lead concentrations in sediment sampling conducted to support the LDW Remedial Investigation are below cleanup levels. Sediment data used to support the empirical demonstration that the erosion pathway is incomplete is shown on **Figure 2**.

3.2. GROUNDWATER

Arsenic and lead concentrations in groundwater are unknown. Although arsenic and lead concentrations in soil at depth are below the MTCA Method A soil cleanup levels for direct exposure, except in the northeast corner of the park, they are greater than the cleanup level for protection of groundwater. However, because groundwater is hydraulically connected to the Duwamish Waterway, groundwater beneath the Site is not a potential source for drinking water; therefore, the soil to potable groundwater pathway is not complete. The soil to groundwater pathway for groundwater to surface water is complete. Anecdotally, Ecology performed a study to determine if Ecology's proposed smelter plume safe levels (up to 100 – 200 mg/kg for arsenic and up to 500 – 700 mg/kg for lead) were protective of groundwater. Upon review, it was concluded that there was no compelling evidence to suggest that smelter plume soils, which are enriched in lead-arsenic, had impacted groundwater (Landau, 2006).

3.3. VAPOR

The vapor inhalation pathway is incomplete. According to Ecology's draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology, 2009), vapor intrusion assessment is recommended when there is the presence of chemicals of sufficient volatility and toxicity to pose a threat, and occupied buildings are present or could be constructed in the future above or near the contamination. Metals in soil at the site are not volatile, buildings do not exist on site nor are they currently planned for future construction; therefore, the vapor intrusion pathway is not complete.

3.4. TERRESTRIAL ECOLOGICAL EVALUATION

A terrestrial ecological evaluation (TEE) is required at sites where a release of a hazardous substance to soil has occurred. The TEE is conducted to evaluate potential risks to terrestrial ecological receptors. Because the site is 1.26 acres, it qualifies for an exclusion under WAC 173-340-7491(1)(c).

4. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Remedial actions must comply with substantive requirements of the applicable or relevant and appropriate requirements (ARARs) which include federal or state statutes, regulations, criteria, and guidelines. The following table summarizes preliminary ARARs.

Preliminary ARAR	**Citation**
MTCA	Chapter 70.105D of the RCW
MTCA Cleanup Regulations	Chapter 173-340 WAC
State Environmental Policy Act	RCW 43.21C
Washington State Shoreline Management Act	RCW 90.58; WAC 173-18; 173-22; and 173-27
The Clean Water Act	33 United States Code (USC) et seq.
Comprehensive Environmental Response, Compensation, and Liability Act of 1980	42 USC 9601 et seq. and Part 300 of Title 40 of the Code of Federal Regulations (40 CFR 300)
The Fish and Wildlife Coordination Act	16 USC 661-667e; the Act of March 10, 1934; Ch. 55; 48 Stat. 401)
Endangered Species Act	16 USC 1531 et seq.; 50 CFR 17, 225, and 402
Native American Graves Protection and Repatriation Act	25 USC 3001 through 3013; 43 CFR 10 and Washington's Indian Graves and Records Law (RCW 27.44)
Archeological Resources Protection Act	16 USC 470aaet seq.; 43 CFR 7
Washington Dangerous Waste Regulations	WAC 173-303
Solid Waste Management Act	RCW 70.95; WAC 173-304 and 173-351
Occupational Safety and Health Administration Regulations	29 CFR 1910, 1926
Washington Department of Labor and Industries Regulations	WAC 296
Water Quality Standards for Surface Waters of the State of Washington	RCW 90.48 and 90.54; WAC 173-201A
Water Quality Standards for Groundwater	WAC 173-200
Department of Transportation Hazardous Materials Regulations	40 CFR Parts 100 through 185
City of Seattle regulations, codes, and standards	All applicable or relevant and appropriate regulations, codes, and standards
King County regulations, codes, and standards	All applicable or relevant and appropriate regulations, codes, and standards

5. PROPOSED CLEANUP STANDARDS

The proposed cleanup standards must comply with the MTCA cleanup regulations specified in WAC 173-340 and with applicable state and federal laws. The cleanup standards selected for the Site are consistent with the remedial objective which is to contain existing contamination of soil and/or groundwater to limit exposure to humans and/or the environment and prevent contaminants in soil and groundwater from migrating off the Site. RCW 70.105D.030(2)d requires cleanup standards to be "at least as stringent as all applicable state and federal laws." As shown in **Table 5**, and listed above, applicable state and federal laws were considered in the selection of the cleanup level for soil and include the applicable state and federal laws included by Ecology in their Preliminary Cleanup Levels for the Lower Duwamish Waterway Document.

The proposed CULs for arsenic and lead in soil at the site are 7.3 and 81 mg/kg, respectively. The point of compliance in soil is to 15 feet bgs.

6. RI SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

6.1. SUMMARY AND CONCLUSIONS

Surface soils in the Duwamish Waterway Park contain arsenic and lead at concentrations expected for a property located in an industrialized location in South Seattle. An exception is the soils in the northeast corner of the park where arsenic and lead concentrations are elevated. The cleanup levels are 7.33 and 81 mg/kg for arsenic and lead. Sampling results from the beach and sediments do not indicate that arsenic and leadconcentrations in these locations are elevated. The soil to potable groundwater pathway is not complete because of the proximity to the Duwamish Waterway.

6.2. RECOMMENDATIONS

Duwamish Waterway Park was renovated in 2020 and 2021. Due to the lack of industrial activity at the park, Ecology model remedies for properties impacted by the former Asarco Smelter plume are appropriate to use to remediate the soils. The following remedies were employed prior to and during park renovations:

- Excavation and Removal:
    - Contaminated soil in the northeast corner of the park was excavated and removed while protecting the critical root zones of the trees as well as the Port of Seattle shoreline rockery. The excavation details are presented in Section 7.
    - Soils removed for utility installation were also disposed of offsite.
- Capping
    - The soils under the play area, the walkway, and the picnic areas are capped with various materials including concrete pads, gravel, and the materials that make up the play area. The direct exposure pathway for human and ecological receptors will be incomplete with the caps, removing the risk of exposure.
- Remaining Soils
    - Surface soils in the remaining areas of the park that are not capped or excavated will be graded with clean top soil to achieve the final design. Park renovations include hydroseed and grass seed to re-establish the lawn after major renovations are complete. Confirmation soil samples will be collected following Ecology guidance after grading and prior to any lawn establishing activities.

The drawings in Appendix C contain detailed drawings of the areas described above; except the excavation area. Confirmation soil samples collected during remedial activities are submitted to an Ecology-certified laboratory and analyzed for arsenic and lead using EPA Method 6020A. Data summary reviews will be performed by City of Seattle environmental analysts. A summary report describing the remaining remedial actions will be submitted to Ecology within 60 days of completion of the park renovations.

7. NORTHEAST INTERIM ACTION

In October 2020, an interim action was conducted to remove contaminated soils from the northeast corner of the park prior to park renovations. The interim action was comprised of soil excavation and capping.

Soil removal areas were determined based on results from the grid sampling conducted in 2019 and 2020. Soil removal areas were adjusted for the significant trees that exist in Duwamish Waterway Park; the trees provide much needed vegetation in this mixed industrial/residential area. Excavation also did not extend to the north and northeast to capture all contamination to avoid compromising the Port of Seattle failing rock wall armoring the steep shoreline.

Sampling results are described first beneath the trees and then from south (and west) to the east and to the waterway.

- SPR arborists used an air knife to remove soil from depths of 6 to 8 inches bgs in the critical root zones of the trees. This soil could not be removed with an excavator without damaging the health of the trees. Portions of the following grids were within the critical root zones of the trees: 52, 53, 59, 60, 66, 67, 71, 72, and 75. As shown in **Table 6**, concentrations of arsenic and lead beneath the excavated soils were mostly below background concentrations except under the large trees in grids 59, 60 and 67.
- Beginning from the south and west, soils were excavated to one ft bgs outside of the trees' critical root zones (grids 46, 53, 66, 67, 59 and 75; in grid 59, beneath the 6-inch thick picnic concrete pad, only 6 inches of soil were removed). **Table 6** shows the confirmation sampling in this area; some concentrations of arsenic and lead are below background levels (grids 66 and 67) at approximately 18 inches bgs. Confirmation samples were greater than the selected screening levels in the remaining grids.
- Soils in grids 60 and 71 were excavated to 18 inches bgs. Arsenic and lead concentrations at approximately 24 inches bgs are below background levels in grid 71. The concentrations of arsenic and lead in the remaining samples are greater than the screening levels.
- Soils in grids 64, 65, and 74 were excavated to 24 inches bgs. Confirmation sampling indicated that soils containing elevated arsenic and lead remain onsite. Excavation was suspended in order to preserve the steep armored shoreline.
- Soil was excavated from an 8 foot square excavation at boring B-4 to a depth of 7 feet bgs. This excavation area was located in grid 65. Arsenic and lead concentrations in confirmation samples collected from all four sidewalls (at approximately 5.5 feet bgs) were below background concentrations (**Table 6**).

Table 6 shows the arsenic and lead concentrations in soils in the northeast meadow pre and post interim action. **Figure 7** shows the cap depths over the excavated area. Contaminated soil was removed from the northeast meadow, except in the root zones under the trees in grids 59, 60 and 67. These areas were capped with up to 8 inches of clean soil. Concentrations of arsenic and lead in remaining soil in the northeast meadow are lower than before the interim action; however, background levels were not achieved in grids 46, 53, 59, 60, 64, 65, 67, 74, and 75. These areas were capped with up to 24 inches of clean soil, additional top soil, and grass will be established prior to the park opening.

Select confirmation samples were also analyzed for PCBs, TPH and PAHs to further characterize the soils for contaminants of concern for the Lower Duwamish Waterway. Sample results are presented in **Table 7**.

Additional sampling conducted in the remaining areas of the park will be included in an interim action report that will be submitted within 60 days after the renovations are complete.

8. WEST INTERIM ACTION

Soil sampling activities in the remaining areas of the park are ongoing and will be reported in a separate memorandum 60 days after the park renovations are complete.

9. REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR), 2007, Toxicological Profile for Arsenic, U.S. Department of Health and Human Services, August.

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Tables

Table 1
Arsenic and Lead Concentrations in Beach and Sediment Samples

Sample ID	DR197	DR198	DR225	B7A0086	SS101	SS102	SS100	LDW-SSB7	LDW-2284	SS533-comp	BNK5-1
Date Sampled	8/20/1998	8/20/1998	8/20/1998	8/30/2004	1/20/2005	1/24/2005	3/11/2005	3/18/2005	2/23/2006	1/12/2010	6/12/2018
Depth (ft bgs)	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-43	0-10
Metals (mg/kg)											
Arsenic	8.9	6.7	8.5	6.56 J	4.9	6.6	7.5	9.4	6.0 U	4.3	2.4
Lead	18	21	26	21.4 J	31	28	61	26	14	NA	2.87 J

Abbreviations
bgs = below ground surface
J = result is estimated
MTCA = Model Toxics Control Act
mg/kg = milligram per kilogram
NA = not analyzed
U = analyte not detected at the given reporting limit

Table 2
Soil Investigation Results - Trail Construction Sampling
July 2, 2014

Sample ID / Depth (inches bgs)	MTCA Method A [1]	1 [2]	2	3
		0-3	0-3	0-3
Metals (mg/kg)				
Arsenic	20	**61**	**69**	7
Barium	16,000 [3]	70.8	104	82.0
Cadmium	2.0	0.6	0.9	0.7
Chromium	2,000 [4]	26.3	42.4	28.6
Lead	250	89	135	32
Mercury	2.0	0.06	0.09	0.08
Selenium	400 [3]	5 U	5 U	5 U
Silver	400 [3]	0.3 U	0.3 U	0.3 U
PAHs (µg/kg)				
Benzo(a)anthracene	NE	180 U		
Chrysene	NE	200		
Total Benzofluoranthenes	NE	250		
Benzo(a)pyrene	100	180 U		
Indeno(1,2,3-cd)pyrene	NE	180 U		
Dibenzo(a,h)anthracene	NE	180 U		
Total cPAHs TEQ	100	27		
Dioxins/Furans (pg/g)				
2,3,7,8-TCDD		1.85		

Notes:
1. MTCA A value for unrestricted land use
2. **Bolded** values exceed the screening level
3. MTCA B value
4. Screening level for chromium III

Abbreviations
bgs = below ground surface
MTCA = Model Toxics Control Act
mg/kg = milligram per kilogram
NE = not established
pg/g = picogram per gram
ug/kg = micrograms per kilogram
U = analyte not detected at the given reporting limit

Table 3
Soil Boring Investigation Results
January 18, 2019

Sample ID / Depth (ft bgs)	MTCA Method A[1]	1A [2]		2A		3A		B-1		B-2		B-3		B-4	
		0.5-1	2-2.5	0.5-1	2-2.5	0.5-1	2-2.5	3-4	8-9	3-4	8.5-9.5	4-5	8.5-9.5	3-4	8-9
Metals (mg/kg)															
Arsenic	20	11.8	11.9	8.35	**20.3**	16.9	15.8	6.13	6.33	6.98	5.99	6.71	6.64	**261**	7.33
Barium	16,000 [3]	58.4	26.7	39.9	85.3	58.9	62.2	27.9	25.4	15.8	21.0	20.0	28.2	89.9	21.0
Cadmium	2.0	0.462	0.279	0.345	1.63	0.564	0.586	0.174 J	0.171 J	0.223	0.176 J	0.168 J	0.210 J	1.32	0.262
Chromium	2,000 [4]	17.7	10.6	12.7	26.2	18.3	22.0	8.02	8.40	9.82	8.04	9.50	9.90	33.0	8.27
Lead	250	11.6	14.6	12.6	23.0	52.4	26.5	0.799	0.676 J	1.56 J	0.702 J	0.948 J	1.25 J	**284**	0.882 J
Mercury	2.0	0.114	0.0356	0.109	0.134	0.124	0.162	0.0261 U	0.0213 U	0.0197 U	0.0222 U	0.0237 U	0.0218 U	0.0760	0.0250 U
Selenium	400 [3]	2.09	1.13 J	0.945 J	30.4 U	2.13 J	2.41 J	1.80 J	0.827 J	1.35 J	1.54 J	1.67 J	1.88 J	2.67 J	1.82 J
Silver	400 [3]	0.332 U	0.309 U	0.353 U	1.82 U	0.362 U	0.352 U	0.294 U	0.320 U	0.299 U	0.310 U	0.303 U	0.355 U	0.308 J	0.354 U
PAHs (µg/kg)															
Naphthalene	5,000	15.2	9.88	13.0	88.4	5.07	8.86	4.79 U	4.74 U	4.82 U	9.52	4.94 U	4.82 U	4.54 J	1.62 J
2-Methylnaphthalene	NE	24.7	14.8	20.5	154	4.50 J	18.4	1.16 J	1.11 J	4.82 U	15.9	4.94 U	1.46 J	4.30 J	3.50 J
1-Methylnaphthalene	NE	23.2	13.8	22.3	140	4.75 J	19.8	0.99 J	0.85 J	0.55 J	12.8	0.47 J	0.92 J	2.75 J	2.15 J
Acenaphthylene	NE	4.81 U	2.24 J	4.87 U	2.91 J	2.00 J	4.71 U	4.79 U	4.74 U	4.82 U	4.97 U	4.94 U	4.82 U	2.28 J	4.88 U
Acenaphthene	NE	2.12 J	4.47 J	4.87 U	31.9	1.24 J	6.40	4.79 U	4.74 U	4.82 U	3.02 J	4.94 U	0.78 J	2.68 J	4.88 U
Dibenzofuran	NE	10.1	6.35	9.95	50.1	2.87 J	11.1	4.79 U	4.74 U	4.82 U	6.79	4.94 U	4.82 U	1.87 J	4.88 U
Fluorene	NE	2.68 J	1.53 J	1.56 J	4.84 U	1.25 J	2.52 J	4.79 U	4.74 U	4.82 U	1.32 J	4.94 U	0.96 J	2.11 J	4.88 U
Phenanthrene	NE	46.8	27.8	31.8	128	26.1	41.0	1.71 J	1.26 J	1.75 J	20.2	0.87 J	2.63 J	19.3	3.21 J
Anthracene	NE	3.78 J	2.56 J	4.23 J	9.90	3.19 J	4.25	4.79 U	4.74 U	4.82 U	4.97 U	4.94 U	4.82 U	3.93 J	4.88 U
Fluoranthene	NE	28.1	18.2	25.4	35.0	32.4	22.9	4.79 U	4.74 U	3.15 J	3.32 J	1.07 J	1.25 J	30.2	1.29 J
Pyrene	NE	24.3	18.1	25.1	40.1	30.8	21.3	4.79 U	0.67 J	2.57 J	3.24 J	1.41 J	1.44 J	31.3	2.20 J
Benzo(a)anthracene	NE	12.5	8.65	11.6	19.8	15.8	10.1	4.79 U	4.74 U	1.22 J	1.60 J	4.94 U	4.82 U	15.0	4.88 U
Chrysene	NE	18.9	15.5	17.2	28.6	24.4	18.7	4.79 U	4.74 U	2.98 J	3.04 J	4.94 U	1.03 J	20.0	1.22 J
Benzo(b)fluoranthene	NE	13.3	13.2	11.2	11.9	20.6	13.6	1.48 J	4.74 U	2.47 J	4.97 U	4.94 U	4.82 U	14.8	4.88 U
Benzo(k)fluoranthene	NE	5.39	4.96	5.33	3.59	9.09	5.02	4.79 U	4.74 U	1.15 J	4.97 U	4.94 U	4.82 U	8.49	4.88 U
Benzo(j)fluoranthene	NE	6.88	6.26	5.26	5.31	9.85	5.94	4.79 U	4.74 U	0.98 J	4.97 U	4.94 U	4.82 U	8.08	4.88 U
Total Benzofluoranthenes	NE	24.4	22.4	21.8	18.8	38.1	23.7	4.79 U	4.74 U	4.74 J	4.97 U	4.94 U	4.82 U	31.7	4.88 U
Benzo(a)pyrene	100	11.7	11.3	11.1	8.45	19.2	9.56	4.79 U	4.74 U	1.75 J	0.80 J	1.04 J	4.82 U	19.1	0.70 J
Indeno(1,2,3-cd)pyrene	NE	10.7	14.4	8.35	10.5	18.7	9.32	4.79 U	4.74 U	2.01 J	4.97 U	4.94 U	4.82 U	18.7	4.88 U
Dibenzo(a,h)anthracene	NE	8.64	9.84	8.09	10.8	9.97	7.95	4.79 U	4.74 U	6.28	6.40	4.94 U	4.82 U	10.1	4.88 U
Benzo(g,h,i)perylene	NE	11.7	18.6	9.55	7.34	20.0	10.2	4.79 U	4.74 U	2.54 J	4.97 U	1.26 J	4.82 U	26.9	1.58 J
Total cPAHs TEF	100	16.94	16.56	15.73	14.40	26.86	14.35	3.61 J	3.58 U	3.09 J	2.38 J	2.30 J	3.63 J	26.01	1.93 J

Notes:
1. MTCA A value for unrestricted land use
2. **Bolded** values exceed the screening level
3. MTCA B value
4. Screening level for chromium III

Abbreviations
bgs = below ground surface
J = result is estimated
MTCA = Model Toxics Control Act
mg/kg = milligram per kilogram
NE = not established
ug/kg = micrograms per kilogram
U = analyte not detected at the given reporting limit

Table 4
Shallow Soil Investigation Results [1,2]
February 22, 2019 [3]

Sample ID	Depth (inches bgs)	Arsenic	Lead
1	0-6	10.1	43.7
2	0-6	5.08	24.3
3	0-6	5.22	25.3
4	0-6	5.05	24.2
4A	7-12	11.4	66.3
5	0-6	11.7	36.5
6	0-6	6.56	45.7
6A	7-12	6.30	23.7
7	0-6	6.54	35.4
8	0-6	7.19	38.3
9	0-6	6.78	33.9
10	0-6	7.12	41.8
11	0-6	3.83	87.1
12	0-6	7.32	36.5
13	0-6	8.56	31.0
14	0-6	6.53	37.6
15	0-6	6.04	32.6
15A	7-12	13.1	46.2
16	0-6	5.22	82.1
17	0-6	6.12	34.8
18	0-6	7.47	36.9
18A	7-12	7.22	20.9
19	0-6	7.39	37.7
20	0-6	7.37	32.7
21	0-6	5.36	51.5
22	0-6	7.81	40.7
23	0-6	9.47	46.1
24	0-6	9.19	45.1
25	0-6	7.42	30.9
25A	7-12	8.18	26.0
26	0-6	7.67	60.5
27	0-6	14.0	48.0
28	0-6	16.8	51.8
28A	7-12	15.2	68.8
29	0-6	9.36	43.8
30	0-6	7.98	29.6
31	0-6	6.32	57.8
31A	7-12	6.57	13.5
32	0-6	11.9	33.7
33	0-6	8.99	31.8
34	0-6	7.30	31.3
35	0-6	7.69	38.2
36	0-6	5.86	47.4
37	0-6	9.12	39.1
38	0-6	5.89	26.3
39	0-6	6.74	27.1
39A	7-12	7.96	18.4
40	0-6	11.7	38.9
41	0-6	6.43	46.8
42	0-6	7.83	34.3
42A	7-12	7.36	20.6
43	0-6	7.01	25.8
44	0-6	5.91	25.7
45	0-6	10.2	47.6
46	0-6	**41.7**	95.1
47	0-6	7.72	40.2
48	0-6	6.81	29.6
49	0-6	16.1	38.1
50	0-6	4.77	25.6
51	0-6	15.5	93.8
52	0-6	**23.7**	155
52A	7-12	**32.6**	82.2
53	0-6	**74.4**	134
54	0-6	6.09	28.9
55	0-6	4.82	19.6
56	0-6	8.51	27.4
56A	7-12	4.13	28.5
57	0-6	10.1	34.0
58	0-6	**34.6**	75.7
59	0-6	**104**	174
60	0-6	**71.3**	146
61	0-6	8.25	64.5
62	0-6	4.10	19.6
63	0-6	**25.4**	82.8
63A	7-12	12.6	20.8
64	0-6	**109**	186
65	0-6	**154**	188
66	0-6	21.9	74.4
67	0-6	62.9	122
68	0-6	17.4	57.6
69	0-6	63.5	119
70	0-6	118	242
71	0-6	72.1	115
71A	7-12	53.6	82.2
72	0-6	19.1	133
73	0-6	8.90	55.1
74	0-6	86.2	144
75	0-6	57.7	104
76	0-6	98.8	170

Notes:
1. All concentrations presented in milligrams per kilogram (mg/kg)
2. **Bolded** values exceed the MTCA A screening level for unrestricted land use of 20 mg/kg for arsenic and 250 mg/kg for lead.
3. Samples 66 through 76 collected on July 22, 2020.

Abbreviations
bgs = below ground surface
MTCA = Model Toxics Control Act
mg/kg = milligram per kilogram

Table 5

Applicable and Relevant Regulations and Site Cleanup Level Selection

Chemical	MTCA A	MTCA B Soil Direct Contact (cancer)	Soil Concentration to Protect Surface Water via GW Vadose Zone [1]	Soil Concentration to Protect Sediment via GW Vadose Zone [1]	Soil Concentration protective of Surface Water via GW Saturated Zone [1]	Soil Concentration to Protect Sediment via GW Saturated Zone [1]	Soil Concentration to Protect Sediment via Bank Erosion Min. ROD CUL + SMS Lower Tier	Natural Background Ecology (1994)	Lowest Applicable Cleanup Level	Natural Background greater than lowest cleanup level	Applicable Cleanup Level for Site
Arsenic	20	0.67	0.082	129	0.0041	6.49	7.00	7.30	0.0041	yes	7.30
Lead	250	250	1600	3900	81	190	450	24	81	no	81

Notes:

All concentrations in mg/kg

Table 6
Pre and Post Interim Action Arsenic and Lead Concentrations

Sample ID	Sample Depth	Arsenic	Lead	Excavated Depth	Excavation Location	Sample Depth	Arsenic	Lead
	Pre Interim Action			Post Interim Action				
52	0-6	**23.7**	**155**	6-8	tree area	6-14	6.71	62.3
	7-12	**32.6**	**82.2**		tree area		2.41	11.1
72	0-6	**19.1**	**133**	6-8	tree area	6-14	3.74	38.7
					tree area	6-26	5.90	32.4
46	0-6	**41.7**	**95.1**	12	bottom	12-18	1.74	1.17
					south sidewall		**7.49**	27.6
					west sidewall		**12.0**	74.6
53	0-6	**74.4**	**134**	6-8	tree area	6-14	1.28	1.0 U
					tree area	6-26	1.54	1.94
				12	bottom	12-18	4.26	**159**
66	0-6	**21.9**	74.4	6-8	tree area	6-14	1.62	1.26
					tree area	6-26	3.59	19
				12	bottom	12-18	1.88	1.67
67	0-6	**62.9**	**122**	6-8	tree area	6-14	**24.8**	**118**
					tree area	6-26	6.26	**82.2**
					tree area	6-14	2.32	1.48
					tree area	6-26	2.30	1.50
				12	bottom	12-18	2.55	1.46
59	0-6	**104**	**174**	6-8	tree area	6-14	12.6	**193**
					tree area	6-26	**112**	**226**
				12	bottom	12-18	**85.9**	**164**
					picnic pad		6.78	55.1
75	0-6	**57.7**	**104**	6-8	tree area	6-14	2.56	1.81
					tree area	6-26	2.93	2.01
				12	bottom	12-18	4.28	26.3
					N sidewall		**16.0**	**84.4**
60	0-6	**71.3**	**146**	6-8	tree area	6-14	**29.1**	**365**
					tree area	6-26	4.69	5.22
				18	bottom	18-24	**139**	**220**
71	0-6	**72.1**	**115**	6-8	tree area	6-14	1.92	2.39
	7-12	**53.6**	**82.2**		tree area		4.74	12.5
				18	bottom	18-24	7.11	64.8
64	0-6	**109**	**186**	24	bottom	24-30	**12.1**	**160**
					NW sidewall	36	**26.8**	58.2
					NE sidewall		**23.2**	**86.3**
65	0-6	**154**	**188**	24	bottom	24-30	**11.7**	78.7
					NW sidewall	36	**242**	**347**
					NE sidewall		**195**	**312**
74	0-6	**86.2**	**144**	24	bottom	24-30	**210**	**282**
					NW sidewall	36	**236**	**249**
					NE sidewall		**89.1**	**96.1**
B-4	3-4 (feet)	**261**	**284**	7 (feet)	N sidewall	5.5 (feet)	2.19	1.55
					S Sidewall		2.72	1.80
					E Sidewall		2.10	1.34
					W sidewall		2.71	46.1

Notes:
1. All concentrations presented in milligrams per kilogram (mg/kg)
2. **Bolded** values exceed the screening levels.

Abbreviations
bgs = below ground surface
MTCA = Model Toxics Control Act
mg/kg = milligram per kilogram

Table 7
Interim Action Additional Analytical Results
October 2020

Sample ID	DX-1	DX-2	DX-3
Grid	65	66	46
Depth (inches bgs)	36	36	36
Metals (mg/kg)			
Arsenic	NA	NA	NA
Barium	86.7	31.8	15.4
Cadmium	1 U	1 U	1 U
Chromium	8.42	5.51	4.96
Lead	NA	NA	NA
Mercury	1 U	1 U	1 U
Selenium	1 U	1 U	1 U
Silver	1 U	1 U	1 U
PAHs (mg/kg)			
Naphthalene	0.05 U	0.01 U	0.01 U
2-Methylnaphthalene	0.05 U	0.01 U	0.01 U
1-Methylnaphthalene	0.05 U	0.01 U	0.01 U
Acenaphthylene	0.05 U	0.01 U	0.01 U
Acenaphthene	0.05 U	0.01 U	0.01 U
Fluorene	0.05 U	0.01 U	0.01 U
Phenanthrene	0.075	0.01 U	0.01 U
Anthracene	0.05 U	0.01 U	0.01 U
Fluoranthene	0.17	0.01 U	0.01 U
Pyrene	0.20	0.01 U	0.01 U
Benzo(a)anthracene	0.069	0.01 U	0.01 U
Chrysene	0.11	0.01 U	0.01 U
Benzo(b)fluoranthene	0.14	0.01 U	0.01 U
Benzo(k)fluoranthene	0.05 U	0.01 U	0.01 U
Benzo(a)pyrene	0.11	0.01 U	0.01 U
Indeno(1,2,3-cd)pyrene	0.092	0.01 U	0.01 U
Dibenzo(a,h)anthracene	0.05 U	0.01 U	0.01 U
Benzo(g,h,i)perylene	0.10	0.01 U	0.01 U
Total cPAHs TEF	0.15	0.01 U	0.01 U
TPH (mg/kg)			
Diesel Range	50 U	50 U	50 U
Motor Oil Range	250 U	250 U	250 U
PCBs (mg/kg)			
Total PCBs	0.02 U	0.02 U	0.02 U

Abbreviations
bgs = below ground surface
mg/kg = milligram per kilogram
PAHs = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyls
TPH = total petroleum hudrocarbons
U = analyte not detected at the given reporting limit

Figures

100 50 0 100 200

SCALE IN FEET

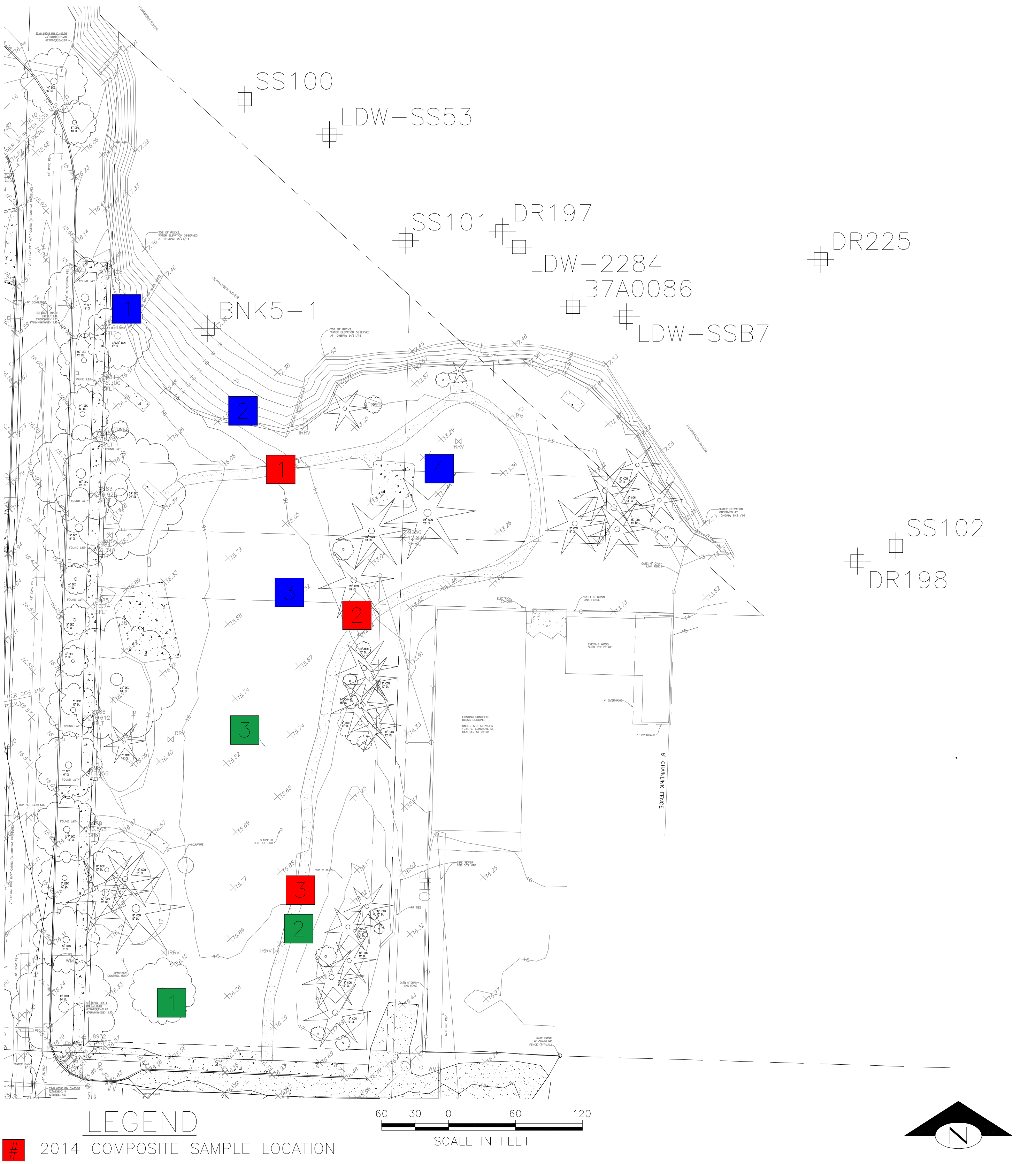
N

REVIEWED: PARK ENGINEER DATE

All work done in accordance with the City of Seattle Standard Plans and Specifications in effect on the date shown above, and supplemented by Special Provisions.

Seattle Parks & Recreation

DUWAMISH WATERWAY PARK	DESIGNED X DRAWN X CHECKED X	DATE X
DUWAMISH WATERWAY PARK FIGURES	ORDINANCE NO. X SPECIFICATION NO. X	SHEET 1 OF 6
SITE VICINITY	SCALE 1"=100'	FIGURE 1



LEGEND

- # 2014 COMPOSITE SAMPLE LOCATION
- # 2019 GEOPROBE SAMPLE LOCATION
- # 2019 HAND AUGER SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION

REVIEWED: PARK ENGINEER DATE

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DUWAMISH WATERWAY PARK

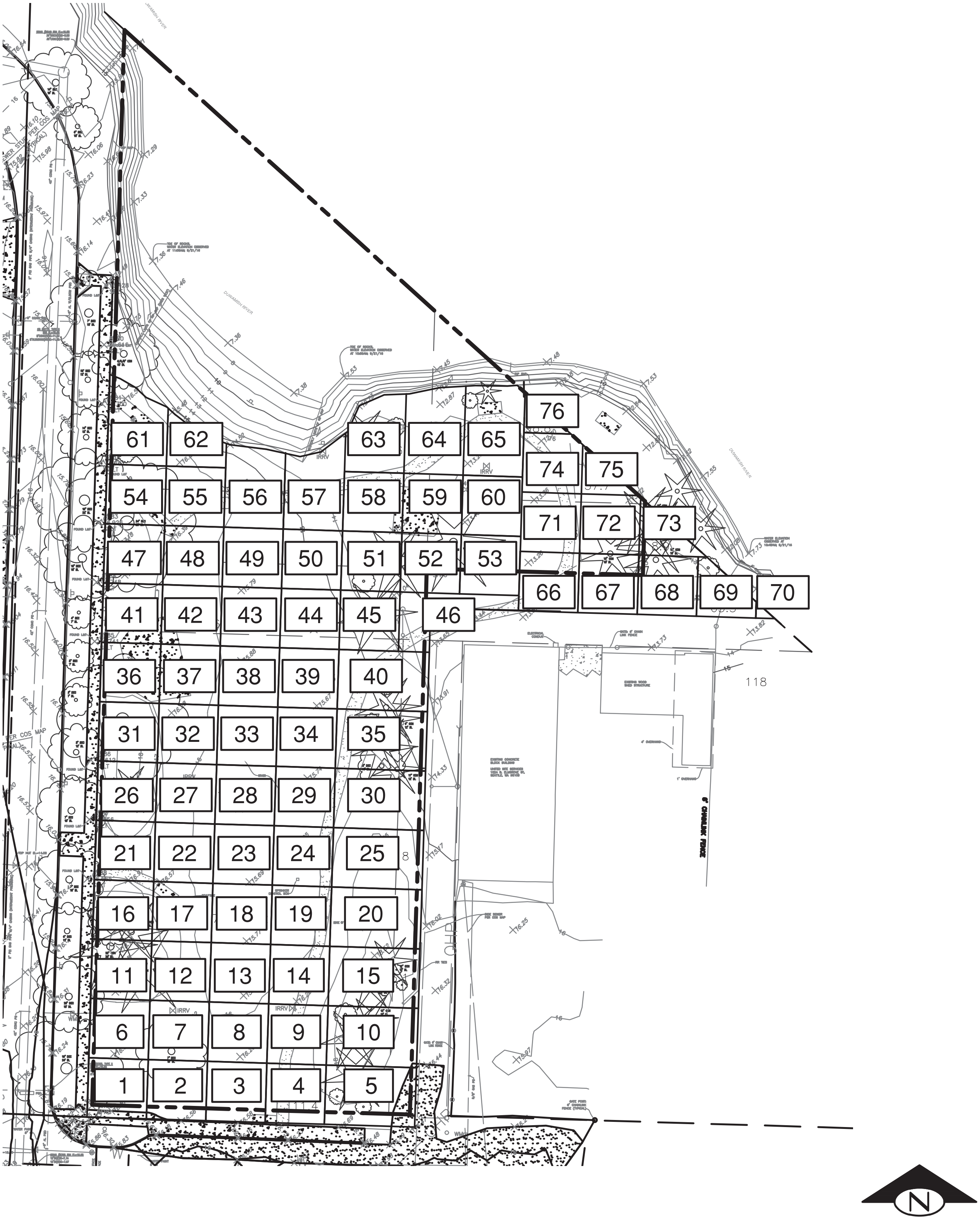
DUWAMISH WATERWAY PARK FIGURES

SOIL BORING AND HISTORICAL TRAIL SAMPLING LOCATIONS

DESIGNED X
DRAWN X
CHECKED X
ORDINANCE NO. X
SPECIFICATION NO. X
SCALE 1"=60'

DATE X
SHEET 3 OF 6

FIGURE 2



REVIEWED:

PARK ENGINEER DATE

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Seattle Parks & Recreation

DUWAMISH WATERWAY PARK

DUWAMISH WATERWAY PARK FIGURES

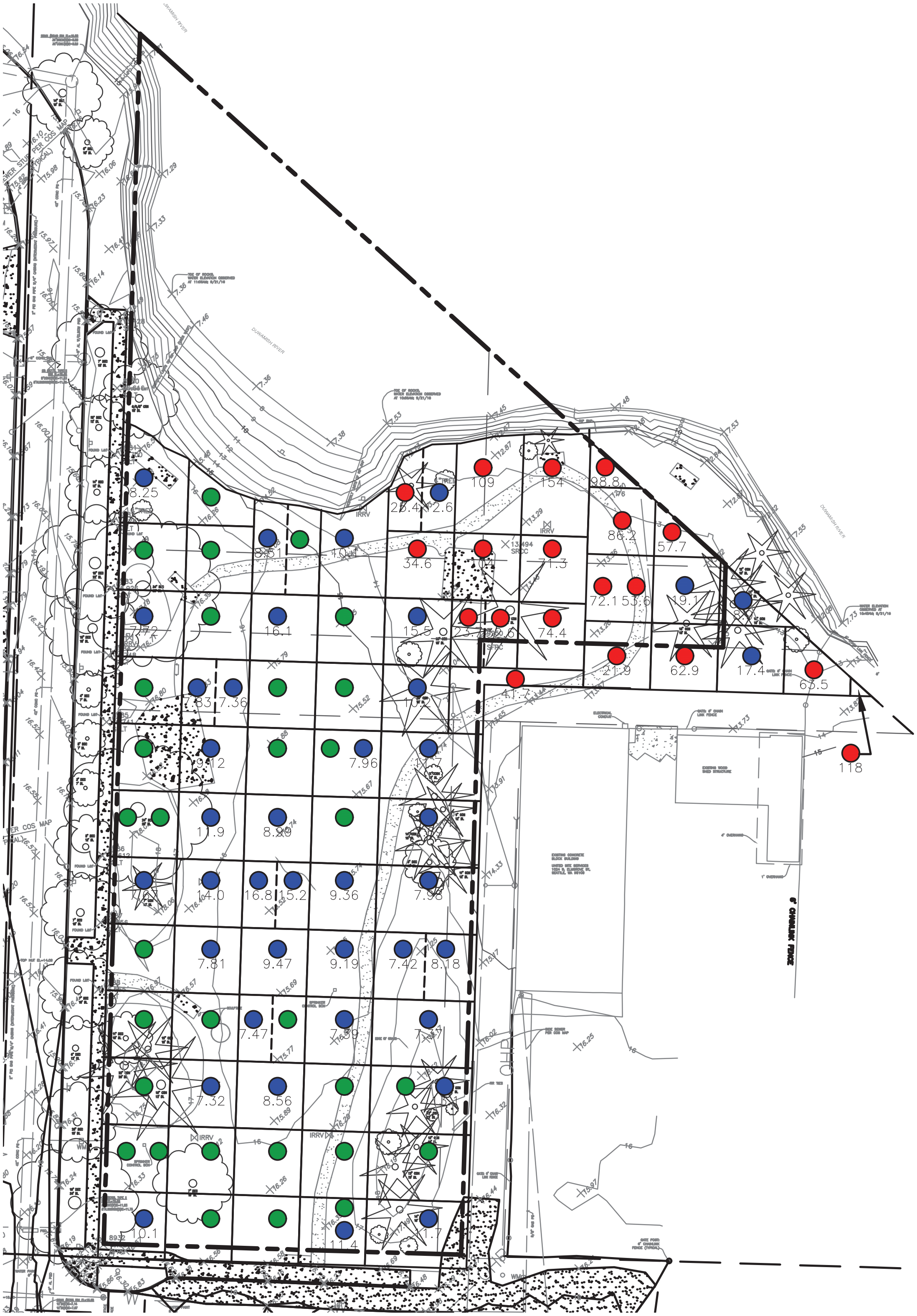
GRID SAMPLE LOCATIONS

DESIGNED X
DRAWN X
CHECKED X
ORDINANCE NO. X
SPECIFICATION NO. X
SCALE 1"=60'

DATE X

SHEET X OF X

FIGURE 3



60 30 0 60 120
SCALE IN FEET

N

NOTES

- LOCATIONS WITH 2 DOTS INDICATE SAMPLES COLLECTED FROM 0–6" AND FROM 6–12".
- LOCATIONS WITH 1 DOT INDICATE SAMPLES COLLECTED FROM 0–6".
- MG/KG = MILLIGRAMS PER KILOGRAM

≤7.3 mg/kg (green) | >7.3–≤20 mg/kg (blue) | >20 mg/kg (red)

REVIEWED: PARK ENGINEER DATE

All work done in accordance with the City of Seattle Standard Plans and Specifications in effect on the date shown above, and supplemented by Special Provisions.

Seattle Parks & Recreation

DUWAMISH WATERWAY PARK

DUWAMISH WATERWAY PARK FIGURES

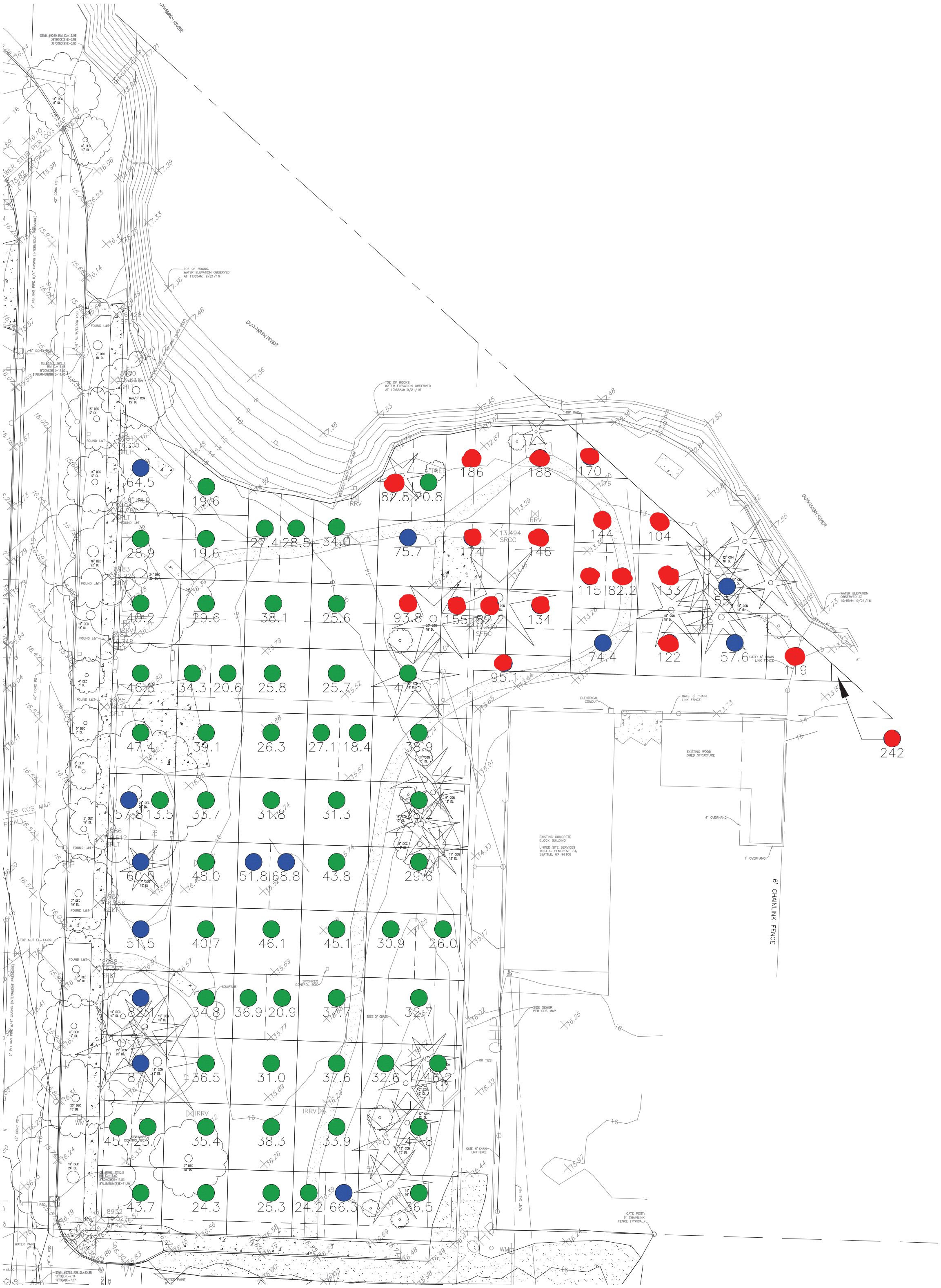
ARSENIC CONCENTRATIONS IN SURFACE SOIL

DESIGNED X
DRAWN X
CHECKED X
ORDINANCE NO. X
SPECIFICATION NO. X
SCALE 1"=60'

DATE X

SHEET X OF X

FIGURE 4



60 30 0 60 120

SCALE IN FEET

N

NOTES

- LOCATIONS WITH 2 DOTS INDICATE SAMPLES COLLECTED FROM 0–6" AND FROM 6–12".
- LOCATIONS WITH 1 DOT INDICATE SAMPLES COLLECTED FROM 0–6".
- MG/KG = MILLIGRAMS PER KILOGRAM

≤50 mg/kg   >50–≤81 mg/kg   >81 mg/kg

REVIEWED:
PARK ENGINEER DATE

All work done in accordance with the City of Seattle Standard Plans and Specifications in effect on the date shown above, and supplemented by Special Provisions.

Seattle Parks & Recreation

DUWAMISH WATERWAY PARK

DUWAMISH WATERWAY PARK FIGURES

LEAD CONCENTRATIONS IN SURFACE SOIL

DESIGNED X
DRAWN X
CHECKED X
ORDINANCE NO. X
SPECIFICATION NO. X
SCALE 1"=60'

DATE X
SHEET X OF X

FIGURE 5

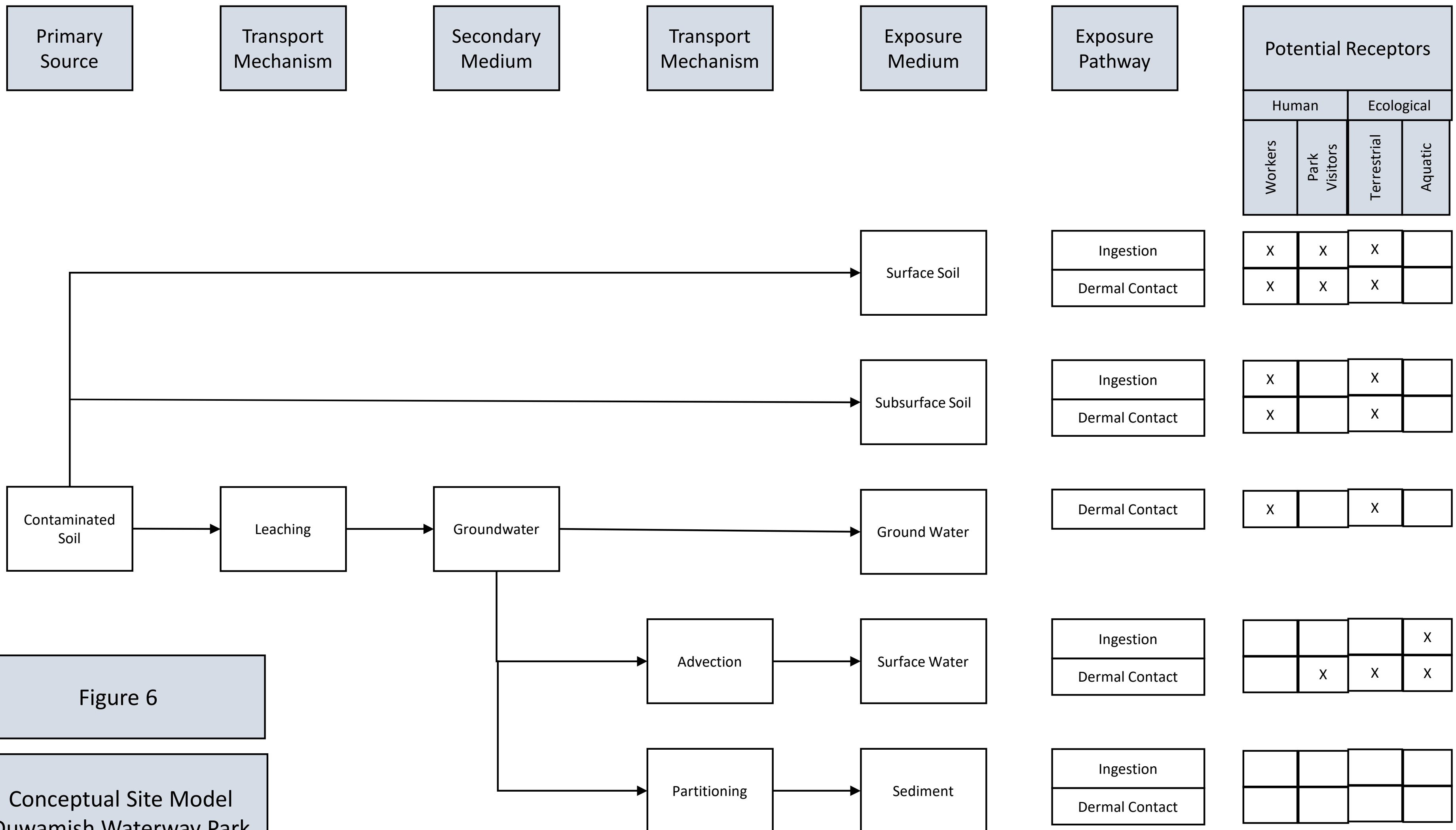
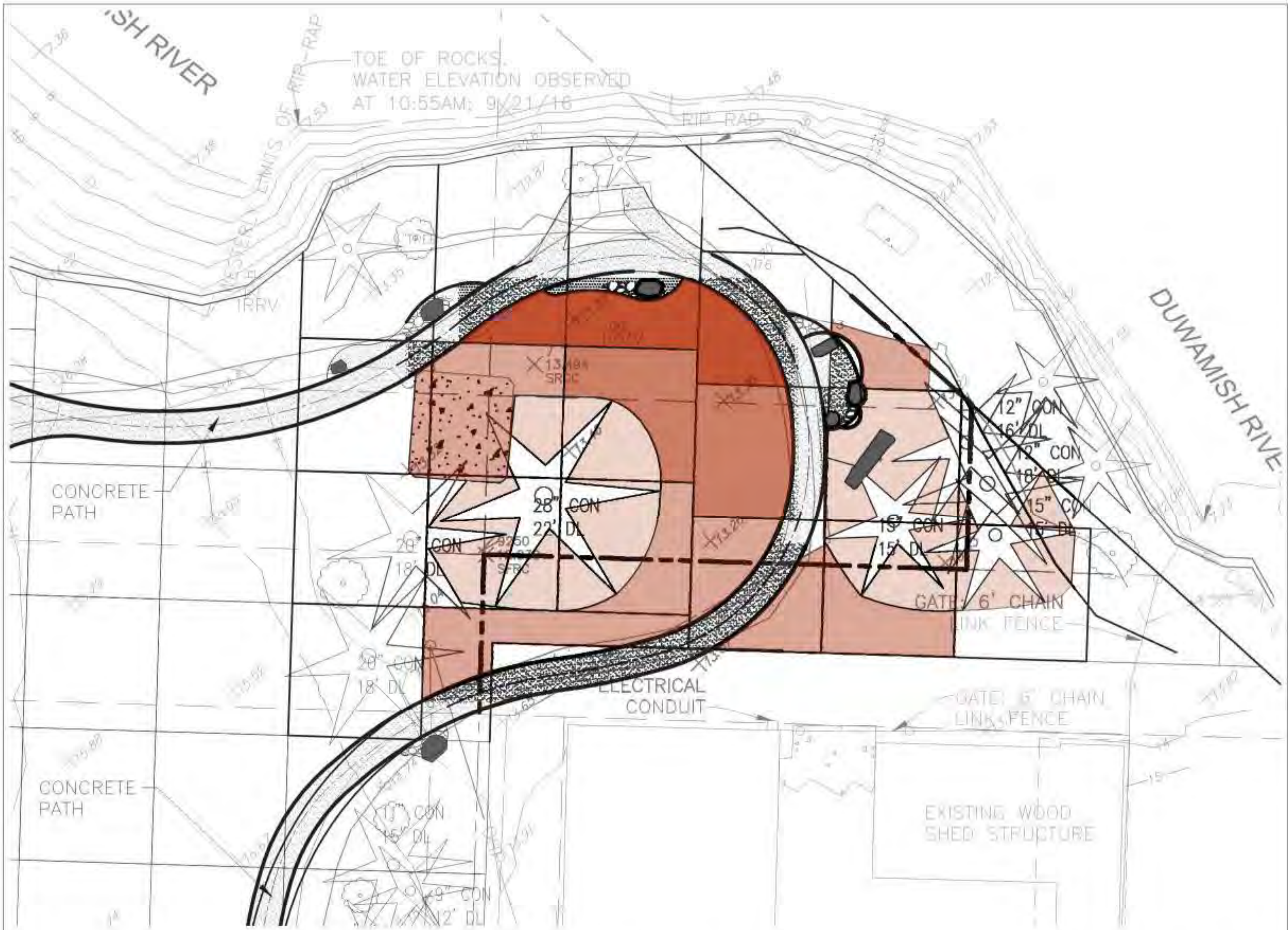


Figure 6

Conceptual Site Model
Duwamish Waterway Park



NOTES

30 15 0 30 60
SCALE IN FEET

N

- =24 INCH EXCAVATION/CAP
- =18 INCH EXCAVATION/CAP
- =12 INCH EXCAVATION/CAP
- =AIR KNIFE AROUND TREES 6 TO 8 INCH
- =CONCRETE PATH

REVIEWED: PARK ENGINEER DATE

All work done in accordance with the City of Seattle Standard Plans and Specifications in effect on the date shown above, and supplemented by Special Provisions.

Seattle Parks & Recreation

DUWAMISH WATERWAY PARK

DUWAMISH WATERWAY PARK FIGURES

EXCAVATION AND CAP DEPTHS

DESIGNED
DRAWN
CHECKED
ORDINANCE NO.
SPECIFICATION NO.
SCALE 1"=60'

DATE
SHEET OF

FIGURE 7