SITE HAZARD ASSESSMENT
Worksheet 1: Summary Score Sheet

SITE NAME: Duwamish Waterway Park **Rank: 2**

Cleanup Site ID: 15139

Facility/Site ID: 49919

Completed on 10/10/2022 for inclusion on the February 2023 Hazardous Sites List.

LOCATION OF SITE

7900 10th Ave S

Seattle, King County, WA 98108

Township 24N, Range 4E , Section 32

Latitude, Longitude: 47.53103 , -122.31985

Tax Parcel ID: 7327901195, 7327902355, 7327902346, 7327901215

SITE DESCRIPTION

Within Currently Defined Site Boundaries

The Duwamish Waterway Park site (Site) is located in the South Park neighborhood of Seattle (Figure 1) and includes the tax parcels listed above and a vacated right-of-way between those parcels (Figure 2). The Site can be divided into two main units, based on current property use: the Park and the Park Addition.

The Park unit includes all of the area currently incorporated into the city park. Seattle Parks and Recreation (SPR) has operated a park in this location since 1975. The Park can be generally divided into three areas: the Central Meadow, the Northeast Meadow, and the Beach (Figure 3). There is also a play area with playground equipment located adjacent to the Central Meadow area in the southeast corner of the Park. Park amenities include a walking trail, playground, picnic tables, and access to the Lower Duwamish Waterway.

The Park Addition includes property adjacent to the Park to the southeast. This property was purchased by SPR in 2021, with the intent of expanding the park into this area in the future. Historically and currently this property has been occupied by commercial businesses. The current occupant of the property is United Site Services, a portable sanitation supply business who uses the property for office space, equipment and vehicle storage, and some equipment maintenance.

SITE IDENTIFYING INFORMATION

Ecology received reports of contamination for the Park and Park Addition in 2020 and 2021, respectively. Based on the initial reports, Ecology created two separate cleanup sites. The identifying information included in the section above was used for the Park site. The Duwamish Waterway Park Addition site had an address of 1024 Elmgrove St, a Facility/Site ID of 14685, and a Cleanup Site ID of 15484. A third cleanup site, Long Painting Co 10th Ave (Cleanup Site ID 4732), has information relevant to the Park and Park Addition in its site file, as discussed further in the Site Characterization and Remediation section below.

The Park site entered the Voluntary Cleanup Program (VCP) in July 2020 under VCP Project Number NW3279. Ecology issued an opinion letter in October 2021. Moving forward, Ecology expects the Site to be cleaned up in the formal cleanup process under a legal agreement with Ecology. This agreement will cover activities on both the Park and Park Addition properties, making them functionally one cleanup site. Ecology's site files and cleanup site database were updated to reflect this at the time of this Site Hazard Assessment. The combined Site will be identified by the information above.

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Historical Owners and Operators

From	To	Owner/Operator	Site Uses
		PARK	
	1975		residential and possibly agricultural use
1975	present	City of Seattle	Duwamish Waterway Park, operated by SPR; Northeast Meadow area was a single family residence added to the Park in 1989; Port of Seattle and Seattle Department of Transportation also own part of property, King County owned part of property until 2019
		PARK ADDITION	
1973	2002	Long Painting	part of commercial painting company operations
2003	2021	Tytanic LLC and Elm Grove LLC	commercial/industrial activities
2021	present	City of Seattle (owner), United Site Services (operator)	offices, equipment and vehicle storage, and maintenance for commercial business providing portable sanitation (toilets, hand wash stations, etc.)

Area Surrounding the Site

The Site is bordered by S Elmgrove St on the south, 10th Ave S on the west, and the Lower Duwamish Waterway on the east. The area around the Site is a mix of commercial and residential properties. There are 11 additional cleanup sites located within a quarter mile of the Site. Two sites have a status of No Further Action needed, while the remaining 9 have a status of Cleanup Started or Awaiting Cleanup. The Site is located within Ecology's Riverside Drive (RM 2.2 to 3.4 West) source control area for the Lower Duwamish Waterway.

LOWER DUWAMISH WATERWAY SUPERFUND SITE
The portion of this Site within the Lower Duwamish Waterway will be cleaned up as part of the Lower Duwamish Waterway Superfund site that is managed by the United States Environmental Protection Agency (EPA). This SHA does not include a comprehensive discussion of the results of sediment sampling completed as part of site characterization for the Superfund site. Additional information on characterization and selected remedial actions for the Superfund site can be found through the documents on the EPA site webpage, specifically in the Remedial Investigation, Feasibility Study, and Record of Decision (see References section below). The Site Characterization and Remediation section below does include some information on recently collected sediment samples near the shoreline of the Park, as they are directly relevant to WARM scoring of this Site. It does not include a comprehensive evaluation of how these results compare to other locations within the Lower Duwamish Waterway.

Surface water quality is also not discussed in detail in this SHA. Sufficient surface water sampling has been done to determine that the section of the Lower Duwamish Waterway adjacent to the Park is a Category 5 waterway. Category 5 waters, also known as the 303(d) List, are waterways with pollution that require a water improvement project. The section of the Lower Duwamish Waterway adjacent to the Park is on the list specifically for elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) in water, concentrations of arsenic in water, and sediment bioassay results that indicate toxicity.

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SITE CHARACTERIZATION AND/OR REMEDIATION

Results discussed below are compared to either Method A cleanup levels or, more generically, to values just called screening levels. Method A cleanup levels for unrestricted land use, which are protective of human health for scenarios including residential property, have been applied to completed evaluations related to the Long Painting site. The appropriate cleanup levels for the Park Site have not yet been determined. Additional information is needed to confirm if some chemical migration pathways (i.e. soil chemicals leach into groundwater that discharges into the Lower Duwamish Waterway) before a final cleanup level can be selected. Conservative screening levels are being applied at this stage to determine areas where more site investigation is needed.

INFORMATION ON THE SITE FROM THE LONG PAINTING SITE FILE

The Long Painting facility, during operations, included the Park Addition property and additional property south and west of the Site (Figure 4). The Long Painting Co 10th Ave cleanup site received a No Further Action letter from Ecology's Voluntary Cleanup Program in February 2003. The cleanup addressed by the letter included two areas of contamination located on the main Long Painting property located west of 10th Ave S and one area within the current Park Addition property. Cleanup on the Park Addition included the excavation of soil contaminated with tetrachloroethene above the applicable Method A cleanup level, located in an area where a solvent still had operated (Figure 5).

In addition to the cleanup specifically evaluated in the No Further Action letter, there is additional information in the Long Painting site file relevant to understanding environmental conditions on the Park and Park Addition properties. In August 1996, approximately 150 gallons of diesel was spilled from equipment to soil with possible runoff to the Lower Duwamish Waterway on the Park Addition property. Contaminated soil was reportedly excavated and removed from the property. The Park Addition property was also the location of two underground storage tanks (USTs) used to store gasoline and diesel for vehicles. The USTs were removed and replaced with new USTs in the same location in December 1998. Soil samples collected from the UST excavation did not identify any areas of contamination. The newer USTs were removed in June 2003. Soil samples collected from the tank excavation at this time also did not identify any areas of contamination. Groundwater samples were collected from six locations near the excavation area in October 2003, to determine if the elevated concentrations of gasoline-range petroleum hydrocarbons and petroleum-associated chemicals in a grab groundwater sample collected from the tank excavation in June accurately reflected conditions in the groundwater aquifer. Concentrations of petroleum and associated compounds were below laboratory reporting limits in all six groundwater samples.

As part of an Initial Investigation for Long Painting, Seattle King County Public Health sampled surface soils (0-2 inches below ground surface (bgs)) from yards and parks in the neighborhood (Figure 6). Duwamish Waterway Park was included in the sampling. No samples were collected on the Park Addition property. Based on reports from community members about particulate matter deposited from the facility and what operations were performed at the Long Painting property, soil samples were analyzed for metals including antimony, arsenic, beryllium, cadmium, chromium (both trivalent and hexavalent), copper, lead, mercury, nickel, selenium, thallium, and zinc. Ecology presented the results of sampling in the 2000 Initial Investigation report. Lead and arsenic were present above the Method A cleanup level in some of the samples collected as part of the investigation, but not in any of the samples collected in the Park. (Method A cleanup levels have changed for some chemicals since 2000; the values for lead and arsenic were the same at the time of the Initial investigation as they are at the time of the Site Hazard Assessment.) Washington Department of Health further evaluated the results and the potential health risk for neighborhood residents in a 2001 Health Consultation report. Their conclusion was that there was no apparent public health hazard from the observed concentrations of arsenic and lead in soil.

RECENT SAMPLING – PARK ADDITION

Eco Compliance Corporation completed a Phase II Environmental Site Assessment in 2021 for SPR. This report included limited sampling, focused on soil characterization in areas where dredged material from the Lower Duwamish Waterway may have been placed (Figure 7). Samples were analyzed for a variety of contaminants, including metals, carcinogenic PAHs (cPAHs), polychlorinated biphenyls (PCBs), and petroleum. Arsenic and

cPAHs were present above the screening levels.

RECENT SAMPLING - PARK

Three shallow soil samples were collected from the Park in 2014 to assess conditions in areas where the grass was going to be removed and a gravel path was going to be constructed. Two of the three samples contained arsenic above the Method A cleanup level. Additional shallow soil samples were collected from 0-1 feet bgs in 2019 to evaluate the extent of arsenic contamination within the Park. Sampling was generally conducted in a grid pattern across the main Park area (Figure 8). The results of the sampling indicated areas of elevated soil concentrations of arsenic and lead, primarily in the Northeast Meadow area of the Park. Three additional soil samples were collected in October 2020 to determine if additional contaminants were present. These samples were analyzed for metals, petroleum, cPAHs, and PCBs. cPAHs were present above screening levels in one of the three samples.

Leidos, on behalf of Ecology, sampled the area in the northeast portion of the Park that is within the operational area of the Park but outside of tax parcel boundaries in 2021. This area is not included within a tax parcel, but is part of the operational area of the Park. Soil samples from this area were analyzed for PCBs, metals, petroleum, cPAHs, semivolatile organic compounds, and total organic carbon (Figure 9). Chemicals exceeding a screening level in at least one sample included arsenic, copper, lead, selenium, zinc, and cPAHs.

Sampling in the Beach area of the Park was done in October 2021. This included two sampling events that targeted different parts of the Beach. The first sampling event involved collecting five samples from the Upper Beach, the open area for water access that is farther from the Duwamish and above the mean higher high water mark. That distinction is important for determining whether soil or sediment screening levels apply. cPAHs were present in these samples above the applicable soil screening level. The second sampling event included collecting samples in the Lower Duwamish Waterway from the area of that is accessible from the Beach area at low tide. Forty-three surface (depth of 0-10 centimeters) samples were collected using sediment collection techniques, and 25 of these samples were analyzed for metals, semivolatile organic compounds, PCBs, and total organic carbon. Based on locations, results of 20 of these samples were compared to sediment screening levels and the other 5 were compared to soil screening levels. All sampling locations are shown on Figure 10. A variety of chemicals exceeded screening levels for at least one sample in the Beach area, including cPAHs, bis (2-ethylhexyl) phthalate, hexachlorobenzene, arsenic, copper, and lead.

Groundwater sampling and characterization has not been included in any of the Site investigations to date.

PARK 2020-2021 SOIL EXCAVATION

Soil excavation for remediation was done in conjunction with Park upgrades. Upgrades included installation of additional picnic tables and benches including the hard surfaces below them, installation of the playground, importing clean fill to prepare lawn areas in the Central and Northeast Meadow areas for seeding grass, installation of new water service and irrigation lines, and installation of a stormwater drainpipe and infiltration trench.

Contaminated soil was excavated and removed from the Site beginning in October 2020. Soil removal extended from between 1 and 7 feet below ground surface. The excavation area was mostly in the Northwest Meadow area of the Park (Figure 11). Excavation in areas with tree root zones was done using an air knife to help loosed and remove contaminated soil from around existing roots. Confirmation samples were collected from all areas of the grid where excavation had occurred prior to filling the excavation areas with clean imported fill soil. Soil conditions in subsurface soils in the Northwest Meadow following soil excavations are shown on Figure 12.

Soil samples were also collected from within the utility trench and water line excavation areas that were part of the Park upgrades. These samples were collected from deeper (2.5-4.5 feet bgs) than most of the previous samples. Arsenic and lead were both present above screening levels in one of the 13 samples collected (not the same sample).

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ADDITIONAL INFORMATION COLLECTED BY THE SITE HAZARD ASSESSOR

The Assessor visited the Site on the afternoon of August 5, 2022. The main grassy area of the Park was closed to the public until additional cleanup is completed. This area was fenced off, with signs on the fencing explaining the reason for the Park closure in multiple languages. The Beach Area, including the bench closest to the Beach, and the playground area were open to the public. Commercial activities were occurring on the Park Addition property, and the assessor observed trucks coming in to the business. Photos from the visit are included below in Figure 13.

SPECIAL CONSIDERATIONS

Checked boxes indicate routes applicable for Washington Ranking Method (WARM) scoring

☑ **Surface Water**

Contaminants detected above screening levels in sediment or beach soil samples.

☐ **Air**

No volatile contaminants identified in sampling to date. Contamination not in areas where airborne particulate transport is a significant concern.

☑ **Groundwater**

Groundwater has not been characterized, but soil is documented to be contaminated and may impact groundwater.

The Site was divided into 3 units for consideration for scoring. Generally, contaminants in each unit were similar. The Beach Area is the part of the Park property adjacent to the Lower Duwamish Waterway, where soil and sediment samples have been collected. The Park Upland includes all the rest of the Park property. The Park Addition property was considered as its own unit. Only one of the Park property units was considered for the surface water and groundwater pathways, based on which was more likely to impact that media. The Beach Area was considered for surface water and the Park Upland area was considered for groundwater. Details on the selection of units for scoring is below on Worksheet 3.

ROUTE SCORES

Surface Water/ Human Health:	46.6	Surface Water/ Environment:	77.9
Air/ Human Health:		Air/ Environment:	
Groundwater/ Human Health:	33.9		

Overall Rank: 2

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State of Washington

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REFERENCES

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6 Eco Compliance Corporation. July 2014. Soil Sample Results for Duwamish Waterway Park.

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8 Eco Compliance Corporation. March 2019. Soil Sample Results for Duwamish Waterway Park, Seattle.

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DEPARTMENT OF ECOLOGY
State of Washington

SITE HAZARD ASSESSMENT
Worksheet 2: Route Documentation

SITE NAME: Duwamish Waterway Park

Cleanup Site ID: 15139

Facility/Site ID: 49919

1. SURFACE WATER ROUTE

List those substances to be considered for scoring:

arsenic, copper, lead, cPAHs (scored as benzo(a)pyrene)

Explain the basis for choice of substances to be used in scoring:

Present above screening levels. While contaminants are only present above screening levels in a limited number of samples in the selected management unit, they are consistent with contaminants in other media on the Site (soil farther from Lower Duwamish Waterway) that may impact surface water.

List those management units to be considered for scoring:

Beach Area, Park Addition

Explain basis for choice of unit to be used in scoring:

Beach Area selected using Worksheet 3.

2. AIR ROUTE

List those substances to be considered for scoring:

Not scored.

Explain the basis for choice of substances to be used in scoring:

List those management units to be considered for scoring:

Explain basis for choice of unit to be used in scoring:

3. GROUNDWATER ROUTE

List those substances to be considered for scoring:

arsenic, copper, zinc, lead, cPAHs

Explain the basis for choice of substances to be used in scoring:

Present above screening levels in soil on Site.

List those management units to be considered for scoring:

Park Upland, Park Addition

Explain basis for choice of unit to be used in scoring:

Park Upland selected using Worksheet 3.

Worksheet 3
Substance Characteristics Worksheet For Multiple Unit/Substance Sites

Site Name: Duwamish Waterway Park
CSID: 15139

Details on what area is included in each unit can be found in the Special Considerations section of Worksheet 1.

1. Surface Water Route

Unit Considered for Scoring:	Beach	Park Addition	Park Upland
Substances:	arsenic, copper, lead, cPAHs	arsenic, PAHs	unit not considered for this route
Human Toxicity Value:	12	12	
Environmental Toxicity Value:	8	6	
Containment Value:	10	4	
Rationale:	in contact with surface water	some stormwater management present on site	
Surface Water Human Subscore:	165	75	N/A
Surface Water Environment Subscore:	121	45	N/A

2. Air Route Route not scored.

3. Groundwater Route

Unit Considered for Scoring:	Park Upland	Park Addition	Beach
Substances:	arsenic, lead, PAHs, copper, zinc	arsenic, PAHs	unit not considered for this route
Human Toxicity Value:	12	12	
Containment Value:	10	10	
Rationale:	contaminated soil	contaminated soil	
Groundwater Subscore:	165	165	N/A

Based on the highest scoring toxicity/containment combinations, the following management units will be used for route scoring:

Surface Water: Beach
Air: not scored
Groundwater: Park Upland. While scores were the same for both considered units, this was selected based on the presence of additional contaminants.

Figure 1. General location of the Site. Base figure from King County iMap.

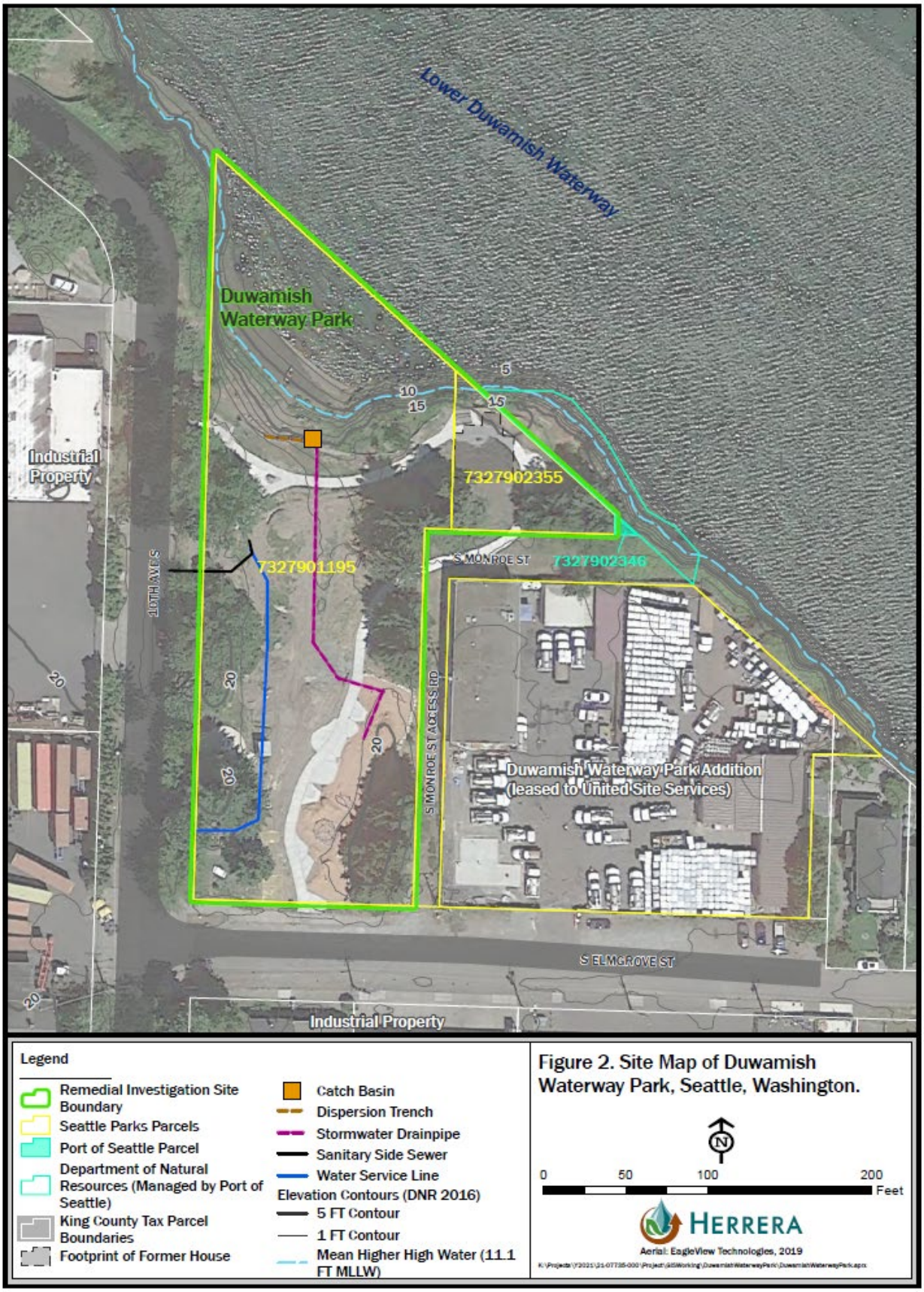

Figure 2. General layout of the Site with parcel numbers. The parcel number for the Park Addition is 7327901215. The vacated right-of way between the Park and Park Addition does not have a parcel number. From Herrera (2022) Draft RI/FS Work Plan.

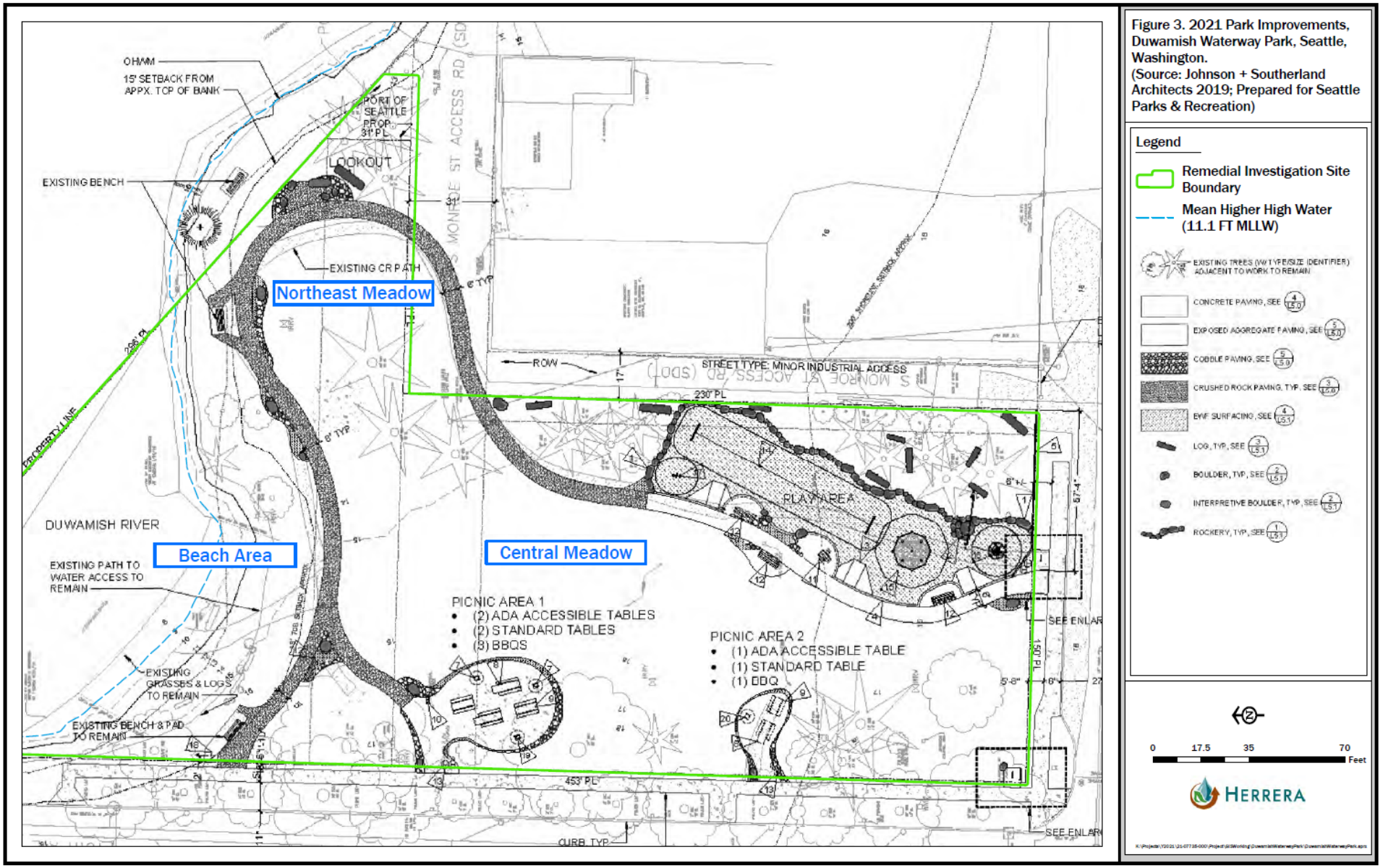

Figure 3. Layout of areas within Park. From Herrera (2022) RI/FS Work Plan.

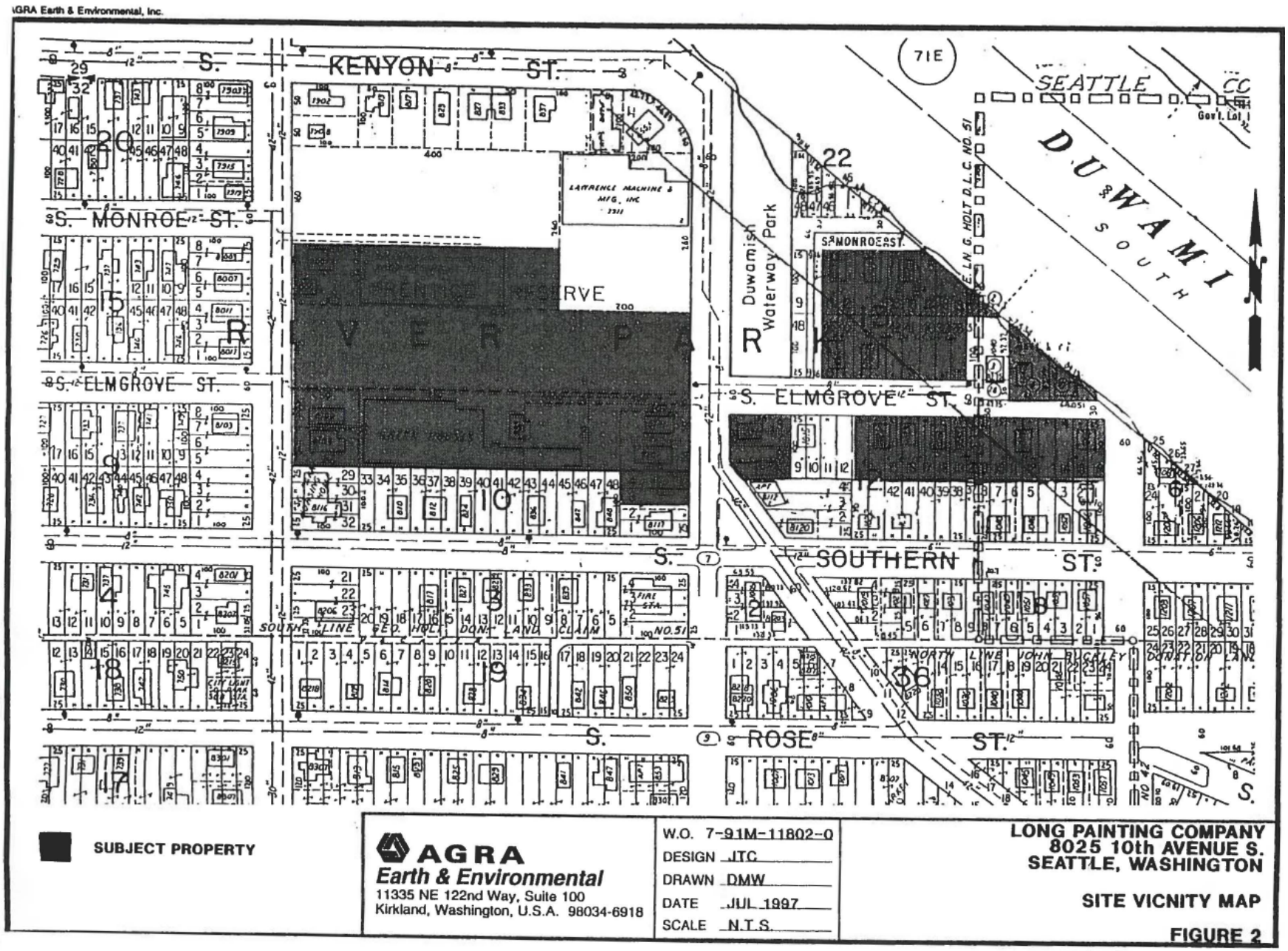

Figure 4. Area included in Long Painting facility at the height of facility operations. From Agra (1997) Phase II.

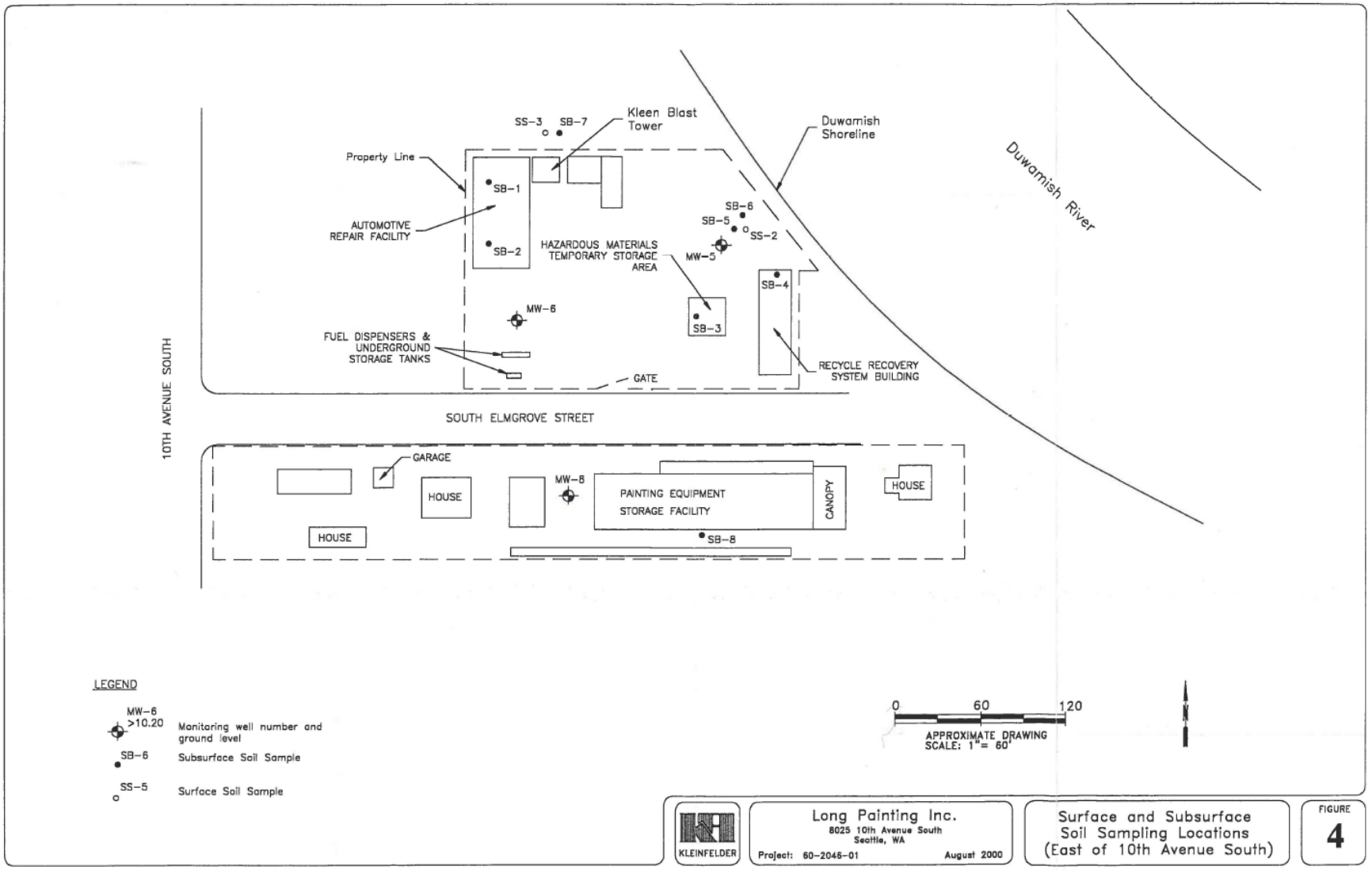

Figure 5. Areas of interest on the Park Addition Property when it was part of Long Painting operations. The PCE-contaminated soil removal was located around SB-4. The 1996 diesel spill was located generally northeast of location SB-6. From Kleinfelder (2000) Site Investigation Report.

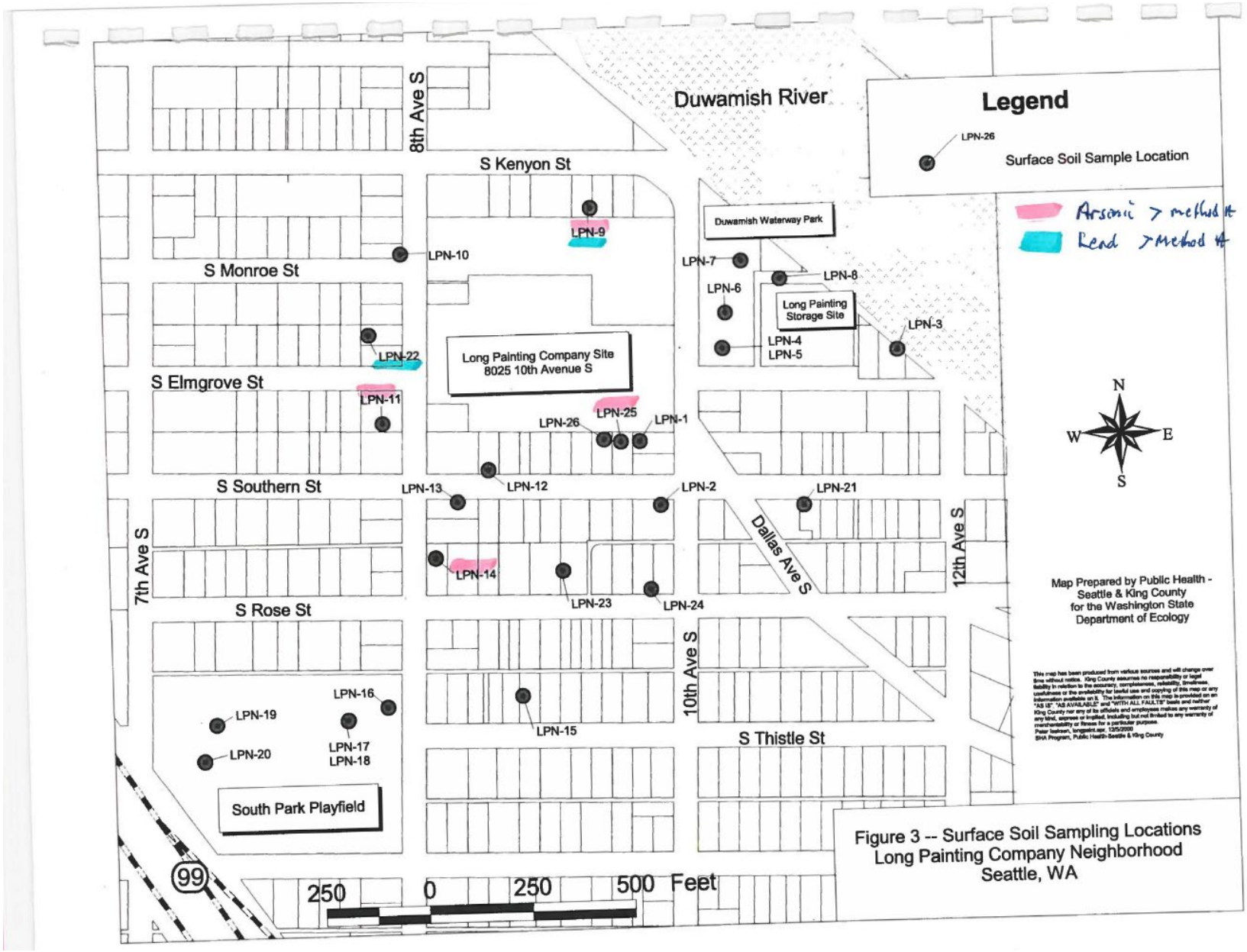

Figure 6. Locations sampled for metals in soil as part of the Seattle-King County Public Health and Ecology investigation. Samples with arsenic or lead above the Method A cleanup level are highlighted. From Ecology (2000) Initial Investigation Report.

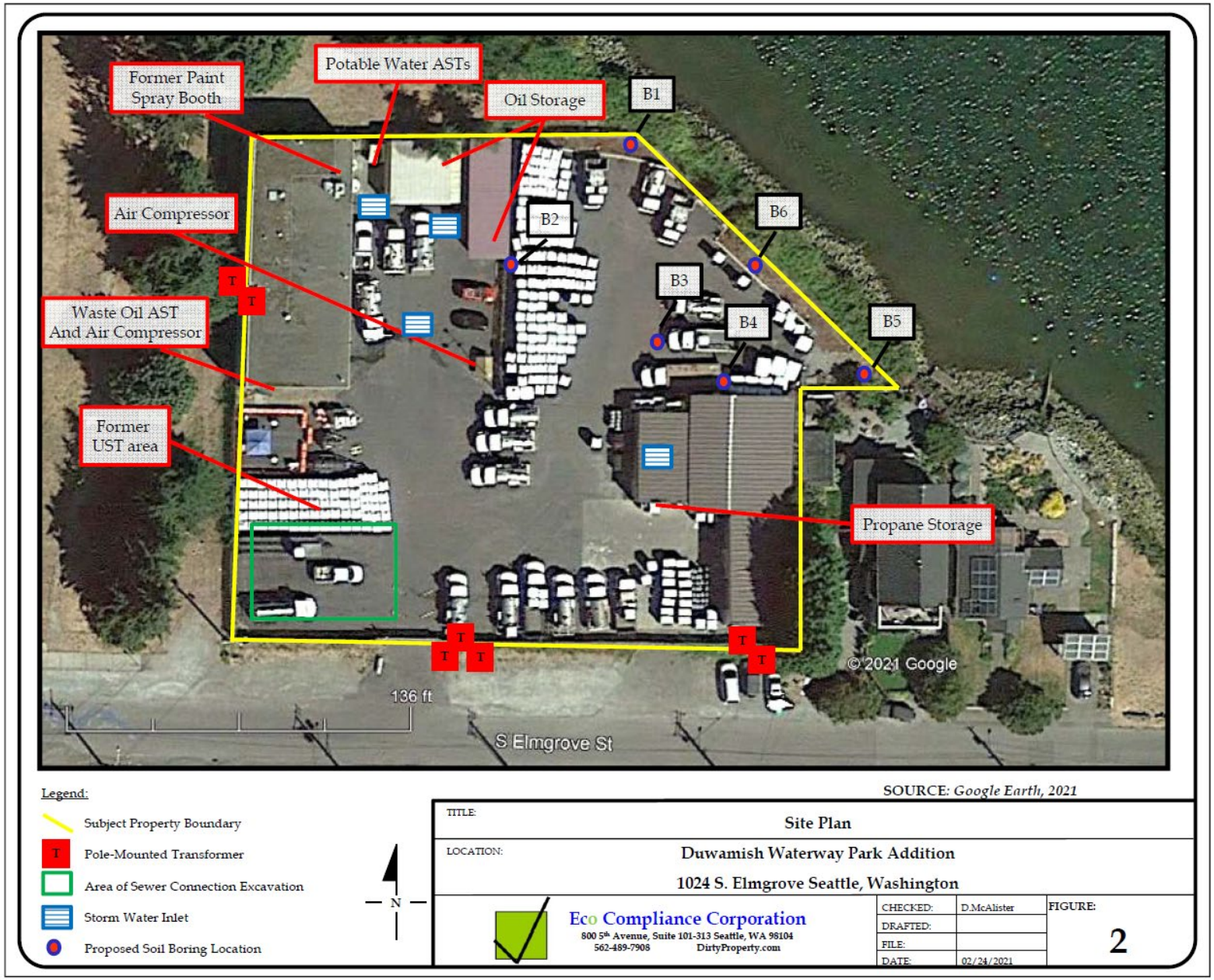

Figure 7. Locations of more recent soil sampling on the Park Addition property. Locations were selected to evaluate possible impacts from placement of dredged material from the Lower Duwamish Waterway on the property. Figure from Eco Compliance Corporation (2021) Phase II.

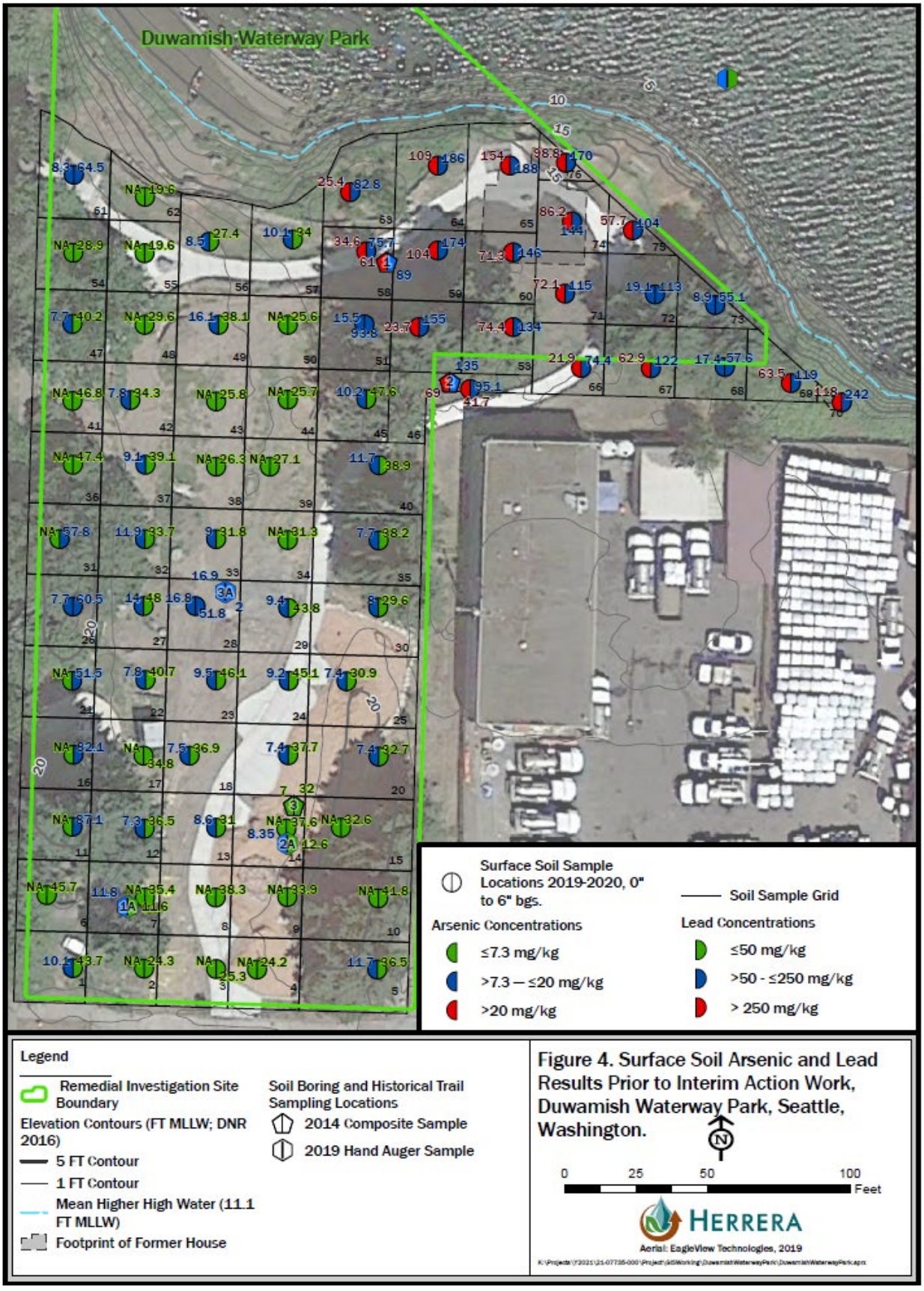

Figure 8. Grid sampling locations for sampling conducted prior to 2020-2021 soil removal. Arsenic and lead results are indicated by the coloring of the location dots. Red indicates concentrations above the Method A cleanup level. From Herrera (2022) RI/FS Work Plan.

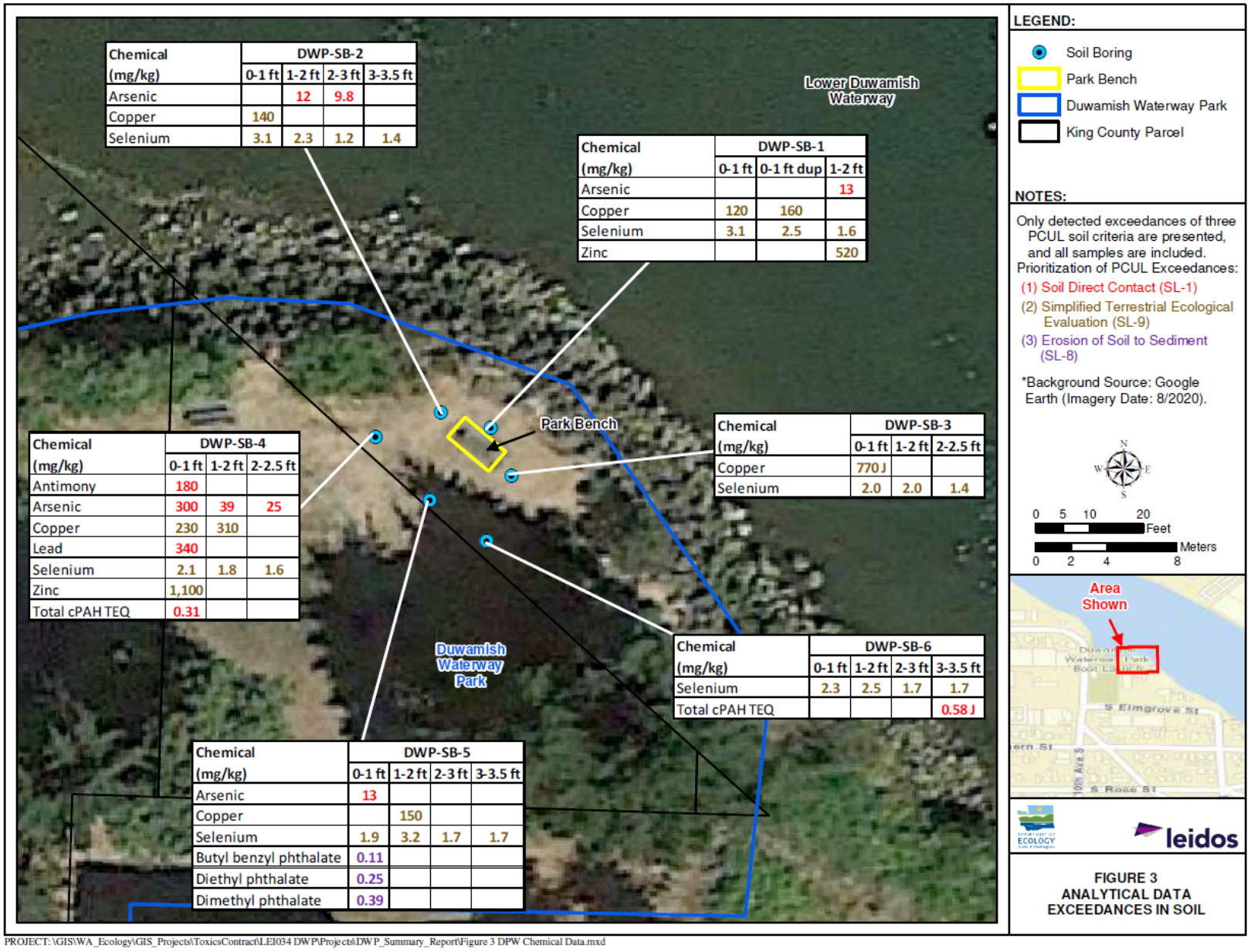

Figure 9. Locations of samples collected by Leidos in the northeast area of the Park on land outside tax parcel boundaries. Figure from Leidos (2021) Data Summary Report.

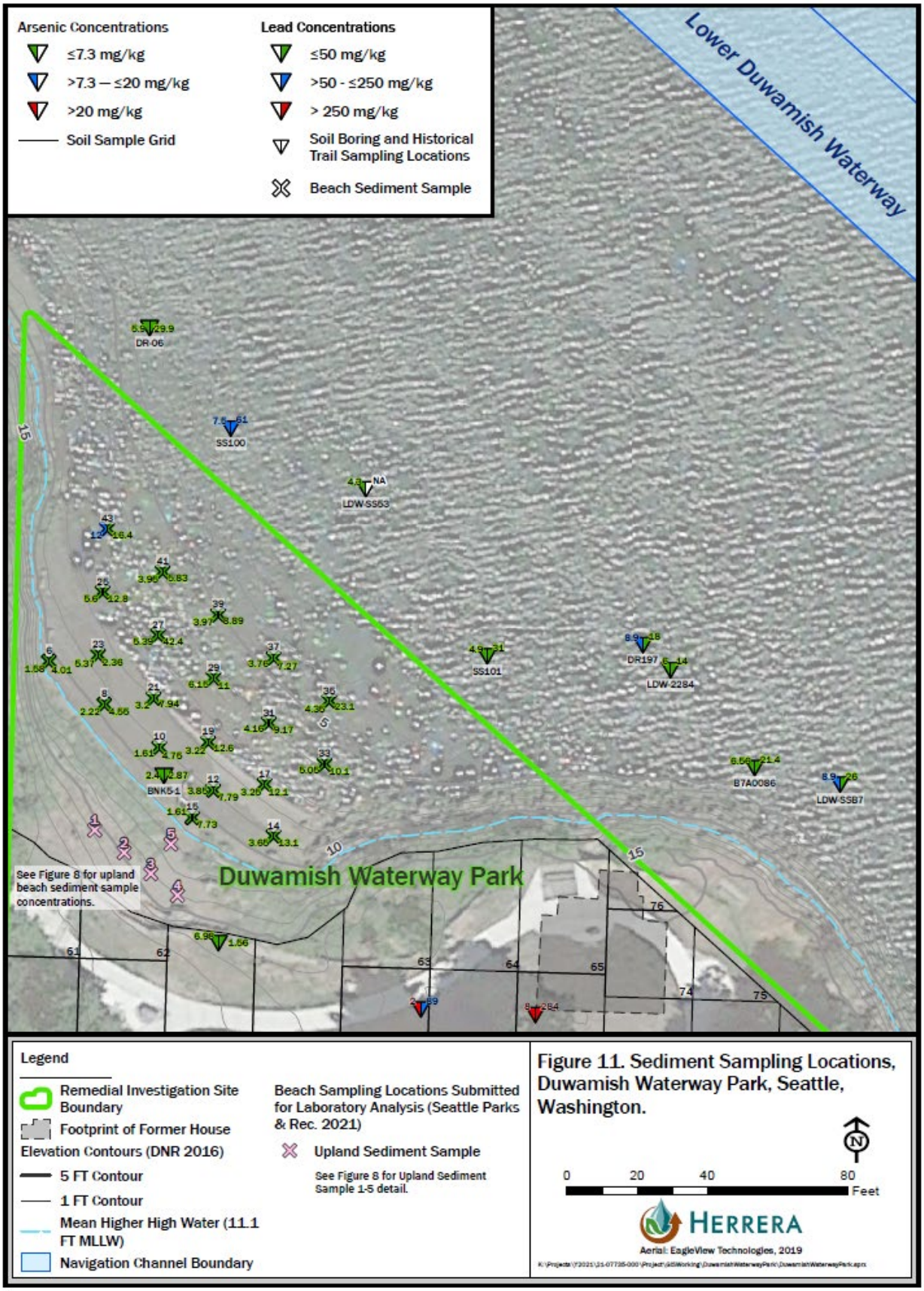

Figure 10. Locations of samples collected in the Beach area of the Park. From Herrera (2022) RI/FS Work Plan.

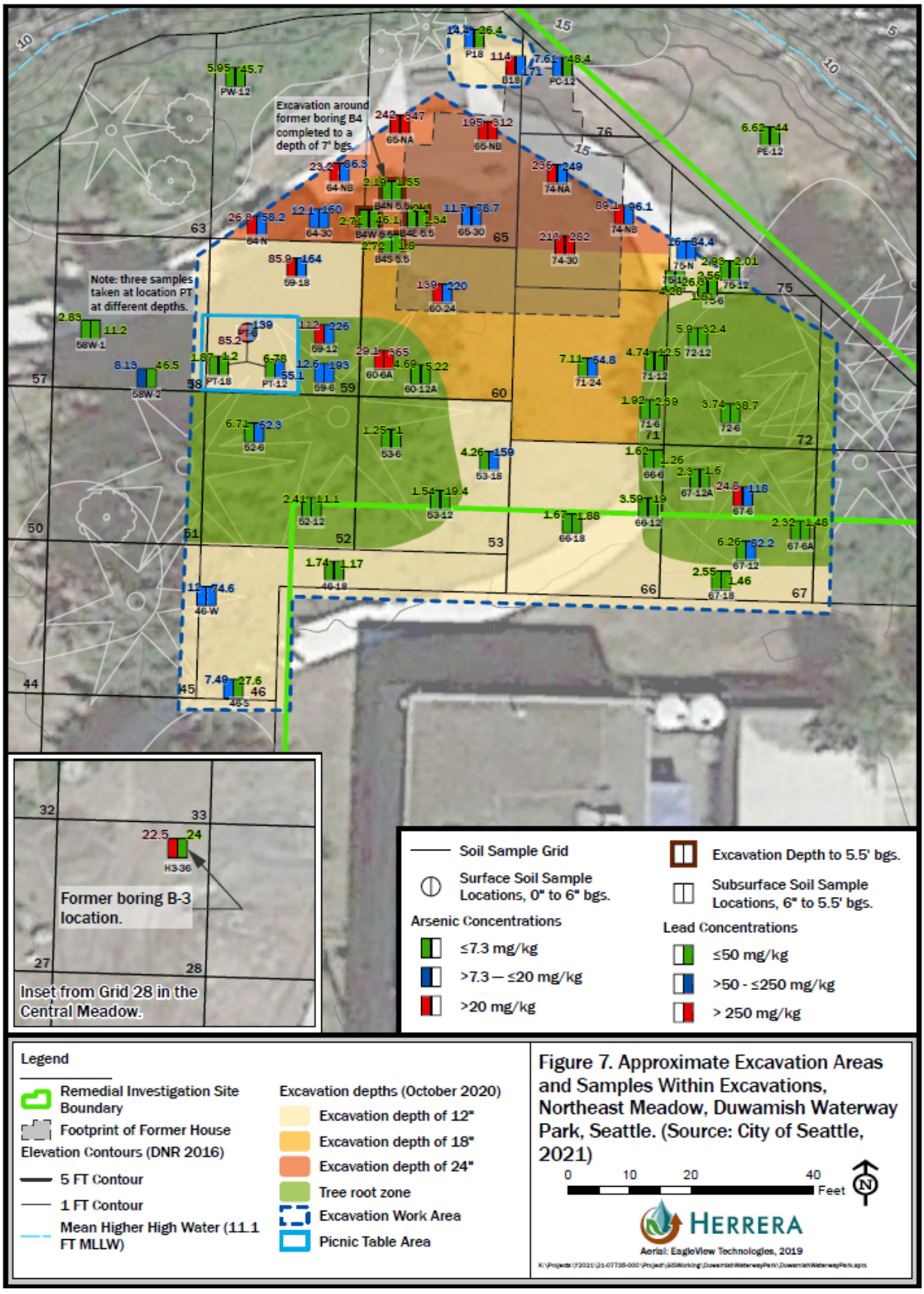

Figure 11. Locations of soil removal in 2020-2021. The area shown on the figure is located in the Northwest Meadow area of the Park. Areas of different colors indicate different excavation depths. Figure from Herrera (2022) RI/FS Work Plan.

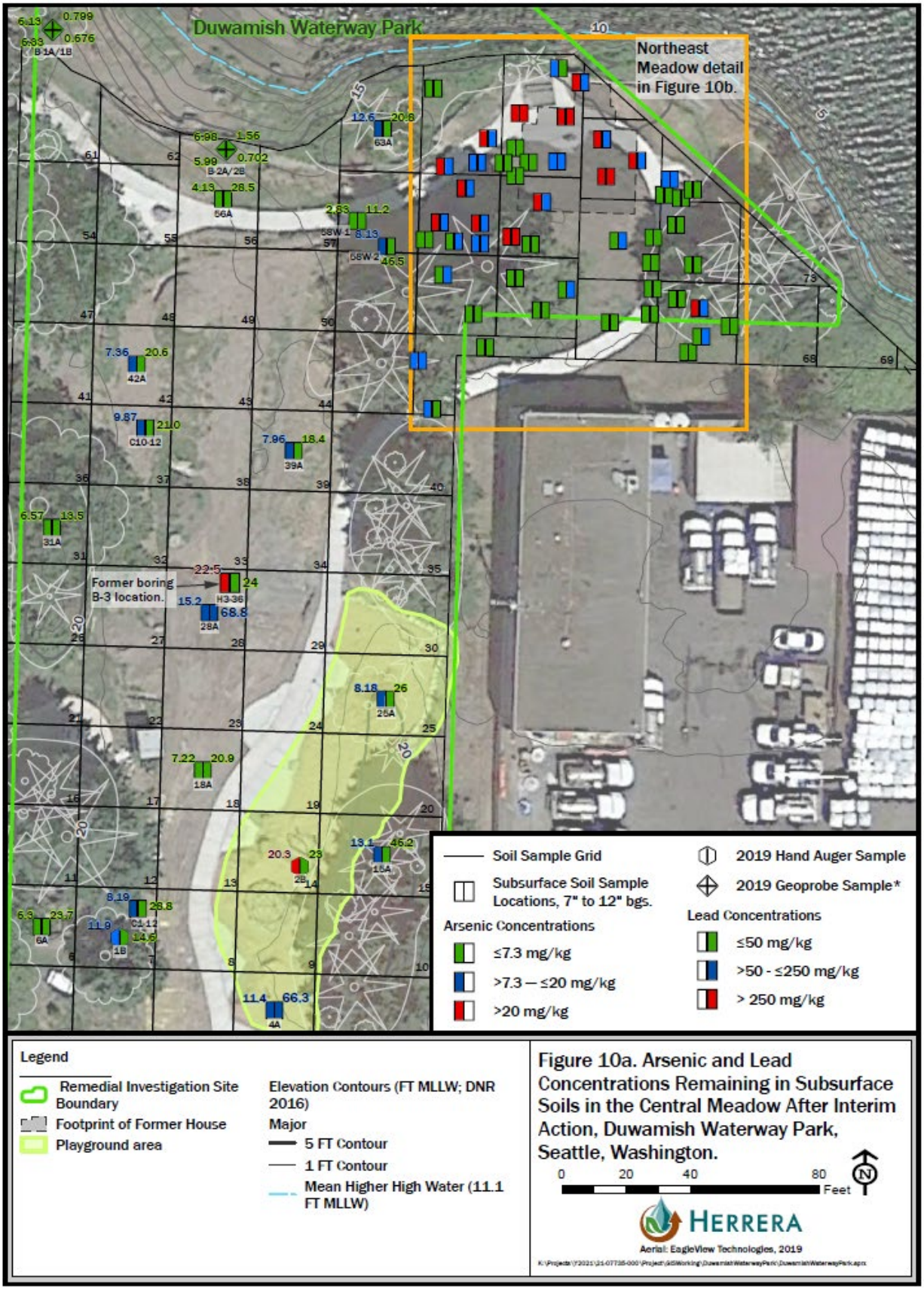

Figure 10a. Arsenic and Lead Concentrations Remaining in Subsurface Soils in the Central Meadow After Interim Action, Duwamish Waterway Park, Seattle, Washington.

Figure 12. Post-soil removal sampling locations. Soil samples were collected from depths greater than 6 inches bgs. Arsenic and lead concentrations are indicated by the color of the rectangles on the sample locations. Red coloring indicates concentrations above the Method A cleanup level. Figure from Herrera (2022) RI/FS Work Plan.

(a)

(b)


Seattle
Parks & Recreation
DUWAMISH WATERWAY PARK
CLOSED
This park is temporarily closed as Seattle Parks and Recreation (SPR) works with Washington State Department of Ecology (Ecology) to complete additional sampling to address Ecology's concerns at the park. Ecology has a draft workplan prepared by SPR's consultant and SPR is awaiting next steps from Ecology. SPR anticipates, beyond new concerns resulting from sampling, that additional remediation will occur in the northeast meadow when the Port of Seattle addresses bank erosion, and if the large trees in the northeast meadow were to be removed.
Thank you in advance for your patience and cooperation as we work through the steps to open this park to the public.
For more information about potential contaminants please visit:
https://apps.ecology.wa.gov/cleanupsearch/site/15139
For more information and to stay up to date on the project please visit:
https://www.seattle.gov/parks/about-us/projects/duwamish-waterway-park

(c)


About Duwamish Waterway Park ("the Park")
Frequently Asked Questions
Who owns and operates the Park?
What happened and why isn't the Park open?
What pollution is present at the Park?
When will the Park open?
How toxic are the chemicals?
How do you stay safe at the Park and beach?
What are the ways that people and pets using the Park can be exposed to pollution?
How long will it take to clean up the pollution?

(d)

(e)

(f)

(g)

Figure 13 (a through g). Photos taken by Ecology Assessor on 8/5/22 site visit. The main grassy area of the Park was fenced to prevent public access ((a), taken from the north fenceline looking south). Signage was present on the fence to explain the reason for the Park closure ((b, c); photos are of English language versions, but signage in multiple languages was present). The playground area in the southeast portion of the Park was open for public use ((d), taken from S Elmgrove St sidewalk looking north). The Beach Area was also open ((e), taken from northwest corner of fenceline looking toward Beach; (f), taken from western end of Beach looking upriver). United Site Services was operating on the Park Addition property ((g), taken from across S Elmgrove St looking north).

Worksheet 4
Surface Water Route

CSID: 15139
Site: Duwamish Waterway Park

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

	Drinking Water Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity	
Substance	Value (µg/L)	Score	Value (mg/kg)	Score	Value (mg/kg/day)	Score	Adj. CPFo (risk/mg/kg-day)	Score
arsenic	1.0E+01	8	7.6E+02	5	3.0E-04	5	1.5E+00	7
copper	1.0E+03	4	--	X	4.0E-02	1	--	X
lead	1.5E+01	6	<0.001	10	--	X	--	X
benzo(a)pyrene	2.0E-01	10	5.0E+01	10	3.0E-04	5	1.0E+00	5

Maximum score: 10
Bonus points: 2
Human Toxicity Score: 12
Source: WARM Toxicity Database
Range: 1-12

1.2 Environmental Toxicity

Freshwater:
Marine: X

	Acute Water Quality Criterion	
Substance	Value (µg/L)	Score
arsenic	6.9E+01	6
copper	4.8E+00	8
lead	2.1E+02	4
benzo(a)pyrene	3.0E+02	4

Maximum score: 8
Environmental Toxicity Score: 8
Source: WARM Toxicity Database
Range: 2-10

1.3 Substance Quantity

Amount: 3800 square feet
Basis: estimated area using approximate length of Beach at the waterline, width approximately 20 feet
Source: site reports, iMap
Substance Quantity Score: 7
Range: 1-10

2.1 Containment

Description: sediment/beach soil in contact or adjacent to surface water

Source: site reports

Containment Score: 10

Range: 0-10

SUBSTANCE PARAMETER CALCULATIONS

Human Health Pathway

SUBh = (Human Toxicity + 3) x (Containment + 1) + Substance Quantity 172.0

Environmental Pathway

SUBe = (Environmental Toxicity + 3) x (Containment + 1) + Substance Quantity 128.0

2.0 MIGRATION POTENTIAL

2.2 Surface Soil Permeability

Description: sediment/soil in contact with surface water

Source: site reports

Soil Permeability Score: 7

Range: 1-7

2.3 Total Annual Precipitation

Amount (inches): 34.3"

Source: NOAA NCEI -Boeing Field, 2000-2021 data

Annual Precipitation Score: 3

Range: 1-5

2.4 Maximum Two-Year/24-Hour Precipitation

Amount (inches): 2.02

Source: NOAA Atlas2

24-Hour Precipitation Score: 3

Range: 1-5

2.5 Flood Plain

Classification: 100 year floodplain

Source: iMap

Floodplain Score: 2

Range: 0-2

2.6 Terrain Slope

Degree of slope: in contact with surface water - max score

Source: site reports

Terrain Slope Score: 5

Range: 1-5

MIGRATION PARAMETER CALCULATION

MIG = Soil Permeability + Annual Precipitation + 24-Hour Precipitation + Floodplain + Slope 20.0

3.0 TARGETS

3.1 Distance to Surface Water

Name:	adjacent		
Distance (feet):	0	Distance to Surface Water Score:	10
Source:	site reports	Range:	0-10

3.2 Population Served within 2 Miles

Population:	0	Population Served Score:	0
Source:	DOH SWAP Map	Range:	0-75

3.3 Area Irrigated within 2 Miles

Basis:	no irrigation rights identified in this area		
Area (acres):	0	Area Irrigated Score:	0
Source:	WRTS	Range:	0-30

3.4 Distance to Nearest Fishery Resource

Name:	Lower Duwamish Waterway		
Distance (feet):	0	Distance to Fishery Score:	12
Source:	iMap	Range:	0-12

3.5 Distance to Nearest Sensitive Environment

Name:	Lower Duwamish Waterway		
Distance (feet):	0	Distance to Sensitive Environment Score:	12
Source:	iMap	Range:	0-12

TARGET PARAMETER CALCULATIONS

Human Health Pathway

TARh= Distance to Surface Water + Population Served + Area Irrigated **10.0**

Environmental Pathway

TARe = Distance to Surface Water + Distance to Fishery + Distance to Sensitive Environment **34.0**

4.0 RELEASE

Evidence of release?	contaminants detected in sediments/soils in Beach area above screening levels		
Source:	site reports	Release Score (REL):	5.0
		Range:	0 or 5

SURFACE WATER ROUTE CALCULATIONS

Human Health Pathway

SWh = (SUBh x 40/175) x ((MIG x 25/24)) + REL + (TARh x 30/115)) / 24 **46.6**

Environmental Pathway

SWe = (SUBe x 40/153) x ((MIG x 25/24)) + REL + (TARe x 30/34)) / 24 **77.9**

Range: 0-100

Worksheet 5
Air Route

CSID 15139
Site: Duwamish Waterway Park

Not scored.

Worksheet 6
Groundwater Route

CSID: 15139
Site: Duwamish Waterway Park

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human toxicity

Substance	Drinking Water Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity	
	Value (µg/L)	Score	Value (mg/kg)	Score	Value (mg/kg/day)	Score	Adj. CPFo (risk/mg/kg-day)	Score
arsenic	1.0E+01	8	7.6E+02	5	3.0E-04	5	1.5E+00	7
copper	1.0E+03	4	--	X	4.0E-02	1	--	X
lead	1.5E+01	6	<0.001	10	--	X	--	X
zinc	5.0E+03	2	--	X	3.0E-01	1	--	X
benzo(a)pyrene	2.0E-01	10	5.0E+01	10	3.0E-04	5	1.0E+00	5

Maximum score: 10
Bonus points: 2
Human Toxicity Score: 12
Source: WARM Toxicity Database
Range: 1-12

1.2 Mobility

Substance	Solubility	
	Value (mg/L)	Score
arsenic	K >1	3
copper	0.1 < K < 1	2
lead	0.1 < K < 1	2
zinc	K >1	3
benzo(a)pyrene	1.6E-03	0

Maximum value: 3
Mobility Score: 3
Source: WARM Toxicity Database
Range: 1-3

1.3 Substance quantity

Quantity: 1930 cubic yards
Basis: approximate amount of contaminated soil, from area of Northeast Meadow and assumed 1 yard depth
Source: site reports
Substance Quantity Score: 4
Range: 1-10

2.1 Containment

Description: contaminated soil
Source: site reports
Containment Score: 10
Range: 0-10

SUBSTANCE PARAMETER CALCULATION

SUB = (Human Toxicity + Mobility + 3) x (Containment + 1) + Substance Quantity **202.0**

2.0 MIGRATION POTENTIAL

2.2 Net precipitation

Amount (inches): 20.6 — Net Precipitation Score: 3

Source: NOAA NCEI, ESRI — Range: 0-5

2.3 Subsurface Hydraulic Conductivity

Description: silt and sand

Source: site reports — Hydraulic Conductivity Score: 3

Range: 1-4

2.4 Vertical Depth to Aquifer

Depth (feet): 5 feet based on estimates of depth of contaminated soil (3 feet bgs) and groundwater (8-9 feet bgs)

Source: site reports — Depth to Aquifer Score: 8

Range: 1-8

MIGRATION PARAMETER CALCULATION

MIG = Depth to Aquifer + Net Precipitation + Hydraulic Conductivity **14.0**

3.0 TARGETS

3.1 Aquifer Usage

Description: a demonstration of non-potability has not been included in any site report; conservatively scored as not used but usable

Source: SWAP Map, site reports — Aquifer Use Score: 2

Range: 1-10

3.2 Distance to Nearest Drinking Water Well

Distance (feet): over 10,000 — Well Distance Score: 0

Source: DOH SWAP Map — Range: 0-5

3.3 Population Served by Drinking Water Wells within Two Miles — Population Served Score: 0.0

Number of people: 0 — Range: 0-100

Source: DOH SWAP Map

3.4 Area Irrigated by Wells within Two Miles — Area Irrigated Score: 0.0

Area (acres): 0 — Range: 0-50

Source: DOH SWAP Map

TARGET PARAMETER CALCULATION

TAR = Aquifer Use + Well Distance + Population Served + Area Irrigated | 2.0 |

4.0 RELEASE

Evidence of release?	no groundwater data
Source:	site reports

Release Score (REL): 0.0

Range: 0 or 5

GROUND WATER ROUTE CALCULATION

GW = (SUB x 40/208) x ((MIG x 25/17) + REL + (TAR x 30/165)) / 24 | 33.9 |

Range: 0-100

Washington Ranking Method
Route Scoring Summary and Ranking Calculation

CSID: **15139**
Site: **Duwamish Waterway Park**

Human Health Route Scores

Pathway	Score	Quintile
Surface water	46.6	5
Air	0.0	
Groundwater	33.9	3

Quintile	Value
High (H)	5
Middle (M)	3
Low (L)	

Human Health Pathway Quintiles - based off Feb. 2022 HSL

Quintile	Surface Water		Air		Groundwater	
1	<=	7.3	<=	8.6	<=	24.1
2	7.4	14.7	8.7	16.3	24.2	33.2
3	14.8	21.2	16.4	25.7	33.3	40.5
4	21.3	29.8	25.8	40.3	40.6	49.8
5	>=	29.9	>=	40.4	>=	49.9

$(H^2 + 2M + L) / 8$

Human Health Priority Bin Score: 3.9

Environmental Route Scores

Pathway	Score	Quintile
Surface water	77.9	5
Air	0.0	

Quintile	Value
High (H)	5
Low (L)	

Environmental Pathway Quintiles - based off Feb. 2022 HSL

Quintile	Surface Water		Air	
1	<=	11.3	<=	1.2
2	11.4	24.1	1.3	1.5
3	24.2	32.5	1.6	13.8
4	32.6	49.6	13.9	26.7
5	>=	49.7	>=	26.8

$(H^2 + 2L) / 7$

Environmental Priority Bin Score: 3.6

FINAL MATRIX RANKING

Human Health Priority	Environmental Priority 5	4	3	2	1	n/a
5	1	1	1	1	1	1
4	1	2	2	2	3	2
3	1	2	3	4	4	3
2	2	3	4	4	5	3
1	2	3	4	5	5	5
n/a	3	4	5	5	5	NFA

n/a - not applicable

NFA - no further action

Site Rank: 2

TEXT SUMMARY OF WORKSHEETS 3 THROUGH 6

The following is a summary of Washington Ranking Method (WARM) scoring for the site. To request the full details of scoring in an accessible format, please contact Ecology. Additional information on WARM, including the scoring options for individual questions and the equations used to convert individual question scores to route scores and then to an overall site rank, is available in the WARM Scoring Manual[1].

Worksheet 3 – Substance Characteristics for Multiple Unit/Substance Sites

Worksheet 3 was used to select a unit for scoring the surface water and groundwater routes. The equation to determine the subscore for a unit considers toxicity and containment of contamination. For surface water, the Beach unit had the highest subscore for both human and environmental toxicity-based subscores. For groundwater, the Park Upland and Park Addition units both had the maximum subscore. The Park Upland was selected for scoring based on the presence of additional contaminants not present in the Park Addition.

Worksheet 4 – Surface Water Route

The substances selected for scoring the surface water route were arsenic, copper, lead, and benzo(a)pyrene (representing polycyclic aromatic hydrocarbons). These substances earned a score of 12 out of 12 for human toxicity and 8 out of 10 for environmental toxicity. Substance quantity scored 7 out of a possible 10, based on an estimated area of contaminated soil or sediment along the shoreline. The maximum value was given for substance containment, since contaminated sediment is in direct contact with surface water.

Scoring of the migration potential of contamination into surface water includes questions on soil permeability, total annual precipitation, maximum precipitation, location of the Site within a flood plain, and slope of the terrain between contamination and surface water. The migration potential subscore was 20 out of a possible 24.

The Site scored the maximum possible points for distance from contamination to surface water, distance to nearest fisheries resource, and distance to nearest sensitive environment based on contamination detected in soil or sediment adjacent to the Lower Duwamish Waterway. There were no identified uses of surface water for drinking or irrigation within 2 miles of the Site, so the score for those questions was 0. Five points were scored for a substance release because chemicals were present in the Beach soil or sediment above screening levels. There are two final scores for the surface water route, one for human health and one for environmental health. The human health score was 46.6 and the environmental health score was 77.9, both out of a possible 100.

Worksheet 5 – Air Route

The air route was not scored.

[1] https://apps.ecology.wa.gov/publications/documents/90014.pdf

Worksheet 6 – Groundwater Route

The substances selected for scoring the groundwater route were arsenic, copper, lead, zinc, and benzo(a)pyrene (representing polycyclic aromatic hydrocarbons). These substances earned the maximum scores for toxicity and mobility. Substance quantity scored 4 out of 10, based on estimated volume of contaminated soil in the Park Upland. Since soil is confirmed to be contaminated, the maximum score was given for substance containment.

Migration potential was scored using net precipitation, hydraulic conductivity, and distance between contamination and the aquifer. The migration potential subscore was 14 out of a possible 17.

To answer questions on potential targets, groundwater was conservatively assumed to be potable (drinkable), since an official determination of non-potability has not been made for the Site. No groundwater wells in use were identified within 2 miles of the Site. Overall, the target subscore was 2 of a possible 165 points. Zero points were given for release, since there is no groundwater data confirming contamination.

Groundwater scoring does not include an environmental score, so only an overall score for human health was calculated. The human health score was of 33.9 out of a possible 100.

Route Scoring Summary and Ranking

Route scores were converted to quintile values using the quintiles calculated after the publication of the February 2022 Hazardous Sites List. Quintile values were then entered into the WARM ranking equations to establish human health and environmental priority bin scores. Priority bin scores were rounded up to the nearest whole number, per the WARM ranking manual, and converted to a final rank using the final ranking matrix.

For human health, the surface water route received a quintile score of 5 and the groundwater route received a quintile score of 3. The priority bin score was 3.9, which rounded up to 4. For environmental health, the surface water route received a quintile score of 5. The priority bin score was 3.6, which rounded up to 4. Entering the bin scores of 4 and 4 into the ranking matrix resulted in an overall site rank of 2. Site ranks range from 1 to 5, with a rank of 1 indicating the highest risk relative to other ranked sites in Washington state.