2023 Interim Action Work Plan and Completion Report

South Recycling and Disposal Station

Prepared for
Seattle Public Utilities

Prepared by
Herrera Environmental Consultants, Inc.

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South Recycling and Disposal Station

Prepared for
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ABBREVIATIONS AND ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
AST	aboveground storage tank
bgs	below ground surface
CPSP	Centerpoint South Park, LLC
Ecology	Washington State Department of Ecology
GP	gas probe
HDPE	high-density polyethylene
IA	Interim Action
kg	kilogram
KIP	Kenyon Industrial Park
LFG	landfill gas
MFS	minimum functional standards
mg	milligram
MTCA	Washington State Model Toxics Control Act
NAVD	North American Vertical Datum
NP	north probe
OMMP	Operations, Maintenance and Monitoring Plan
PLP	Potentially Liable Person
PSCAA	Puget Sound Clean Air Agency
RI/FS	Remedial Investigation/Feasibility Study
ROW	right of way
SP	south probe
SPPD	South Park Property Development, LLC
SPU	Seattle Public Utilities
SQER	small quantity emission rate
SR	State Route
SRDS	(SRDS Parcel) South Recycling and Disposal Station and associated City-owned property
STSII	Seattle Transfer Station Phase II site
TAP	toxic air pollutant
TEQ	toxic equivalence
UST	underground storage tank
VOC	volatile organic compound
WAC	Washington Administrative Code

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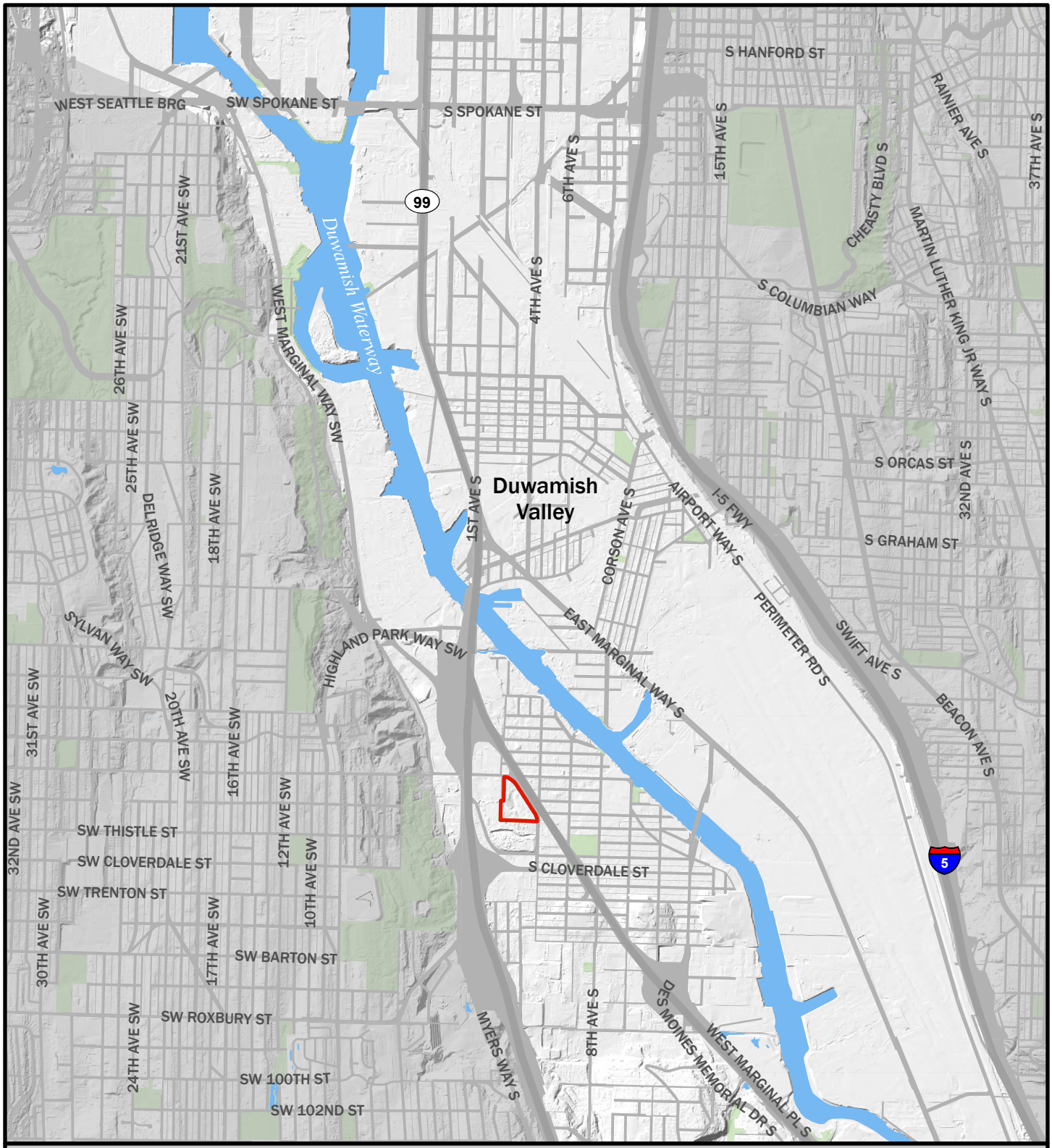
1. INTRODUCTION

This Interim Action Work Plan and Completion Report has been prepared by the Herrera Environmental Consultants, Inc. (Herrera) team for Seattle Public Utilities (SPU). It describes an interim action (IA) that was conducted at the former South Recycling and Disposal Station (SRDS) situated on a portion of South Park Landfill (Landfill) (Figure 1). The SRDS was a solid waste transfer station operated by the City of Seattle (City) and is no longer in operation. A new transfer station has been constructed across the road to the north and this IA applies to the actions required under the Agreed Order to address issues with the environmental control associated with the Landfill which exists under most of the SRDS parcel. Centerpoint South Park, LLC (CPSP) owns the adjacent property, also situated on a portion of the Landfill, and is addressing contamination issues in a separate but coordinated effort. The CPSP-owned portion of the landfill was formerly owned by South Park Property Development, LLC (SPPD) and will continue to be referred to as the SPPD parcel in this document.

The Landfill is a former municipal solid waste landfill located in the South Park neighborhood of Seattle, Washington (Figure 2). It received solid waste from the 1930s until 1966, when it was closed under existing landfill closure laws. In February 2007, the Landfill was added to Washington State's Hazardous Sites List, based on concerns related to groundwater contamination and the presence of potentially flammable landfill gas (LFG). Groundwater, surface water, soil, and LFG investigations began in the late 1980s, continuing to the present day.

A Remedial Investigation/Feasibility Study (RI/FS) of the entire Landfill Site was conducted under Washington State Model Toxics Control Act (MTCA) Agreed Order No. 6706 (Agreed Order) with the Washington State Department of Ecology (Ecology) to determine the nature and extent of contamination and to evaluate remedial actions necessary for the Site. The City, King County (County), and SPPD were originally identified by Ecology as potentially liable persons (PLPs) for the Landfill Site. SPPD and the City were signatories of the Agreed Order in 2009 (referred to as AO PLPs). An amendment to the Order was issued in 2013, directing the AO PLPs to conduct an IA. The 2013 IA addresses the SPPD property and contiguous offsite areas where solid waste from Landfill operations extended beneath City rights-of-way, including 5th Avenue South, 2nd Avenue South, and South Sullivan Street. A second amendment to the Order was issued in 2016, directing the AO PLPs to conduct another IA. The 2016 IA addresses the SRDS property and where solid waste extends beneath 5th Avenue South. Both SPPD and the City would coordinate to mitigate groundwater contamination and LFG associated with the Landfill Site, as well as to control surface water based on independent property development plans.

This 2023 IA will be implemented through a third amendment to the AO, and it will supersede and replace the 2016 IA. The AO PLPs will complete the requirements of the 2023 IA which addresses the SRDS property and where solid waste extends beneath 5th Avenue South.



Legend

STSII Property

Figure 1.
Site Vicinity Map, South Transfer Station Phase II, Seattle, Washington.

N

0 1,500 3,000 6,000 Feet

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Legend

- Piezometer
- Gas Probe
- STSII Property
- Landfill Boundary (based on RI/FS)

Figure 2.
Site Plan, South Transfer Station Phase II, Seattle, Washington.

N

0 250 500 1,000 Feet

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King County, Aerial (2021)
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The following terms are used throughout the document:

- **South Park Landfill (Landfill):** Landfill refers to the extent of refuse or solid waste that was placed during the operation of the South Park Landfill from the 1930s until it was closed in 1966.
- **Site (capitalized):** Site is used to be consistent with the MTCA definition of the site and includes the Landfill and other areas where contamination has come to be located.
- **site (not capitalized):** site refers either to the SRDS or SPPD portion of the Landfill Site, depending on the context.

1.1. Rationale for Interim Action

In accordance with Section 430 of Chapter 173-340 of the Washington Administrative Code (WAC 173-340-430), an IA is "a remedial action that is technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance at a facility".

The RI/FS, submitted in July 2017 for public comment and finalized in 2021, compiled Landfill investigation data for soil, cover material, groundwater, LFG, and surface water conducted by the County and/or City over the last 25 years and addressed identified data gaps.

The RI/FS indicated the need for an action to address potential exposure to hazardous substances associated with redevelopment of the SRDS property. This completed IA is intended to protect human health and the environment and to mitigate potential exposure pathways that could occur from redevelopment of the SRDS property.

1.2. Description of Interim Action Area

The SRDS property is defined by King County tax parcel 7328400005, encompassing 10.3 acres. Two additional strips of land, 60 feet on the west of the SRDS parcel and 30 feet on the south, were incorporated into the property in 2003 by City ordinance 121306. This additional land is in the process of being recorded by King County and brings the site area to approximately 11 acres. The SRDS property is bordered by 5th Avenue South to the east, Kenyon Street South to the north, Kenyon Industrial Park (KIP) to the west, and SPPD property to the south and partially to the west (Figure 3). The SRDS property is presently used by SPU for the following:

- Yard waste collection
- Household Hazardous Waste collection
- Transfer trailer and truck parking, fueling, and vehicle washing.

Most of the property is covered with asphalt and several structures, including the household hazardous waste building, former waste collection building, fueling area, and temporary office trailers.

Legend

- STSII Property

Figure 3.
Interim Action Area, South Transfer Station Phase II, Seattle, Washington.

N

0 75 150 300
Feet

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King County, Aerial (2021)
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1.3. Overview of the Interim Action

The 2016 AO Amendment incorporated an IA Work Plan for the SRDS property (2016 IA) and was determined necessary to reduce threats to human health and the environment by eliminating or substantially reducing hazardous substance exposure pathways and monitor conditions in advance of the primary implementation of the remedial action. The 2016 IA coupled its South Transfer Station Phase II (STSII) redevelopment plan with remediation.

The City's decision to rescope its development plans resulted in removing the originally planned combined cleanup and redevelopment of the SRDS property into STSII and now the City has proceeded only with the MTCA cleanup portion of the 2016 IA. This 2023 IAWP and Completion Report reflects that approach.

The City will manage the SRDS parcel as a paved support facility with minor operational improvements for Seattle Public Utilities (SPU) activities. The City will implement a comprehensive remedial action in accordance with the 2018 Final Cleanup Action Plan and its amendment, the Amended SPPD/City Cleanup Action Plan. The design for that remedial action is scheduled for completion in 2023 and construction is scheduled to begin in 2024.

In the interim, and in accordance with MTCA requirements (WAC 173-340-430(3(b)), the IA was implemented to maintain environmental controls and monitoring at the property. The IA Actions are defined in Section 4 of this document and include:

- Action 1—Seep Monitoring and access control
- Action 2—Supplemental Groundwater Investigation Report
- Action 3—Cap, Landfill Gas and Surface Water Maintenance and Monitoring

The IA Actions includes maintenance of the existing cap, perimeter gas compliance monitoring, and groundwater compliance to confirm protectiveness of existing environmental controls at the SRDS portion of the Landfill Site per the Operations, Maintenance, and Monitoring Plan prepared as part of the Clean Up Action plan.

Additional work was done when a seep was discovered in the compactor bay of the existing solid waste building in 2018. The seep was initially monitored for extent of contamination. Upon confirmation that the seep was isolated to this one location and flow was not exiting the compactor bay, a fence was installed in October of 2018 to prohibit access to the contained seep area, reducing the threat to human health and environment. The fence is considered part of this IA and permanent until further site development occurs. The fence is to be maintained in similar fashion as other fencing onsite as described in the site OMMP. Upon discovery of the seep a Supplemental Groundwater Investigation was completed at the direction of Ecology to ensure the identified groundwater seep in the compactor bay was isolated and contamination was not migrating offsite. The Supplemental Groundwater Investigation Report is referenced in the RI/FS and submitted under separate cover to Ecology.

1.4. Purpose of the 2023 Interim Action Work Plan and Completion Report

The purpose of the 2023 IA and Completion Report is to provide:

- A description and completion of the IA and how it meets the criteria identified in WAC 173-340-430(1), (2), and (3).
- A description of existing area conditions and a summary of available data related to the 2023 IA.

1.5. Organization of the 2023 Interim Action Work Plan and Completion Report

The IA Plan and Completion Report has been developed in accordance with the provisions of WAC 173-340-430 and consists of the following nine sections:

- Section 1, Introduction describes the regulatory framework for conducting the IA, provides an overview of the IA, and describes the purpose of the IA Plan.
- Section 2, IA Area Features and Background describes Landfill Site features and other details, such as hydrogeology and surface water bodies in the vicinity, and presents an overview of previous investigations at the Landfill Site and a summary of environmental conditions relevant to the IA.
- Section 3, Regulatory Considerations includes a description of applicable regulatory considerations and relationship to the RI/FS.
- Section 4, Action Items for Interim Action describes the actions associated with this Interim Action.
- Section 5, Compliance Monitoring and Reporting provides a summary of the compliance monitoring and reporting protocols for the IA.
- Section 6, References lists documents cited in the IA Plan.

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2. INTERIM ACTION AREA FEATURES AND BACKGROUND

Much of this section has been excerpted from the South Park Landfill RI/FS and provides a description of the setting and features of the SRDS property, including a discussion of geological and hydrogeological conditions. A summary of prior investigations for the Site is presented in Table 2.4 of the RI/FS report and information summarized below for the IA area is based on the results of previous investigations conducted on behalf of King County, the City, KIP, and SPPD, from the 1980s through 2014.

2.1. Interim Action Area Features and Current Use

The Landfill consists of several parcels situated in the South Park neighborhood of south Seattle. It covers approximately 39 acres and is roughly bounded to the north by South Kenyon Street, to the east by State Route (SR) 99 and Fifth Avenue South, to the south by South Sullivan Street, and to the west by Occidental Avenue South. The Landfill was operated by the City, until it closed in 1966, and included disposal and burning of municipal, commercial, and industrial waste (SPU 1997; Ecology and Environment, Inc. 1988). Since that time, the Landfill has undergone filling and grading activities and has been redeveloped. A detailed description of the history of the Landfill and its owners is provided in Table 2.1 and Appendix A of the RI/FS (Floyd Snider 2021). Appendix A also includes historical aerial photographs illustrating changes to the Landfill boundary and land use over time.

The SRDS property is located at 8100 Second Avenue South and covers 11.26 acres overlying the Landfill. The SRDS was constructed on the property in 1966, eventually including a main waste disposal building, a small maintenance facility, a scale house, two vehicle-fueling systems, and several additional small buildings used for offices and household hazardous waste collection. In 2013, the South Transfer Station, a replacement for the SRDS became operational across South Kenyon Street. In January 2014, when the City's North Recycling and Disposal Station (NRDS) closed for a scheduled rebuild, a portion of the SRDS was reopened as the SRDS facility, to increase the City's solid waste handling capacity. SRDS accepted yard waste while the NRDS was modernized. The NRDS reopened in 2016.

Several of the old SRDS structures, including the old scale houses and the main waste disposal building, are pile-supported. These piles extend to depths of more than 96 feet below ground surface (bgs). The SRDS parcel is paved, except for some perimeter landscaping and small areas in the interior of the property. Two rights-of-way (ROWs) were added to this parcel in 2003 through the ordinance provided in Appendix A of the RI/FS. The IA also addresses that portion of the Landfill that extends northeast and east of Fifth Avenue South and west of Second Avenue South, along the KIP property line.

Truck fueling systems that remain on the SRDS property consist of 2,000- and 3,000-gallon aboveground storage tanks (ASTs) used to store diesel fuel, and a dispenser island. In 1999, an earlier fueling system was decommissioned. It had consisted of a 10,000-gallon diesel and a 3,000-gallon gasoline underground storage tanks (USTs), dispensers, and underground piping. In 1999, it was reported that a release of petroleum hydrocarbons had occurred and about 250 cubic yards of petroleum-contaminated

soil were removed from an excavation beneath the former fuel dispensers as part of the decommissioning. Some residual petroleum hydrocarbons attributed to the former fueling system were left in place. Heavy oil-range petroleum hydrocarbons were also detected and attributed to disposal practices when the property was operated as a landfill.

The property also contains a French drain system of limited extent beneath the compactor structure on the east side of the disposal building, which discharges to the municipal sanitary sewer. The system is designed to capture the seasonal build-up of groundwater beneath the foundation but drains to a sanitary sewer catch basin.

A stormwater collection system that extends across the parcel connects to the City's storm drain system beneath Second Avenue South, which is connected to the SR 509 storm drain system that flows into wetlands on the west side of the highway.

SRDS buildings are connected to the public sanitary sewer system, located beneath Second Avenue South; water and natural gas mains are located along Fifth Avenue South. The Renton Effluent Treatment System line is located northeast of Fifth Avenue South, along the SR 99 ROW. It is a 96-inch diameter force main sewer line that carries treated effluent from the County's South Treatment Plant in Renton to an outfall in Elliott Bay.

The City plans to demolish and clear the site of all existing structures except the HHW facility (remains in place) and Crew Quarters (relocated onsite). The City will implement the remedial action as required by the Cleanup Action Plan and anticipated CAP Amendment, and will manage the SRDS parcel as a paved support facility with minor operational improvements for Seattle Public Utilities (SPU) activities.

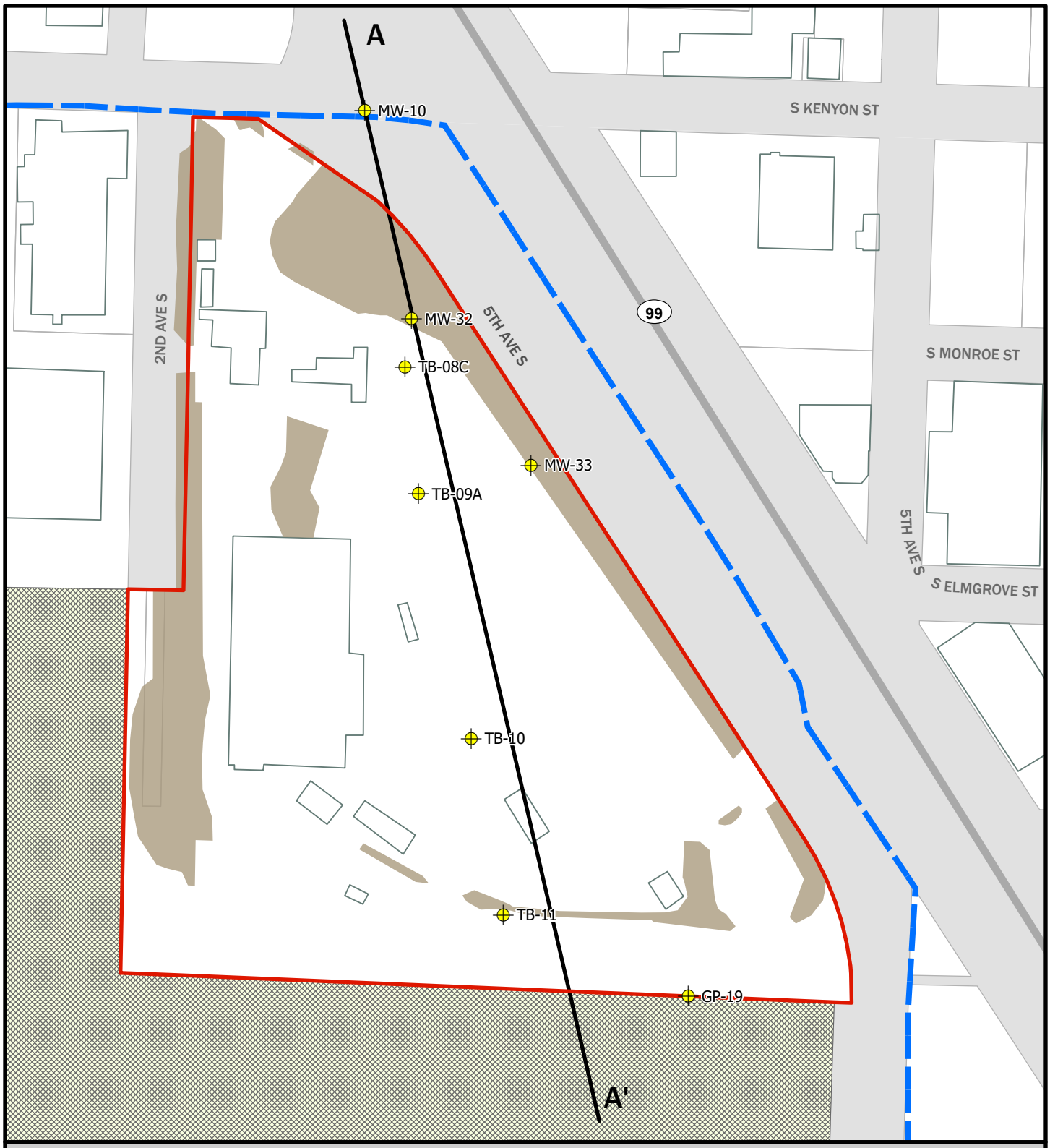
2.2. Hydrogeology

Geologic and hydrogeologic conditions for the property are summarized from information in the RI/FS Work Plan (Farallon 2010), RI/FS Report (Floyd Snider 2021), and the SPPD Interim Action Work Plan (Farallon 2013).

A supplemental groundwater investigation was completed by SPU in 2019 at the request of Ecology. The investigation consisted of the installation of six new monitoring wells and two rounds of groundwater sampling. The results are documented in the Supplemental Groundwater Investigation Report (Aspect Consulting 2020).

2.2.1. Geology

The Landfill is located in the Duwamish Valley, which is a glacially-carved trough, in-filled with more recent sediments and soil. In many areas of the Duwamish Valley, the ground surface was modified by dredging and fill placement that overlies the alluvial soil (Figure 4). Local geology is based on four defined units: imported fill, alluvial sediments, estuarine deposits, and glacial soil (Figure 5). A description of each unit, including Site-specific information collected during 2011 investigations, is provided below. Logs for Landfill borings, test pits, gas probes, and monitoring wells are provided in Appendix A of the RI/FS Work Plan (Farallon 2010) and Appendix B of the RI/FS Report (Floyd Snider 2014).



Legend

- STSII Property
- Landfill Boundary (based on RI/FS)
- Cross-section data point
- Unpaved area
- South Park Property Development
- Cross-section
- Right-of-way (ROW)
- Parcel

Figure 4.
Cross-Section Location Map,
South Transfer Station Phase II,
Seattle, Washington.

N

0 75 150 300 Feet

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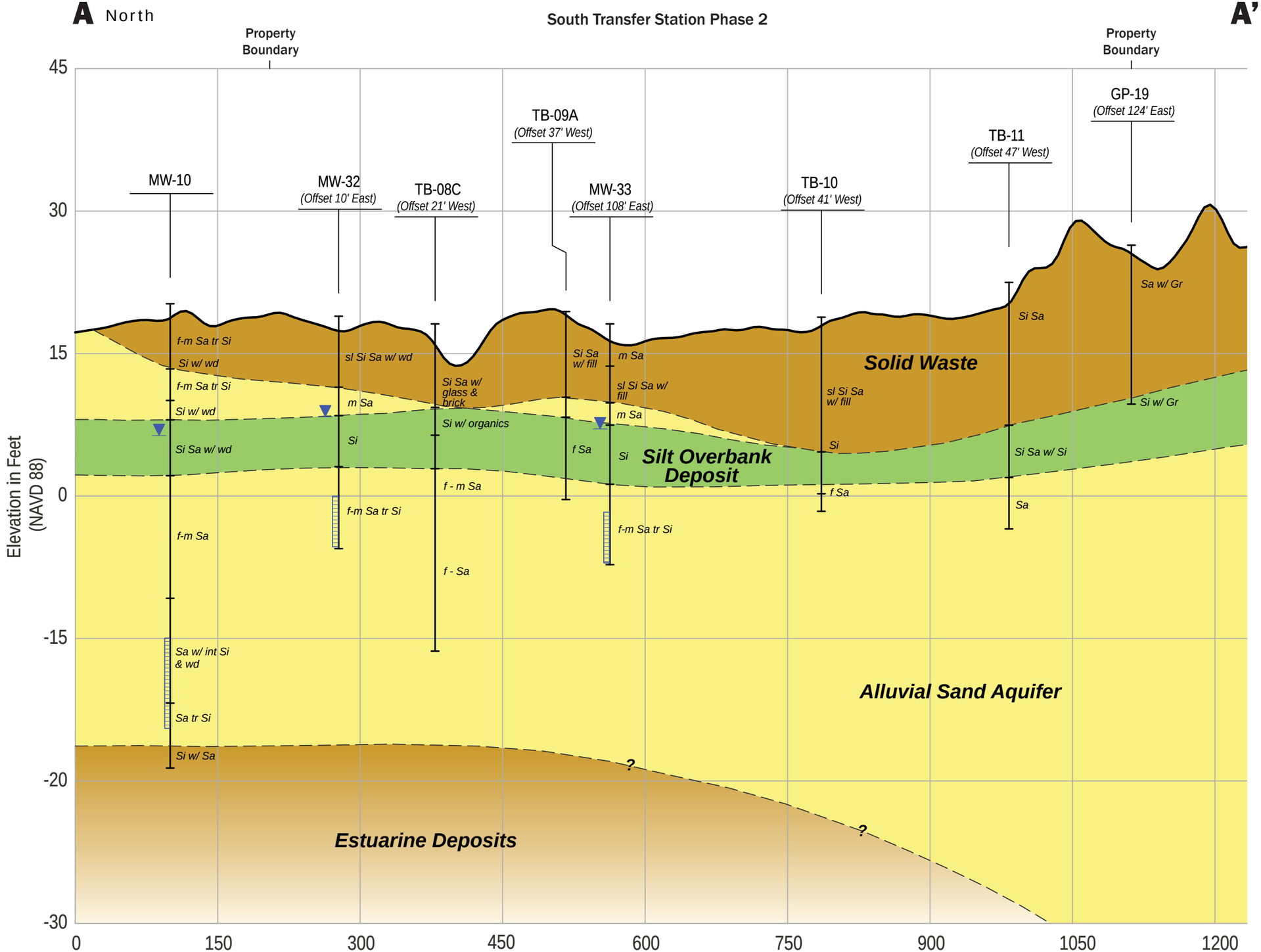
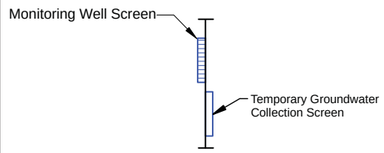


Figure 5.
Cross-Section A - A',
South Transfer Station Phase II,
Seattle, Washington.

Legend

- Static Water Level (January or March 2011)
- Approximate Ground Surface
- Approximate Geologic Unit Contact
- Inferred Geologic Unit Contact

Groundwater Data



Soil Description

Cl	=	Clay	f	=	fine
Sa	=	Sand	m	=	medium
Si	=	Silt	c	=	course
Gr	=	Gravel	w/	=	with
Org	=	Organic	s	=	some
Wd	=	Wood	&	=	and
Deb	=	Debris	sc	=	scattered
Fl	=	Fill	sl	=	slightly
			tr	=	trace
			int	=	interbedded

(Adapted from RI/FS 2014)

0 150'
0 15'

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Imported Fill/Solid Waste—Imported fill at the SRDS property is composed of solid waste disposed during operation of the Landfill and structural fill placed for development of the SRDS by the City in the 1966. Cover material placed over the solid waste typically consisted of sand, silty sand, gravel, and silty gravel. Lithologic logs for borings completed at the SRDS property indicate that a laterally continuous soil cover is not present.

Solid waste disposed at the Landfill is composed of municipal solid waste, commercial waste from local businesses, residential vehicles, and other recyclable materials. From the 1940s until 1961, solid waste occasionally was burned to reduce volume and promote more-rapid settling and compaction. In general, the thickness of the solid waste ranges from less than 5 feet to approximately 20 feet (Figure 5).

The composition and texture of solid waste encountered during subsurface investigations varies widely across the Landfill Site. Typical solid waste materials observed in borings on the SRDS property include ash, plastic, glass, tires, organic material, and other anthropogenic materials. Materials such as, wood, metal, brick, concrete and other types of construction related debris also were noted in some locations.

Alluvial Sediments—The RI/FS reported that the Landfill was developed on alluvial sediments divided into an upper section of overbank flood deposits and a lower underlying section of silty sands and sands generally described as follows:

- The overbank flood deposits consist of interbedded fine sand and silt containing abundant organic debris associated with marshland vegetation, with a density ranging from loose to firm.
- The underlying sequence of dark gray or black silty sands and sands constitutes the thickest section of the alluvial soil. The upper portion of this silty sand and sand sequence has been described as reddish brown or brown at some boring locations.

Saturated material in the alluvial sediment strata is regionally referred to as the Alluvial Aquifer. The RI/FS report refers to the Alluvial Aquifer as the Shallow Aquifer. The thickness of alluvial sediments ranges from approximately 25 to 35 feet across the SRDS property.

Estuarine Deposits—Logs for deep borings in the Duwamish Valley indicate a sequence of estuarine deposits progressing upward vertically into an alluvial sequence. The estuarine deposits typically are composed of fine sands and silts with shell fragments, which distinguish sediments deposited on the border of a marine environment. Estuarine deposits were encountered at monitoring well MW-10 (located northeast of the SRDS property) at approximately 44 feet bgs. None of the explorations on the SRDS site were deep enough to encounter the estuarine deposits.

Glacial Soil—Glacial soil, composed of dense silt, sand, and gravel, is present at the margins of the Duwamish Valley, but has not been encountered in borings completed on SRDS. It may be present at the SRDS property below the estuarine deposits at depths greater than 65 feet bgs.

2.2.2. Surface Water

There are no surface water bodies on the SRDS property; the Duwamish Waterway is located approximately 1,700 feet to the northeast. It forms at the confluence of the Green and Black Rivers and historically meandered along the valley floor, discharging into Elliott Bay. Figure 1 shows the location of the Landfill in relation to the Duwamish Waterway.

2.2.3. Groundwater

Groundwater in the vicinity of the Landfill generally occurs within alluvial sediments (also referred to as the Shallow Aquifer in the RI/FS report), sandwiched beneath Silt Overbank Deposit above and estuarine deposits below. There also may be a perched water bearing zone between the refuse and Silt Overbank Deposit in places. The system is described, as follows:

- Perched Zone: discontinuous shallow zone of groundwater and infiltrating precipitation stormwater, ranging from 0 to 5 feet in thickness, occurring at elevations generally from +5 to +15 feet North American Vertical Datum of 1988 (NAVD 88) at the SRDS property. The perched zone was not observed in the SRDS monitoring wells.
- Silt Overbank Deposit: fairly continuous within the uppermost portion of the alluvial deposits, which act as low permeability aquitards that separate infiltrating precipitation and overland flow from the Perched Zone and the Shallow Aquifer.
- Shallow Aquifer: continuous groundwater-bearing zone beneath the Silt Overbank Deposit, occurring at elevations generally from +4 to greater than -30 feet NAVD 88 at the SRDS property, bounded by the estuarine/marine deposits.

Groundwater flow in the vicinity of the Landfill is generally toward the Duwamish Waterway. There is no evidence that groundwater elevations are tidally influenced at wells in the Landfill monitoring well network. Minor groundwater level fluctuations identified through monitoring indicates that groundwater levels below the Silt Overbank Deposit are influenced by changes in barometric pressure, indicative and common of confined aquifer conditions. Groundwater recharge occurs primarily in up-gradient upland areas south and west of the SRDS site; however, some precipitation falling on pervious areas of the site infiltrates to the Shallow Aquifer.

2.3. Summary of Environmental Conditions

This section provides a general summary of environmental conditions in the vicinity of the SRDS property based on Landfill-related studies through 2014. This section is not intended to be a complete discussion of the nature and extent of contamination, but rather a summary of available data used to support the design of the IA.

The RI/FS report identifies potential exposure pathways at the Landfill, including:

- Direct contact with contaminated soil or solid waste that is not under a controlled landfill cap

- Direct contact with contaminated groundwater (because there are no drinking water wells, such contact would be limited to groundwater seeps and construction activities below the water table)
- Direct contact/inhalation with indoor air that may contain concentrations of volatile organic compounds (VOCs) from LFG diffusion into structures.

Refer to the RI/FS report for a detailed discussion of chemicals of concern and proposed cleanup standards (Ecology will determine the site's final cleanup standards, as part of the Cleanup Action Plan [CAP]).

2.3.1. Surface Soil

Approximately 80 percent of the SRDS property is paved; solid waste is typically found below the pavement and gravel base layer. It is not customary to analyze soil samples within a closed landfill because they would be considered samples of solid waste, not soil. As such, "soil" samples historically collected at SRDS have been acquired from unpaved landscaped areas.

Twenty eight soil samples were collected from surface soil across unpaved landscaped areas around the SRDS property in 2011. All samples were composited by the laboratory into a single "multi-increment" sample and analyzed for the five MTCA metals (Table 1). A detailed discussion of the sample collection process is provided in the RI/FS report.

Dioxin/furan analysis was also conducted on the multi-increment sample. The calculated toxic equivalence (TEQ) concentration for 2,3,7,8-tetrachloro-dibenzo-p-dioxin of 333 nanograms per kilogram was less than the MTCA method C cleanup level of 1,500 nanograms per kilogram.

No soil chemicals of concern were identified for the SRDS property, based on a review of historical soil sampling and sampling conducted for the RI/FS.

Table 1. Soil Sample Metals Analytical Results.

Metal	Concentration (mg/kg)	MTCA Method C (mg/kg)
Arsenic	20	*87*
Cadmium	2.1	*3,500*
Lead	273	*1,000*[a]
Mercury	0.23	*2*[a]
Chromium (III)	43	*5,250,000*
Hexavalent Chromium	< 0.400	*10,500*

[a] Method A Industrial properties

mg/kg–milligrams per kilogram

2.3.2. Groundwater

A detailed discussion of groundwater conditions for the Landfill Site is provided in the RI/FS report. Groundwater conditions for the SRDS property will be addressed through the CAP for the Site, not within this IA Plan.

A groundwater seep that existed in the compactor bay of the existing solid waste facility was initially monitored for extent of contamination in 2018. Upon confirmation that the seep was contained in its location, not exiting the compactor bay, which is the lowest part of the SRDS building, a fence was installed in October of 2018 to prohibit access to the seep area and a Supplemental Groundwater Investigation (Aspect Consulting 2020) was conducted. The fence is considered part of this IA and permanent until further site development occurs. The fence is to be maintained in similar fashion as other fencing onsite as described in the site OMMP.

2.3.3. Surface Water

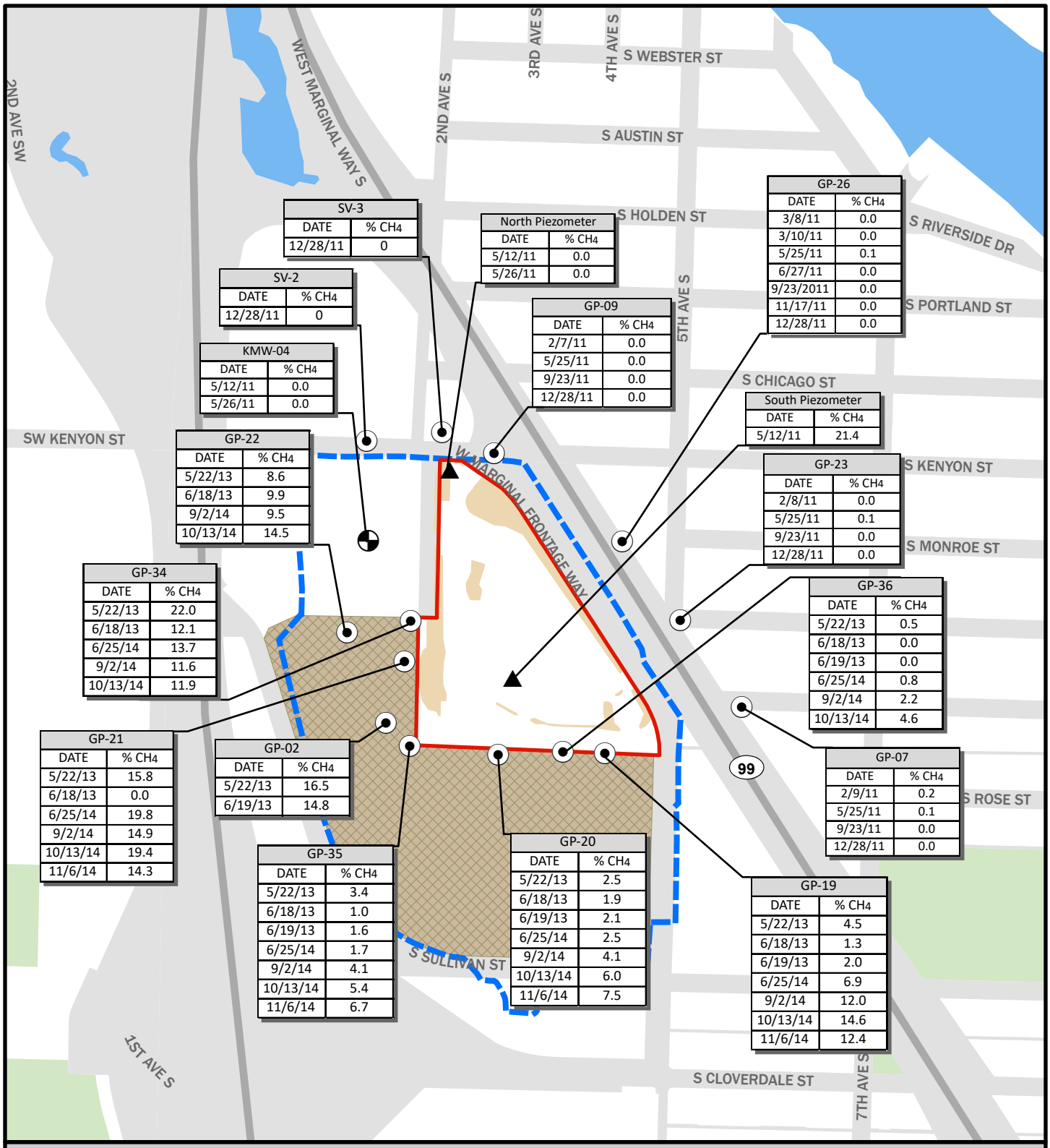
There are no surface water bodies within the SRDS property. A discussion of surface water (i.e., stormwater) runoff control is provided below in the discussion of IA components.

2.3.4. Landfill Gas

Over 36 LFG probes have been installed within and along the perimeter of the Landfill. Recent LFG monitoring performed for the RI/FS defines baseline conditions for both the SPPD and SRDS IAs, with methane concentrations ranging from 0.0 to 85.1 percent at locations on and adjacent to the Landfill. See Figure 6 for methane concentrations at locations on and immediately adjacent to the SRDS property. The lower explosive limit for methane is 5 percent by volume. On the SRDS property, LFG monitoring was performed at two piezometers located on the Landfill (NP–north probe, near the site boundary and SP-south probe, in the center of the site) and six perimeter probes (GP-07, GP-09, GP-23, and GP-26, SV-2, and SV-3) located offsite to the northeast and north.

No methane was detected at interior piezometer NP, but a concentration of 21 percent was detected at SP. Methane concentrations have been negligible at perimeter probe locations, ranging from 0.0 to 0.2 percent. Two of the northern perimeter probes SV-2 and SV-3, located at the new transfer station, are no longer accessible, due to recent development activities and were replaced during the IA (renamed GP-37 and -38–shown in Figure 2).

In 2011, LFG samples were collected from piezometers NP and SP and analyzed for VOCs. None of the VOCs exceeded MTCA Soil Gas Industrial Screening Levels (discussed in more detail in the RI/FS report).



Legend

- Monitoring Well
- Piezometer
- Gas Probe
- STSII Property
- Landfill Boundary (based on RI/FS)
- Unpaved area
- South Park Property Development
- Right-of-way (ROW)

Figure 6.
Landfill Gas Monitoring Results on and Adjacent to South Transfer Station Phase II, Seattle, Washington.

N

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3. REGULATORY CONSIDERATIONS

The RI/FS provides a summary of MTCA requirements for cleanup of landfills within the context of original date of closure and the development of landfill management regulations over the years. This summary is repeated here.

The Landfill is a historical municipal landfill that was originally closed in 1966 under the County's Title 10 provisions for landfills—the only applicable regulations at the time. Washington State's first Minimum Functional Standards (MFS) for solid waste landfills, Chapter 173-301 WAC, became effective in 1972. In November 1985, Chapter 173-301 was replaced by Chapter 173-304 as Washington State's for solid waste landfills. MTCA allows for containment to be the preferred remedy for historical landfill sites and uses MFS (WAC 173-304) as a relevant and appropriate requirement. Closed landfills are considered under MTCA to be sites that have used "containment of hazardous substances" as the preferred remedy. Under WAC 173-340-740(6)f), MTCA states that containment sites will comply with cleanup standards if they meet the following requirements:

> *"WAC 173-340-740(6)(f) The department recognizes that, for those cleanup actions selected under this chapter that involve containment of hazardous substances, the soil cleanup levels will typically not be met at the points of compliance specified in (b) through (e) of this subsection. In these cases, the cleanup action may be determined to comply with cleanup standards, provided:*
>
> > *(i) The selected remedy is permanent to the maximum extent practicable using the procedures in WAC 173-340-360;*
> >
> > *(ii) The cleanup action is protective of human health. The department may require a site-specific human health risk assessment conforming to the requirements of this chapter to demonstrate that the cleanup action is protective of human health;*
> >
> > *(iii) The cleanup action is demonstrated to be protective of terrestrial ecological receptors under WAC 173-340-7490 through 173-340-7494;*
> >
> > *(iv) Institutional controls are put in place under WAC 173-340-440 that prohibit or limit activities that could interfere with the long-term integrity of the containment system;*
> >
> > *(v) Compliance monitoring under WAC 173-340-410 and periodic reviews under WAC 173-340-430 are designed to ensure the long-term integrity of the containment system; and*
> >
> > *(vi) The types, levels, and amount of hazardous substances remaining onsite and the measures that will be used to prevent migration and contact with those substances are specified in the draft cleanup action plan."*

Approximately 10 years after MFS was developed, USEPA published their *Presumptive Remedy for CERCLA Municipal Landfill Sites Directive* (OSWER Directive 9355.3–11). This document was based on USEPA's experiences on multiple solid waste landfill sites and reflected a growing body of knowledge regarding the key components that were necessary to build long-term containment remedies at solid waste landfills. The FS conducted for the Landfill Site uses ideas from USEPA's presumptive remedy to refine the MTCA remedial action, while continuing to treat MFS as a key ARAR.

4. COMPLETED ACTION ITEMS FOR THE 2023 INTERIM ACTION

The intent of this IA was to perform work necessary to reduce a threat to human health and the environment by eliminating or substantially reducing one or more pathways for exposure to hazardous substances.

There were three cleanup type actions completed for the 2023 IA:

- Action 1—Seep Monitoring and Access Control
- Action 2—Supplemental Groundwater Investigation Report (Aspect Consulting 2020)
- Action 3—Cap, Landfill Gas and Surface Water Maintenance and Monitoring.

A brief description of each of these actions is presented below.

4.1. Action 1–Seep Monitoring and Access Control

When a seep was discovered in the compactor bay of the existing solid waste building in 2018, it was initially monitored for extent of contamination. Upon confirmation that the seep was contained in its location, not exiting the compactor bay, a fence was installed in October of 2018 to prohibit access to the seep area, reducing the threat to human health and environment. The fence is considered part of this IA and permanent until further site development occurs. The fence is to be maintained in similar fashion as other fencing onsite as described in the site OMMP.

4.2. Action 2–Supplemental Groundwater Investigation Report (Aspect Consulting 2020)

The Supplemental Groundwater Investigation was completed at the direction of Ecology to ensure the identified groundwater seep in the compactor bay was isolated and contamination was not migrating offsite. The Supplemental Groundwater Investigation Report is referenced in the RI/FS and submitted under separate cover to Ecology.

4.3. Action 3–Cap, Landfill Gas and Surface Water Maintenance and Monitoring

Action 3 included maintenance and monitoring of the cap over the Interim Action Area where solid waste is present, monitoring of perimeter LFG probes, control of stormwater, implementation of institutional

controls, and compliance monitoring of IA effectiveness. This maintenance and monitoring requirement will take place under the 2023 IA until an equivalent requirement is in place under the Site CAP.

In accordance with WAC 173-340-440, Action 3 includes implementation of institutional controls that limit or prohibit activities that may interfere with the integrity of the IA or that may result in exposure to hazardous substances in the Interim Action Area. Institutional controls include physical measures, such as fencing to limit access, procedural measures, such as developing and implementing an Operations and Maintenance Plan for the cap systems, or administrative measures, such as recording an environmental covenant on the property title. Installation and maintenance of institutional controls will take place under the 2023 IA until an equivalent requirement is in place under the Site CAP.

4.4. Evaluation of Actions

MTCA (WAC 173-340-360[2][a]) stipulates that the following minimum criteria be met when evaluating the actions for this Interim Action:

- Protection of human health and the environment
- Compliance with cleanup standards (WAC 173-340-700 through -760)
- Compliance with other ARARs
- Performance of compliance monitoring.

The three actions achieve compliance with landfill closure standards and provide controls for the potential direct contact exposure pathway by humans and transport of contaminants to surface water or groundwater in the Interim Action Area. They also comply with MTCA and the identified ARARs (listed in the RI/FS), and includes compliance monitoring following implementation of the IA.

5. COMPLIANCE ACTIVITIES

Monitoring for the 2023 IA will be conducted during maintenance activities and during long-term operations to determine whether the system remains effective. Monitoring performed under the 2023 IA will be conducted in accordance with the Operations, Maintenance, and Monitoring Plan (OMMP) prepared under the Clean Up Action Plan,

5.1. Monitoring and Reporting

WAC 173-340-410 identifies three types of compliance monitoring to include:

- Protection monitoring to confirm that human health and the environment are adequately protected during maintenance activities and then during the operation and maintenance of the IA.
- Performance monitoring to confirm that the remedial action has attained cleanup standards and, if appropriate, remediation levels or other performance standards (e.g., construction quality control measurements or monitoring) necessary to demonstrate compliance with a permit or, where a permit exemption applies, the substantive requirements of other laws.
- Confirmational monitoring to confirm long-term effectiveness of the remedial action once cleanup standards and, if appropriate, remediation levels or other performance standards, have been attained.

Monitoring and reporting requirements for the 2023 IA will be conducted per Appendix A–Landfill Post Closure Operations Maintenance and Monitoring Plan of the March 2018 Cleanup Action Plan (Floyd Snider 2018).

Reporting of long-term monitoring results will be continued in annual monitoring reports, based on the OMMP developed in the CAP.

5.2. Corrective Actions

Monitoring LFG in probes and ambient air in buildings will be performed in accordance with the current Compliance Monitoring Program during implementation of the 2023 IA. Long-term monitoring under this 2023 IA may be discontinued upon Ecology's approval, once the equivalent requirement is part of the Site CAP. If exceedances occur, corrective actions may need to be initiated to remain in compliance with regulatory requirements at the landfill perimeter as well as within structures on and off the landfill. Corrective actions, if necessary, will be discussed and approved by Ecology to address the specific issues noted during monitoring or subsequent inspections to address health and safety concerns and to ensure design controls are functional, and during long-term operations to determine whether the system remains effective to mitigate exposures or potentially explosive atmospheres to confirm the system

remains effective in mitigating methane hazards. Minor modifications or substantial changes to corrective actions detailed in this IA work plan will follow the amendment process detailed in the Agreed Order.

Corrective actions will require notifications to property owners and regulators. Corrective actions may include targeted cover system or foundation sealing.

5.2.1. Landfill perimeter

Methane concentrations in soil gas at the boundary of solid waste must not exceed 5 percent by volume (the LEL). The GEM 2000 instrument will be used to measure methane at the six perimeter probes (GP-07, -09, -23, -26, -37, and -38) per the Sampling and Analysis Plan (see Appendix A of the Final Cleanup Action Plan, Floyd Snider 2018). If methane exceeds the LEL, additional monitoring will be conducted both at the probes and at selected nearby offsite buildings and corrective actions will be initiated.

5.2.2. Building monitoring

Building monitoring protocols have been developed for the SRDS site and adjacent property structures off the landfill. Specific monitoring methods and designated perimeter probes have been identified in the Landfill Gas Monitoring and Contingency Plan (see Appendix A of the Final Cleanup Action Plan, Floyd Snider 2018) and its figures provide a decision tree for monitoring including trigger levels for actions and response. The building monitoring protocols have been developed to address situations where buildings are equipped with continuous monitoring methane detectors as well as for buildings that do not have detectors. Response levels detected exceedances are similar for both on and off landfill occupied structures.

5.2.2.1. Offsite Buildings

Methane concentrations inside buildings and structures off the landfill must not exceed 100 parts per million volume (ppmv), equivalent to 0.01 percent by volume or 0.2 percent of the LEL per Dept. of Public Health (Seattle–King Co). Offsite building monitoring will be conducted by the PLPs following notification by SPU, per Appendix A–Landfill Post Closure Operations Maintenance and Monitoring Plan of the March 2018 Cleanup Action Plan (Floyd Snider 2018). The need for building monitoring will be determined based on identification of methane exceeding 5 percent by volume in adjacent perimeter probes during routine monitoring.

5.2.2.2. Onsite Buildings

Methane concentrations inside buildings and structures on the landfill must not exceed 1.25 percent by volume, equivalent to 25 percent of the LEL. Building monitoring will be conducted per Appendix A–Landfill Post Closure Operations Maintenance and Monitoring Plan of the March 2018 Cleanup Action Plan (Floyd Snider 2018). Onsite buildings are equipped with methane meters. Meters in all buildings are set to alarm at the 1.25 percent level, indicating the need for monitoring with hand-held meters sensitive to below 100 ppmv. Monitoring will continue on a daily basis if methane is found to exist between 5,000 and 100 ppmv. Extended monitoring will be coordinated with implementation of corrective actions.

6. REFERENCES

American Society for Testing and Materials International (ASTM). 2006. Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). ASTM D2488-06. American Society for Testing and Materials. 11 p.

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