
## South Park Landfill

# Kenyon Industrial Park Cleanup Action Plan

**Issued by**

Washington State Department of Ecology
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# Executive Summary

The South Park Landfill Site (Site) includes property that is a closed solid waste landfill in the South Park neighborhood of Seattle, Washington. It is located in the Lower Duwamish Valley near the western valley wall between State Routes (SR) 509 and 99. The Kenyon Industrial Park (KIP) property (also referred to herein as the "KIP Area") is within the Site. The landfill operated from the 1930s until 1966 when it was closed. Landfill operations on KIP ended by the early 1950s and a portion of the KIP Area was used for auto wrecking from the early 1950s to the early 1960s. Between the mid-1960s and mid-1970s, the four buildings currently located on KIP were constructed. During this period of development, a north-south drainage swale in the western portion of KIP was filled with cement kiln dust (CKD).

Soil, groundwater, surface water, and landfill gas monitoring began in the late 1980s and have continued periodically to the present day. Today, landfill gas (methane) is still being produced at low levels at the KIP Area, but no methane was detected in buildings on or near the landfill based on investigations conducted over four quarters in 2011. In 2017, continuous methane monitors were installed in each of the buildings at KIP and methane above the applicable regulatory standard levels were not detected. Vinyl chloride, iron, and manganese are still present in groundwater at concentrations greater than the Site's groundwater cleanup level at monitoring wells located northeast of KIP near the Edge of Refuse at the landfill.

In February 2007, the Site was added to Washington State's Hazardous Sites List. A preliminary draft Cleanup Action Plan (CAP) for the two largest parcels within the Site and adjacent rights-of-way was prepared in 2017 under Agreed Order No. 6706. These two largest parcels and the rights-of-way are referred to as the SPPD/City Area and consist of the South Recycling and Disposal Station and associated City of Seattle-owned property (SRDS parcel), and the parcel formerly owned by South Park Property Development, LLC (SPPD), the SPPD parcel, owned since September 2022 by CenterPoint South Park LLC (CPSP)[1]. The Washington State Department of Ecology (Ecology) reviewed the preliminary and public review draft CAPs and used them to develop a Final CAP for a portion of the Site. A consent decree to implement this Final CAP for a portion of the Site was entered into with SPPD and the City of Seattle in 2019. The consent decree covered a portion of the Site identified as the "Settlement Area" (including the SRDS and SPPD parcels).

[1] On September 9, 2022, CPSP purchased the SPPD parcel from SPPD. For continuity of drafting, the CPSP-owned parcel will continue to be referred to as the SPPD parcel in CAP text and figures, but title to the SPPD parcel is with CPSP.[2] Because vinyl chloride has a state and federal drinking water number, the MTCA Method B value is modified per Ecology's guidance (Ecology 2005).

An Agreed Order has been issued requiring Schnitzer Properties LLC to implement this KIP CAP in the KIP Area portion of the Site. In addition, an Enforcement Order (and associated 7901 CAP) has been issued for the adjacent 7901 2nd Ave S. (7901 parcel) portion of the Site.

To effectuate the work to be performed under these Site cleanup action plans in the most efficient manner, certain PLPs have elected to take the lead in performing various aspects of the required work. Language in the consent decree and agreed orders, exhibits to these documents, and the cleanup action plans may reflect this agreement. However, the PLPs remain strictly, jointly, and severally liable for the performance of any and all obligations for the Site.

This KIP CAP describes the remedial alternative and specifies cleanup standards applicable to the KIP Area, which covers the northwest portion of the Site, and also addresses wastes associated with historical auto wrecking operations, and the CKD placed in the swale. The cleanup action is based on information and technical analyses documented in the *South Park Landfill Remedial Investigation/Feasibility Study, Revised Final* (Floyd|Snider et al. 2021; RI/FS) for the Site and consideration of public comments and community concerns.

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## List of Acronyms, Abbreviations and Terminology

| Acronym/ Abbreviation | Definition |
|---|---|
| 7901 | 7901 2nd Avenue S., LLC |
| 7901 Parcel | The tax parcel owned by 7901 2nd Avenue S., LLC (tax parcel 3224049077) |
| ARAR | applicable or relevant and appropriate requirements |
| CAP | Cleanup Action Plan |
| CFR | Code of Federal Regulations |
| City | City of Seattle |
| CKD | cement kiln dust |
| COC | chemical of concern |
| County | King County |
| CPOC | conditional point of compliance |
| CPSP | CenterPoint South Park, LLC |
| CUL | cleanup level |
| DCE | cis-1,2-dichloroethene |
| Ecology | Washington State Department of Ecology |

| Acronym/ Abbreviation | Definition |
|---|---|
| Edge of Refuse | The approximate boundary of the area where wastes were placed as part of South Park Landfill operations. |
| Farallon | Farallon Consulting, LLC |
| FS | feasibility study |
| Harsch | Harsch Investment Properties, LLC, former owner of the KIP Area parcel |
| Hart Crowser | Hart Crowser, Inc. |
| IG2 | General Industrial 2 (City zoning) |
| KIP | Kenyon Industrial Park |
| KIP Area | The parcel known as Kenyon Industrial Park (KIP), (tax parcel 3224049007). |
| Landfill Property Boundary | The boundary of the parcels located partially or entirely within the Edge of Refuse. This includes the parcels covered under the SPPD/City Area, the KIP Area, the 7901 2nd Ave S. parcel, and the 2nd Ave S right-of-way where it is located within the Edge of Refuse. The Landfill Property Boundary does not include rights-of-way located to the east and south of these parcels. |
| LEL | lower explosive limit |
| LFG | landfill gas |
| LFGMCP | Landfill Gas Monitoring and Contingency Plan |
| MFS | Minimal Functional Standards |
| µg/L | micrograms per liter |
| mg/L | milligrams per liter |
| MTCA | Model Toxics Control Act |
| NAVD 88 | North American Vertical Datum of 1988 |
| NESHAPS | National Emission Standards for Hazardous Air Pollutants |
| PLP | Potentially Liable Person |
| POC | Point of compliance |
| ppmv | parts per million by volume |
| PSCAA | Puget Sound Clean Air Agency |
| RI/FS | Remedial Investigation/Feasibility Study; in this document this refers to the *South Park Landfill Remedial Investigation/Feasibility Study, Revised Final* (Floyd\|Snider et al. 2021) |

| Acronym/ Abbreviation | Definition |
|---|---|
| Settlement Area | The parcels and rights-of-way covered under the 2019 Consent Decree. This includes the SPPD/City Area and adjacent rights-of-way within the Edge of Refuse. |
| Site | South Park Landfill Site |
| SPPD | South Park Property Development, LLC, former owner of Parcel 3224049005 |
| SPPD/City Area | The portion of the Site that includes the CenterPoint South Park, LLC-owned parcel (3224049005),the City of Seattle-owned parcels (7328400005 and 3224049110), and the adjacent City of Seattle and Washington State rights-of-way located within the Edge of Refuse. |
| SPU | Seattle Public Utilities |
| SR | State Route |
| SRDS | South Recycling and Disposal Station |
| SRDS parcel | City-owned South Recycling and Disposal Station and associated City of Seattle-owned property |
| USEPA | U.S. Environmental Protection Agency |
| WAC | Washington Administrative Code |

# 1.0 Introduction

This Kenyon Industrial Park Cleanup Action Plan (KIP CAP) describes the cleanup action selected by the Washington State Department of Ecology (Ecology) for the KIP Area, a portion of the larger South Park Landfill Site (Site) (Figure 1.1). Per Model Toxics Control Act (MTCA), the Site is defined by where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located. Based on factors currently known to Ecology, the Site is generally located at 7900 and 8100 2nd Avenue South, Seattle, Washington, and includes a former municipal solid waste landfill located in the South Park neighborhood of Seattle. For purposes of this KIP CAP, certain areas of the Site have been separately identified (e.g., the Settlement Area, the SPPD/City Area, the 7901 parcel and the KIP Area). Ecology considers those areas to be part of the Site.

Ecology has already approved a CAP for the two largest parcels *(South Park Property Development LLC [SPPD] and South Recycling and Disposal Station [SRDS] parcels)* and adjacent rights-of-way where wastes were placed as part of the South Park Landfill operations (Ecology 2023). The SRDS parcel is owned by the City of Seattle (City). The SPPD parcel was formerly owned by SPPD but has been owned by CenterPoint South Park, LLC (CPSP) since September 9, 2022. These two largest parcels are referred to as the "SPPD/City Area". Documents related to the Site refer to Kenyon Industrial Park as the "KIP Area" and this term is used throughout this KIP CAP (Figure 1.2).

The South Park Landfill, including the eastern portion of KIP Area, received solid waste from the 1930s until the late 1940s or early 1950s, when it was closed under the existing landfill closure laws. Following the closure of the landfill, a portion of the KIP Area was used for auto wrecking from the 1950s to the early 1960s. Between the mid-1960s and mid-1970s, the four buildings currently located on the KIP Area were constructed. During this period of development, a north-south drainage swale in the western portion of the KIP Area was filled with cement kiln dust (CKD).

In February 2007, the Site was added to Ecology's Hazardous Sites List, based on concerns related to groundwater contamination and the presence of potentially flammable or explosive landfill gas (LFG). Investigations of groundwater, surface water, soil, and LFG began in the late 1980s and have continued to the present day. The selected cleanup action described in this KIP CAP fulfills the requirements of the Model Toxics Control Act (MTCA), Chapter 70A.305 of the Revised Code of Washington, administered by Ecology under the MTCA Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code (WAC), for a portion of the Site.

This KIP CAP was developed using information presented in the revised final remedial investigation (RI)/feasibility study (FS) (Floyd|Snider et al. 2021) for the South Park Landfill,

which was prepared by the Floyd|Snider Team (Floyd|Snider, Aspect Consulting, Herrera Environmental Consultants, and BHC Consultants) on behalf of the City of Seattle (City), King County (County), and SPPD, and reviewed and approved by Ecology.

The objective of this KIP CAP is to satisfy the MTCA requirements for cleanup action plans set forth in WAC 173-340-380(5). Consistent with the requirement of that section, this KIP CAP provides the following information:

- Site description and history
- Conceptual site model
- Contaminated media, chemicals of concern (COCs) and cleanup standards
- Applicable or relevant and appropriate requirements (ARARs)
- Description of the selected cleanup action, including institutional controls
- Implementation schedule and
- References

# 2.0 Site Description

The Site is situated in the South Park neighborhood, located in Section 32 of Township 24 North, Range 4 East. Although the Site has not been fully defined, the Site includes but is not limited to, the area within the Edge of Refuse, which refers to the approximate boundary where landfill operations occurred historically and solid waste was placed. Areas within the Site have been identified as the SPPD/City Area, the KIP Area, and the 7901 Parcel. Remedial actions required by this KIP CAP address the KIP Area.

The KIP Area (Figure 1.2) is currently owned by Schnitzer Properties, LLC and consists of an approximately 6.5-acre parcel (County Tax Parcel No. 3224049007). The eastern half of the KIP Area overlies a portion of the refuse placed within the former South Park Landfill. The western portion of the KIP Area is beyond the Edge of Refuse and upgradient (west) of the South Park Landfill.

The KIP Area is developed with four buildings (three of which overlie the landfill, Buildings B, C, and D) with paved areas covering the surfaces outside of the building footprints (Figure 1.2). Small landscaped areas are present near the perimeter of the KIP Area (Figure 4.1). The buildings are slab-on-grade construction and contain a mixture of office and manufacturing/ warehouse space. The offices generally have either carpet or tile flooring, and the warehouse areas have exposed concrete floors. The following buildings are located on the KIP Area (Koll-Dove Venture I. 1996):

- A 32,000-square-foot building built in 1966 (Building D), at 7951–7953 2nd Avenue South
- A 15,624-square-foot building built in 1973 (Building C), at 7929–7937 2nd Avenue South
- A 44,000-square-foot building built in 1970 (Building B), at 121–129 South Kenyon Street
- A 36,000-square-foot building built in 1973 (Building A), at 7910–7936 Occidental Avenue South

W.G. Clark Construction (W.G. Clark) and the SPPD parcel are located adjacent to the south and the SRDS parcel and the 7901 parcel are adjacent to the east of the KIP Area. The SPPD and SRDS parcels overlie the landfill and are included in the SPPD/City Area. Occidental Avenue South is to the west and South Kenyon Street is to the north of the KIP Area. The W.G. Clark property is primarily used for equipment storage.

Under the terms of this KIP CAP, there will be ongoing operations, maintenance, and monitoring obligations performed at the KIP Area. These obligations are detailed in the Landfill

Cap Inspection and Maintenance Plan (CIMP, Appendix A), the Landfill Gas Monitoring and Contingency Plan (LFGMCP, Appendix B), and the Groundwater Monitoring and Contingency Plan (GWMCP, Appendix C).

## 2.1 ZONING AND LAND USE

The KIP Area and surrounding areas are zoned by the City as General Industrial 2 (IG2; Figure 2.1). This zoning designation includes general and heavy manufacturing, commercial uses subject to certain limitations, transportation and utility services, and salvage and recycling uses (Floyd|Snider et al. 2021). All parcels surrounding the KIP Area are also designated as IG2. The nearest residential property to the KIP Area is a Lowrise 3 (L3) apartment building at the southeastern corner of 5th Avenue South and South Sullivan Street, which is approximately 1,200 feet southeast of the KIP Area (Figure 2.1).

Based on zoning characteristics and review of the available aerial photographs, the IG2-zoned areas near the KIP Area can be reasonably designated as industrial properties.

## 2.2 Site History

The KIP Area contained a historical drainage channel (i.e., swale) that drained surface water from the valley wall toward wetlands closer to the Lower Duwamish Waterway (Floyd|Snider et al. 2021). East of the historical KIP swale, landfilling began in the 1930s and continued until the late 1940s. Figure 2.2 shows a sequence of aerial photographs of the KIP Area and the image from 1946 shows active dumping on the east side of the swale. Materials disposed of in the landfill primarily consisted of municipal, commercial, and industrial waste (SPU 1997; Ecology and Environment, Inc. 1988) from south and west Seattle. Waste from some parts of nearby unincorporated King County may also have been disposed of at the landfill. Solid waste was burned at the landfill prior to final disposal (Floyd|Snider et al. 2021). West of the swale were farmed fields, a house, a barn, and small farm structures. The sequence of aerial photographs (Figure 2.2) also show that the swale extended south of the KIP Area and onto the adjacent W.G. Clark parcel.

By 1951, landfilling associated with the South Park Landfill on the KIP Area had ceased. The 1951 aerial photograph shows that the section of the KIP Area where landfilling had occurred had been regraded and appears to be used as an auto-wrecking or used vehicle sales lot. By the mid-1950s, auto-wrecking or sales operations were occurring at the KIP Area on both sides of the swale.

By 1960, aerial photographs show that the swale was partially filled (Figure 2.2). By the late 1960s, the first building at KIP had been constructed and occupied and is evident in the 1969 aerial photograph (Figure 2.2). By 1974, the swale on the KIP Area had been filled, the KIP Area had been paved and developed with a stormwater collection system, and all four buildings had been constructed and occupied (Figure 2.2). Investigation in the KIP area determined that the swale was partially filled with CKD. (Floyd|Snider et al. 2021).

# 3.0 Conceptual Site Model

The conceptual site model for the South Park Landfill and surrounding area was described in the *South Park Landfill Remedial Investigation/Feasibility Study, Revised Final* (Floyd|Snider et al. 2021; RI/FS). This includes a description of the landfill "stage" conceptual site model. This element of the conceptual site model is incorporated into this KIP CAP by reference. This section focuses on exposure pathways and receptors at the KIP Area and RI conclusions that are specific to KIP Area.

## 3.1 Physical Conceptual Site Model

The KIP Area is within the Lower Duwamish Valley, near the western valley wall, as shown in Figure 1.1. The Duwamish Valley consists of a relatively thick sequence of alluvial deposits overlain by imported fill. The alluvial deposits range from 30 to 50 feet thick near the edge of the valley to more than 100 feet thick in the center of the valley (Hart Crowser 1998). The eastern portion of the KIP Area is underlain by fill soils that were placed over refuse. The refuse ranges in thickness from less than 1 foot to approximately 10 feet. No refuse is present on the western portion of the KIP Area, which is upgradient of the Edge of Refuse. The refuse and the western portion of the KIP Area are underlain by silty clay, silty sand and sand.

The Duwamish Valley Aquifer is subdivided into three zones (Perched Zone, A-Zone, and B-Zone) to assist in the classification and investigation of the aquifer conditions and chemical contamination:

- **The Perched Zone:** A shallow zone of groundwater and infiltrating stormwater, typically less than 1 foot in thickness perched on top of the Silt Overbank Deposit where it is present. This zone reflects very localized conditions.
- **A-Zone groundwater:** The groundwater in the Duwamish Valley Aquifer beneath the Silt Overbank Deposit is generally the upper 15 feet of the aquifer, extending down to approximately -15 feet North American Vertical Datum of 1988 (NAVD 88).
- **B-Zone groundwater:** Groundwater deeper in the Duwamish Valley Aquifer is saline generally located below -15 feet NAVD 88 but above the estuarine/marine deposits. This zone does not exist along the upgradient edge of the landfill near the valley wall because the Duwamish Valley Aquifer becomes thinner and only the A-Zone is present. Along the downgradient edge of the landfill, estuarine deposits are generally encountered around -40 feet NAVD 88.

Groundwater migration through the Duwamish Valley Aquifer is through both the A-Zone and the B-Zone. Near the KIP Area, groundwater generally flows east-northeast towards the Lower Duwamish Waterway.

# 3.2 EXPOSURE PATHWAYS AND RECEPTORS

## 3.2.1 Human Health Exposure Pathways and Receptors

The KIP Area was used historically as a solid waste landfill and by an auto wrecking operation. The KIP Area includes a historical drainage swale that was filled with cement kiln dust (CKD). The KIP Area was redeveloped in the 1960s and 1970s and contains four buildings (Buildings A though D), paved areas, and small landscaped areas as shown on Figure 3.1. The KIP Area and surrounding area are zoned as IG2 (Figure 2.1).

Table 3.1 lists potential exposure pathways and human receptors that are being considered at the KIP Area and for downgradient groundwater.

**Table 3.1**
**Potential Exposure Pathways and Human Receptors**

| Medium | Location | Exposure Route | **Receptor** |
|---|---|---|---|
| Ambient Air | Buildings at Kenyon Industrial Park parcel | Inhalation of volatile organic compounds | Industrial worker |
| Ambient Air | Buildings at Kenyon Industrial Park parcel | Explosive hazard from methane | |
| Confined Air | Utility Vaults at Kenyon Industrial Park parcel | Inhalation of volatile organic compounds | Industrial maintenance worker |
| Confined Air | Utility Vaults at Kenyon Industrial Park parcel | Explosive hazard from methane | |
| Surface soil and refuse | Soils that are not covered by the existing pavement/buildings or future landfill cap at the Kenyon Industrial Park parcel | Direct contact, including dermal | Industrial worker |
| Subsurface soil and refuse | Soils beneath existing pavement/buildings or future landfill cap at the Kenyon Industrial Park parcel if pavement/buildings or cap is disturbed | Direct contact, including dermal | Industrial worker |

| | | | |
|---|---|---|---|
| Groundwater | Groundwater downgradient of the edge-of-refuse | Potential drinking water use | No current or potential future receptors |
| | Groundwater that discharges into the Lower Duwamish Waterway | Use of surface water by aquatic species | Aquatic species (because the Lower Duwamish Waterway is saline; there is no drinking water use) |

### 3.2.2 Ecological Receptors

The KIP Area is exempt from the requirement for a terrestrial ecological evaluation consistent with WAC 173-340-7491(1)(b) because all contaminated soil "is, or will be, covered by buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from being exposed to soil contamination." To qualify for this exclusion, an institutional control is required under WAC 173-340-440. This institutional control is also required as part of the landfill closure. Filing an environmental (restrictive) covenant on the KIP Area is a remedial action required by this KIP CAP.

## 3.3 REMEDIAL INVESTIGATION FINDINGS

Except as otherwise noted, the following historical information, findings, and determinations for 3.3.1 through 3.3.4 are based on the findings of the RI and the conceptual site model described in the RI/FS (Floyd|Snider et al. 2021). This information was considered during development of the FS to identify effective remedial actions for the KIP Area. These findings were also used to develop the final cleanup levels (CULs) for the Site, which are discussed in Section 4.

### 3.3.1 Age, Extent, and Condition of the Landfill

- Solid waste was disposed of in the eastern portion of the KIP Area from the 1930s through the late-1940s or early 1950s; much of the waste was burned to reduce the volume. The Edge of Refuse is shown in Figure 1.2 and is based on review of aerial photographs, available records from the City and County, and soil test pit and boring logs. Refuse is not present north and west of the KIP Area, but refuse is present beneath the parcels adjacent to the east (7901 2nd Ave. S. and SRDS parcel) and south (SPPD parcel).

- The landfill is unlined and the bottom of the waste is in direct contact with groundwater, either a thin layer of Perched Zone groundwater resting on the Silt Overbank Deposit or the upper few feet of the A-Zone of the Duwamish Valley Aquifer where the silt layer is not present.

- Prior to development in the 1960s, the KIP area was unpaved, which allowed rainfall to infiltrate. The contents of the landfill include municipal solid waste, burned waste and ash, and interbedded soil and general-purpose fill used as cover during operations and as fill during

closure and post-closure activities. Because of the heterogeneous nature of the waste/fill and its presence within a closed landfill, limited characterization was performed during the RI. Based on 30 years of state and national experience with similar landfills, the waste/fill is presumed to contain one or more hazardous substances, some of which may be at concentrations greater than MTCA CULs. Some of these hazardous substances have been released to groundwater and soil vapor as discussed below.

### 3.3.2 Historical Auto Wrecking Wastes and Cement Kiln Dust

- By 1951, the portion of the KIP Area east of the swale where landfilling had occurred had been regraded and was being used as an auto-wrecking or used vehicle sales lot. By the mid-1950s, auto-wrecking and sales were occurring on both sides of the swale on the KIP Area. By the late 1960s auto-wrecking had ceased on the east side of the swale but continued on the west side of the swale until at least 1969 (Figure 2.2). The nature and extent of potential wastes from auto salvage operations is unknown. The U.S. Environmental Protection Agency (USEPA) lists petroleum products, heavy metals, and chlorinated solvents (parts cleaning) as common contaminants of concern at auto salvage yards (USEPA 2006).

- In 1972, the main stormwater line for KIP was placed in the historical KIP swale and the swale was filled. Subsequent investigation in this area confirmed that the swale was filled primarily with CKD. Several borings on the west side of the historical KIP swale identified several feet of fill beneath the CKD that contained larger debris (e.g., charred wood, glass, plastic, brick fragments) similar to refuse observed in other borings in the KIP area (Floyd|Snider et al. 2021). The approximate extent of the CKD on the KIP Area and the adjacent W.G. Clark parcel is shown in Figure 3.2. CKD is a caustic substance that may contain elevated levels of trace metals such as arsenic (Ecology 2015).

### 3.3.3 Landfill Gas Findings

- The landfill is still producing methane in some areas but with no measurable pressure buildup on the KIP Area. Methane concentrations measured in the monitoring wells and LFG probes within the landfill on the KIP Area ranged from non-detect to 13 percent (by volume) as shown on Figure 3.2. Similar conditions have been observed at the landfill since the 1990s.

- During the RI, methane was also detected in LFG probes installed in the historical KIP swale (Figure 3.2) that was filled in the late 1960s. There are several potential sources for this methane, including: decaying plant matter (as seen in the soil logs) that was in the swale before it was filled; residual petroleum contamination within the swale potentially associated with auto wrecking operations; or methane migration from the degrading landfill waste. The area of highest methane concentration is limited to the central portion of the swale and decreases rapidly to the west. Given the proximity of the swale to the landfill, it is not practical to differentiate the methane migrating from the landfill from the methane produced in the swale.

- Methane measured in the swale in 2016 and 2017 ranged from zero to 77.5% methane by volume, depending on the seasonable water table elevation.

- Screening of buildings at the KIP Area for methane and explosive gases occurred quarterly for four quarters in 2011 and no methane was detected (Floyd|Snider et al. 2021). In 2017, continuous methane monitors were installed inside each of the buildings at KIP and levels of methane above relevant regulatory standards (see Section 6.2.2) were not recorded in documentation retained by property management personnel. The data suggests that methane intrusion is not likely occurring into the buildings.

- On the W.G. Clark parcel, Buildings 1, 2, and 3 were constructed with a concrete slab on grade foundation. Building 2 was constructed with a methane mitigation system that consists of a series of perforated pipes installed beneath the concrete slab which are vented to the roof on the north side of the building . A large open-air building with a steel roof, but no walls, is located in the southern part of the property. Building 1 is the only enclosed building located over the former swale on the W.G. Clark parcel.

- No methane was noted above detection limits during the 2016 air monitoring completed within the buildings at the W.G. Clark Parcel during the RI.

- Benzene was detected in soil vapor in the historical KIP swale outside the Edge of Refuse at concentrations greater than the screening level for benzene but is less than the screening level at all other locations.

### 3.3.4 Groundwater Findings

- Vinyl chloride, iron, and manganese are groundwater COCs that have exceeded CULs at the conditional point of compliance (CPOC) (i.e., monitoring wells MW-10 and MW-25) located downgradient of the KIP area and SRDS parcel.

- Vinyl chloride exceeds its CUL northeast of the KIP Area near the Edge of Refuse at the landfill. The vinyl chloride CUL is 0.29 micrograms per liter (µg/L) and is based on protection of surface water. Concentrations in this area in March 2014 ranged from 0.49 µg/L (MW-10) to 0.99 µg/L (MW-25). Vinyl chloride is still present today because residual contamination is likely trapped in the fine-grained Silt Overbank Deposit; this residual contamination would slowly diffuse into the A-Zone of the Duwamish Valley Aquifer.

- Iron and manganese concentrations are naturally high in the Alluvial Aquifer; therefore, a CUL based on background was calculated using the procedures in MTCA 173-340-709. Details are presented in Section 5.6.4 of the RI/FS. Iron and manganese are periodically (but not consistently) elevated at concentrations greater than CULs in MW-10 and MW-25. Based on the trend plots presented in Appendix J of the RI/FS, all wells are expected to be in compliance for iron and manganese within the next 10 years.

- The historical KIP swale also has a unique groundwater signature due to the presence of the CKD. Groundwater from KMW-05 (Figure 3.1) is highly alkaline (e.g., pH of approximately 13) and has concentrations of arsenic exceeding the CUL. Groundwater monitoring wells downgradient of this area have pH values between 7.4 and 7.8. The CPOC wells (MW-10 and MW-25) further downgradient have neutral pH values, indicating that the alkalinity has been neutralized before the groundwater leaves the downgradient edge of the South Park Landfill.

- Downgradient arsenic concentrations are less than natural background (5 µg/L as discussed in Section 5.7 and Table 5.9 of the RI/FS) at the CPOC wells. Arsenic concentrations are being monitored in wells MW-10 and MW-25 pursuant to the Groundwater Monitoring and Contingency Plan (Appendix C).

- Benzene concentrations exceeding the CULs in well KMW-05 and have been detected in MW-25. This constituent is being monitored in well MW-25 pursuant to the Groundwater Monitoring and Contingency Plan.

- The concentrations of *cis*-1,2-dichloroethene (DCE, a precursor of vinyl chloride) are below the CULs in all wells, and DCE is being monitored in wells MW-10 and MW-25 pursuant to the Groundwater Monitoring and Contingency Plan.

- A groundwater seep existed in the compactor bay of the former SRDS waste collection building. In 2018, the seep was monitored and found to be contained in its location, and a fence was installed to prohibit access to the seep area (Aspect 2020).

- A Supplemental Groundwater Investigation was performed in 2019 during which additional groundwater monitoring wells were installed at the SRDS parcel (Aspect 2020).

# 4.0 Contaminated Media, Chemicals of Concern, and Cleanup Standards

Environmental investigation of the KIP Area began in the 1980s. The South Park Landfill has been investigated since the late 1990s because of the ongoing presence of low concentrations of LFG and groundwater contamination. Data from various investigations at the KIP Area, the South Park Landfill, and surrounding area were compiled in the RI/FS Revised Final (Floyd|Snider et al. 2021) to develop the list of contaminated media and COCs. This section provides a summary of these data.

## 4.1 Soil Cleanup Levels, Point of Compliance, and Compliance Requirements

The landfill waste and soil at the KIP Area is presumed to be contaminated with one or more hazardous substances related to the landfill, historic auto wrecking operations, and the placement of CKD in the historical KIP swale. Due to the heterogeneous nature of municipal landfill waste and its planned containment within a closed landfill, the landfill contents were not fully characterized for specific hazardous substances during the RI, although leachate and groundwater were. Soil used as daily cover during operations and as fill during closure and post-closure activities is also considered part of the landfill contents and was not fully characterized. The presence of the landfill and other wastes (e.g., CKD and auto wrecking wastes) on KIP requires the placement of an environmental (restrictive) covenant on the property. Per MTCA requirements, a plan that relies on containment and use of industrial soil CULs also requires that an environmental covenant (discussed in Section 6.2.7) be recorded on the KIP Area. The environmental covenant will also state that the KIP Area is limited to industrial uses.

## 4.2 Groundwater cleanup levels and point of compliance

For groundwater, the point of compliance (POC) is the point or points where the groundwater CULs must be attained to be in compliance with the cleanup standards. The standard POC for groundwater under MTCA is throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth, which could potentially be affected by the site. Where it is not practicable to meet the CUL throughout the site within a reasonable restoration timeframe, Ecology may approve a CPOC.

Ecology determined it is appropriate to use a CPOC for groundwater CULs at this Site. Compliance at the CPOC for the landfill is monitored by wells located as close as possible to the Edge of Refuse, including monitoring wells MW-10 and MW-25. These two wells are included as part of the perimeter groundwater monitoring well network for the landfill and are discussed in the Groundwater Monitoring and Contingency Plan.

Ecology has determined that maximum beneficial use of groundwater is drinking water; therefore, the groundwater CULs are based on CULs for potable groundwater. MTCA Method B CULs were developed for all contaminants detected in groundwater; CULs for iron, manganese, and arsenic are based on

background consistent with procedures in Section 709 of MTCA regulations. The groundwater CULs consider protection of drinking water, surface water, sediment, and indoor air.

Currently vinyl chloride, iron, and manganese exceed their respective CULs at the CPOC. The chemical precursor of vinyl chloride, *cis*-1,2-DCE, is currently being monitored in all CPOC wells to aid in understanding future vinyl chloride concentrations but has been in compliance for years and is not a COC.

Arsenic and benzene concentrations are above CULs within the KIP Area but decrease downgradient and are currently in compliance at the CPOC wells MW-10 and MW-25. Benzene is currently being monitored in MW-25 pursuant to the Groundwater Monitoring and Contingency Plan, which is downgradient of where benzene exceeds the CUL. Arsenic is also being monitored in well MW-10.

Iron and manganese exceeded the CULs for the landfill during one or more sampling events between 2011 and 2014. Therefore, iron and manganese are also groundwater COCs that are being monitored at the CPOC pursuant to the Groundwater Monitoring and Contingency Plan.

The COCs and their concentration range in the two wells downgradient of KIP (MW-10 and MW-25) and the other landfill CPOC wells located downgradient of the landfill during the groundwater monitoring event in March 2014 are summarized in Table 4.1. The restoration timeframe for groundwater compliance at the Site is 10 years, according to the trend plots in the RI/FS (Floyd|Snider et al. 2021).

**Table 4.1**
**Chemicals and Their Groundwater Cleanup Levels**

| Chemical | Cleanup Level | Compliance Status in CPOC Monitoring Wells | Range in CPOC Monitoring Wells (March 2014) |
|---|---|---|---|
| Vinyl chloride | 0.29 µg/L | Out of compliance | <0.02 to 0.99 µg/L |
| Iron (Total) | 27 mg/L (A-Zone)<br>31 mg/L (B-Zone) | Out of compliance | A-Zone: 4 to 29 mg/L<br>B-Zone: 21 to 33 mg/L |
| Manganese (Total) | 2.1 mg/L (A-Zone)<br>1.1 mg/L (B-Zone) | Out of compliance | A-Zone: 0.15 to 2.9 mg/L<br>B-Zone: 1.1 to 1.5 mg/L |
| *cis*-1,2-DCE | 16 µg/L | No exceedances | <0.2 to 1.9 µg/L |
| Benzene | 5.0 µg/L | No exceedances | <0.2 µg/L |
| Arsenic | 5.0 µg/L (background) | No exceedances[1] | Dissolved: 0.2 to 0.9 µg/L<br>Total: 0.3 to 0.7 µg/L |

Note:

1 MW-27, a downgradient A-Zone well across SR 99 consistently has arsenic at concentrations greater than the CUL due to a cement kiln dust deposit that is across the street from the SPPD/City Area; this well is not a CPOC for arsenic. Arsenic concentrations at the CPOC upgradient of MW-27 are in compliance, as shown in Figure 5.13 of the RI. All other CPOC wells are in compliance for arsenic.

Abbreviations:

| | |
|---|---|
| µg/L | Micrograms per liter |
| mg/L | Milligrams per liter |

Vinyl chloride concentrations in the compliance wells range from not detected (at a detection limit of 0.02 µg/L) to 0.99 µg/L. In some locations the concentrations are greater than the MTCA Method B CUL of 0.29 µg/L.[2]

Figure 4.2 shows the vinyl chloride concentrations at the Site for the March 2014 sampling event. Green symbols for the wells indicate concentrations less than the CUL. Yellow symbols indicate concentrations greater than the CUL but less than the drinking water standard, and red symbols indicate concentrations greater than both. For those wells that have exceedances, trend plots are showing the trends over time for the wells.[3]

## 4.3 Air Cleanup Levels and Point of Compliance

The KIP Area and the surrounding area are zoned industrial. The CULs for air at the Site are the MTCA Method C industrial standards. The standard POC is ambient air throughout the Site. Application of these standards is complex because ambient air measurements cannot distinguish between vapors associated with the landfill and chemicals typically used by tenants at the KIP Area. Soil vapor sampling has been conducted and based on a vapor intrusion analysis performed in accordance with Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Ecology 2016), as discussed in Section 6.5.3 of the RI/FS, vapor intrusion is not a pathway of concern (Floyd|Snider et al. 2021).

## 4.4 Landfill Gas Requirements

Methane, the primary constituent of LFG, is regulated under MTCA. Methane as LFG is also regulated in the regulations pertaining to landfills, and these regulations are relevant and appropriate requirements for establishing CULs. These criteria are found under the Minimal Functional Standards (MFS) and are defined in WAC 173-304-460 and County Board of Health Title 10 regulations. The principal criteria and requirements relevant to the KIP Area are the following:

- Methane concentrations at the boundary of the landfill property and beyond must not exceed 5 percent by volume, the lower explosive limit (LEL) for methane. Because the landfill extends onto the adjacent properties to the south (SPPD parcel) and east (SRDS parcel), this condition only applies to the property boundaries at the northern and western portions of the KIP Area. The LFGMCP addresses monitoring of LFG probes to the north of KIP along South Kenyon Street. Methane concentrations in these LFG perimeter probes (GP-37 and GP-38, Figure 4.3) comply

[2] Because vinyl chloride has a state and federal drinking water number, the MTCA Method B value is modified per Ecology's guidance (Ecology 2005).

[3] Trend plots begin when data for a well were first available; wells were installed at different times.

with this criterion. Two additional LFG perimeter probes will be installed along the property boundaries in the western portion of KIP and monitored as described in Section 6.2.2.1.

- Methane concentrations inside buildings and structures within the Landfill Property Boundary[4], which includes Buildings A, B, C, and D (Figure 1.2), are to be monitored. These measurements are collected within the buildings. During the RI, all of the KIP buildings were below trigger levels identified in this document (and appendices). Ongoing monitoring of the KIP buildings is included as part of long-term compliance monitoring for LFG (refer to Section 6.2.2 and Appendix B). Methane trigger levels designed to prevent excessive methane are described in Section 6.2.2.3.

- During the RI, all off-site buildings within 100 feet of the landfill were inspected and methane was not detected. Ongoing monitoring of buildings is still required as part of long-term compliance monitoring as described in the LFGMCP for KIP (Appendix B) for any building within 100 feet of a perimeter LFG probe that exceeds 5 percent methane (by volume). Monitoring of Building 1 on the W.G. Clark parcel, which is the W.G. Clark building closest to the landfill and overlying the swale (Figure 3.2), is included as a contingent action (refer to Section 6.2.2).

Figure 4.3 shows recent data for each of the perimeter probes. Extensive monitoring of the buildings occurred during the RI, and no methane was detected.

## 4.5 Final Chemicals of Concern and Cleanup Levels

The COCs exceeding a CUL at their CPOC and their associated CULs are summarized in Table 4.2.

**Table 4.2**
**Contaminated Media, Chemicals of Concern, and Their Cleanup Requirements**

| Medium | Chemical of Concern Exceeding Cleanup Level | Cleanup Level (or Equivalent) | Point of Compliance | Restoration Timeframe |
|---|---|---|---|---|
| Waste and soil within the Site | Multiple hazardous substances based on heterogeneity of landfill refuse | MTCA Method A and C Industrial cleanup levels | Wastes and soil that are contained within the Landfill | In compliance as long as containment remedy meets requirements of this KIP CAP |
| Groundwater | Vinyl chloride (refer to Table 4.1 for other COCs that are in compliance at the CPOC) | 0.29 µg/L | Groundwater throughout the aquifer at and beyond the CPOC (Edge of Refuse) | Approximately 10 years based on existing trend data |

[4] The Landfill Property Boundary is the boundary of a property partially or entirely located on South Park Landfill waste. This includes the SPPD, City, KIP, and 7901 2nd Ave S. parcels, and the 2nd Ave S right-of-way where it is located within the Edge of Refuse. The Landfill Property Boundary does not include rights-of-way located to the east and south of these parcels.

| Medium | Chemical of Concern Exceeding Cleanup Level | Cleanup Level (or Equivalent) | Point of Compliance | Restoration Timeframe |
|---|---|---|---|---|
| Groundwater | Iron | 27 mg/L (A-Zone)<br>31 mg/L (B-Zone) | Groundwater throughout the aquifer at and beyond the CPOC (Edge of Refuse) | Approximately 10 years based on landfill stage model |
| Groundwater | Manganese | 2.1 mg/L (A-Zone)<br>1.1 mg/L (B-Zone) | Groundwater throughout the aquifer at and beyond the CPOC (Edge of Refuse) | Approximately 10 years based on landfill stage model |
| Groundwater | Arsenic | 5 µg/L | Groundwater throughout the aquifer at and beyond the CPOC (Edge of Refuse) | Approximately 10 years based on existing trend data |
| Soil vapor | LFG (methane) | 5 percent by volume | Vadose zone at and beyond the CPOC (Edge of Refuse) | Within 1 year after the completion of construction of the individual LFG systems, as required |
| Indoor air | LFG (methane) | 100 ppmv action level | Throughout the buildings located within the Landfill Property Boundary | N/A |
| Indoor air | LFG (methane) | 100 ppmv action level | Throughout offsite buildings | N/A |

Notes:

CAP = Cleanup Action Plan
CPOC = conditional point of compliance
KIP = Kenyon Industrial Park
µg/L = micrograms per liter
MTCA = Model Toxics Control Act
COC = chemical of concern
DCE = dichloroethane
LFG = landfill gas
mg/L = milligrams per liter
ppmv = parts per million by volume

# 5.0 Applicable or Relevant and Appropriate Requirements

According to WAC 173-340-360(2) and WAC 173-340-710, all cleanup actions under MTCA must comply with applicable state and federal laws and Ecology-identified relevant and appropriate requirements. "Applicable state and federal laws" include legally applicable requirements including those cleanup standards, standards of control and other environmental protection requirements, criteria or limitations adopted under state or federal law that specifically address a hazardous substance, cleanup action, location, or other circumstance at the site. "Relevant and appropriate requirements" include those cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that, while not legally applicable to the hazardous substance, cleanup action, location or other circumstance at the site, are considered by Ecology to address problems or situations similar enough to those encountered at the site that their use would make common sense. These two types are referred to collectively as "applicable or relevant and appropriate requirements" or "ARARs." The remedial action must meet all Ecology-approved ARARs.

Table 5.1 lists the known ARARs for this cleanup action separated into three categories that apply to establishing CULs or conducting cleanup actions:

- Chemical-specific requirements are usually health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. These were used during the RI/FS (Floyd|Snider et al. 2021) to establish the CULs presented in Section 4.0.

- Location-specific requirements are restrictions placed on the concentration of hazardous substances or on activities solely because they occur in special locations.

- Action-specific requirements are usually technology-based requirements or limitations on actions taken with respect to hazardous substances.

## 5.1 Minimum Functional Standards for Solid Waste Handling

Because of the size of the South Park Landfill, the fact that development that has already occurred on areas where waste is in place, and the apparent effectiveness of the current containment system, it was concluded that treatment or removal of the landfill and other wastes on KIP is not practicable. Because that is the case, as a starting point, MTCA uses the closure requirements in the MFS for Solid Waste Handling (WAC 173-304) as an ARAR for the selected cleanup action and then modifies them as needed to meet the MTCA cleanup requirements (WAC 173-340-710(7)(c), solid waste landfill closure requirements):

> *"For solid waste landfills, the solid waste closure requirements in Chapter 173-304 WAC shall be minimum requirements for cleanup actions conducted under this chapter. In addition, when the department determines that the closure requirements in chapters 173-351 or 173-303 WAC are legally applicable or relevant and appropriate requirements, the more*

*stringent closure requirements under those laws shall also apply to cleanup actions conducted under this chapter."*[5]

[5] Solid waste landfills operating after October 1991 are required to meet landfill requirements in WAC 173-351. Because the South Park Landfill was closed in 1966, none of the closure requirements in WAC 173-301, 173-304, or 173-351 are applicable requirements. However, as allowed by WAC 173-340-710(7)(c), Ecology used the soil waste closure requirements in WAC 173-304 as minimum requirements for the cleanup action.

**Table 5.1**
**Applicable or Relevant and Appropriate Requirements**

| Potential Chemical-Specific ARARs[1] | Source[2,3] | Description and Relevance |
|---|---|---|
| Cleanup Requirements | | |
| National Ambient Air Quality Standards | 40 CFR 50 | Specifies primary and secondary National Ambient Air Quality Standards, National Emission Standards for Hazardous Air Pollutants, and performance standards for new and existing stationary sources. National Ambient Air Quality Standards are applicable to those elements of the Interim Action pertaining to the collection and management of LFG. |
| Federal Regulations Implementing the Toxic Substances Control Act | 40 CFR 700-799, as applicable | Specific testing, handling, and disposal requirements for materials contaminated with polychlorinated biphenyls (PCBs), dioxins/furans, etc. These regulations would apply to material generated during conduct of the Interim Action that is found to be contaminated with toxic substances regulated on TSCA. |
| Washington State Minimal Functional Standards for Landfills | WAC 173-304-460 | This regulation applies to facilities that dispose of solid waste in landfills, with the exception of inert, demolition, and wood waste landfills. It specifies limits on methane concentrations at the property boundary and in on-site and off-site structures, and requires compliance with ambient air quality standards and emission standards at the property boundary. This regulation applies only to solid waste landfills that operated after 1985, but it is a minimum requirement for solid waste landfill cleanups. |
| PSCAA Notice of Construction | Regulation I | Requires a Notice of Construction and Application for Approval before constructing or modifying an air contaminant source. This would apply to the Interim Action due to potential emissions of LFG. |
| PSCAA Emission Standards for Toxic Air Pollutants | Regulation III | Implements at a regional level the NESHAPS. It requires best available control technology for sources of toxic air contaminants; and requires that toxic air contaminants be quantified and compared against acceptable source impact levels for each contaminant. PSCAA Emission Standard for Toxic Air Pollutants are applicable to air emissions from the LFG collection system. |
| King County Board of Health Regulations | Title 10 | The requirements established in this regulation meet or exceed the requirements established by the Washington State Minimum Functional Standards for Solid Waste Handling. Applicable |

| Potential Chemical-Specific ARARs[1] | Source[2,3] | Description and Relevance |
|---|---|---|
| | | chemical-specific requirements are the same as those described for the Minimal Functional Standards (see WAC 173-304-460 above). |
| Archaeological Resources | | |
| Federal Archaeological Resource Preservation | RCW 27-53 | This law addresses the discovery, identification, excavation, and study of archaeological resources, and the communication of information to state and federal agencies regarding the possible impact of construction activities on Washington State archaeological resources. |
| State Permits for Archaeological Excavation and Removal | WAC 25-48 | This establishes application and review procedures for the issuance of archaeological excavation and removal permits, for the issuance of civil penalties for violations. |
| Monitoring and Maintenance | | |
| Federal Occupational Safety and Health Standards | 29 CFR 1910.120 | This requires that employers develop and implement a written safety and health program for their employees involved in hazardous waste operations. The program must be designed to identify, evaluate, and control safety and health hazards and to provide for emergency response for hazardous waste operations. |
| State Occupational Health Standards | WAC 296-62 | This establishes rules designed to protect the health of employees and help to create a healthy workplace by establishing requirements to control health hazards. Requirements for chemical hazard communication programs, workplace lighting levels, and exposure records are in the core safety and health rules of this chapter. |
| Well Construction Standards | WAC 173-160, Part Two | Part Two of this regulation defines minimum standards for the construction and decommissioning of the water resource protection wells that will be installed as part of the groundwater monitoring program to be implemented as part of the cleanup action. Resource protection wells may not be used to withdraw or inject water for domestic, industrial, municipal, commercial, or agricultural purposes. |

| Potential Action-Specific ARARs[1] | Source[2,3] | Description and Relevance |
|---|---|---|
| Groundwater Monitoring Plan | WAC 173-304-490 | This regulation addresses groundwater monitoring requirements for solid waste landfills including provision for a minimum of one upgradient and two downgradient monitoring wells. The monitoring plan must specify procedures for sample collection, preservation and shipment, laboratory analysis and associated quality control protocols, and health and safety. Although this requirement applies only to landfills that operated after 1985, these monitoring requirements will be incorporated into the long-term groundwater monitoring program that will be conducted as part of the cleanup action. |
| Excavation and Filling | | |
| State Particulate Matter Standards | WAC 173-470 | This establishes maximum acceptable levels for particulate matter in ambient air based on the criteria defining particulate matter that have been developed by the U.S. Environmental Protection Agency. This regulation establishes requirements for monitoring, measuring, and reporting particulate matter data. It applies to dust-producing activities during implementation of the cleanup action, particularly excavation and filling. |
| PSCAA Fugitive Dust Standards | Regulation I | This establishes emission standards for fugitive dust. Like the previous ARAR, this regulation applies to dust-producing activities during implementation of the cleanup action. |
| Treatment, Discharge, and Disposal | | |
| NPDES Permit | WAC 1732-220 | This established a state individual permit program, applicable to the discharge of pollutants and other wastes and materials to the surface waters of Washington State, operating under state law. Permits issued under this chapter are designed to satisfy the requirements for discharge permits under both the Federal Water Pollution Control Act and Washington State Water Pollution Control Act. This requirement is applicable to the control, collection, management, and discharge of stormwater runoff during and after construction of the cleanup action. |

| Potential Action-Specific ARARs[1] | Source[2,3] | Description and Relevance |
|---|---|---|
| State Minimum Functional Standards for Solid Waste Handling | WAC 173-304-460 | This regulation applies to facilities that dispose of solid waste in landfills, with the exception of inert, demolition, and wood waste landfills. The regulation establishes standards for landfill cover, surface water control, LFG collection, access control, and compliance monitoring. |
| King County Board of Health Regulations | Title 10 | The requirements established in this regulation meet or exceed the requirements established by the Washington State Minimum Functional Standards for Solid Waste Handling (see above) and apply to the cleanup action for compliance monitoring programs and as performance standards for the design of control systems. |

Notes:

[1] Because it is understood that MTCA is the overarching regulation governing all aspects of the cleanup action, it is not included in this table.

[2] Pursuant to RCW Section 70.105D.090, potentially liable persons conducting a remedial action under an agreed order with Ecology are exempt from some state-administered procedural requirements and the procedural requirements of any local laws requiring or authorizing local government permits or approvals for the remedial action. However, the substantive requirements of state and local laws requiring permits or approvals shall be complied with.

[3] Pursuant to WAC 173-340-710(9), the state agencies and local governments that have potential permits subject to the permit exemption have been consulted. The substantive requirements of the permits that are exempt, to the extent they are currently known, have been incorporated into this Cleanup Action Plan. Therefore, the substantive requirements of state and local laws subject to the permit exemption will be met during the cleanup action.

The requirements described in the MFS are designed to ensure that a landfill is closed in a manner that accomplishes the following:

- Minimizes the need for further maintenance.
- Controls, minimizes, or eliminates threats to human health and the environment from post-closure escape of municipal solid waste constituents, leachate, LFGs, and contaminated rainfall or waste decomposition products to the ground, groundwater, surface water, and the atmosphere.
- Prepares the site for the post-closure period, which must allow for continued facility maintenance and monitoring of air, land, and water as long as necessary for the facility to stabilize and protect human health and the environment.
- Implements LFG collection and treatment, if required.
- Establishes institutional controls to supplement engineering controls.

## 5.2 Other Location- and Action-Specific Applicable or Relevant and Appropriate Requirements

Additional ARARs for the KIP Area are identified in Table 5.1.

# 6.0 Implementation of the Cleanup Action

This section describes the cleanup action for the KIP Area developed in accordance with WAC 173-340-360 through 173-340-390. The cleanup action is based on the presumptive remedy for solid waste landfills, which is containment (i.e., a cap), and LFG monitoring with possible contingent actions for LFG. Groundwater monitoring and contingent actions for groundwater are described in Appendix C. The cap will extend beyond the area where solid waste was placed to contain the CKD in the historical KIP swale and residual impacts to soil that may be attributed to historical auto wrecking activities at the KIP Area. Similar to the landfill wastes, treatment or removal of the CKD and auto wrecking wastes are not considered practicable given the current development at the KIP parcel.

For the purposes of this document, the term "cap" refers to the proposed cap covering all areas of KIP meeting the minimum standards described in Section 6.2.1.

The cleanup action also includes provisions for inspection and maintenance of the cap, long-term LFG monitoring, and institutional controls, including an environmental covenant, and meets the MTCA cleanup action requirements for the KIP Area.

The appendices to this document include requirements related to the inspection and maintenance of the cap and long-term groundwater monitoring that are required for the KIP Area (Appendix A, Landfill Cap Inspection and Maintenance Plan and Appendix C, Groundwater Monitoring and Contingency Plan). These requirements and the plans in which they are described are similar for other landfill properties. Required monitoring, maintenance, and contingent actions specific to LFG at the KIP Area are described in the LFGMCP (Appendix B of this KIP CAP). The LFGMCP is considered to be part of the CAP requirements for the KIP Area.

## 6.1 Use of the Presumptive Remedy for Landfills

Under MTCA, closed landfills are considered to be sites that have used "containment of hazardous substances" as the preferred remedy for meeting soil cleanup standards. Containment is also the preferred remedy for the remainder of hazardous substances at KIP. Under WAC 173-340-740(6)(f), MTCA defines the expectation for containment sites as follows:

> *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 on-site and the measures that will be used to prevent migration and contact with those substances are specified in the draft cleanup action plan.*

As noted above, it has been concluded that treatment or removal of the wastes at KIP are not practicable alternatives. However, the specific remedy selected for the KIP Area must demonstrate that the other elements of containment are met as defined by sections (ii) through (vi) above. The RI/FS (Floyd|Snider et al. 2021) focuses on screening alternative approaches consistent with the landfill closure ARAR that would meet the requirements of containment under MTCA as described above—for example, determining site-specific alternatives for LFG controls that would comply with WAC 173-340-740(6)(f).

The basic requirements for landfill closure under MFS are as follows:

- Installation of a cap, with associated grading and stormwater controls to eliminate direct contact with refuse, decrease leachate formation, and avoid contamination of stormwater by refuse.
- Installation of LFG controls as needed to control migration of LFG at unacceptable levels from the area of refuse.
- Installation of leachate controls as needed to prevent groundwater contamination from the refuse.
- Institutional controls to supplement engineering controls.
- Long-term monitoring of remedial systems for as long as the system is needed to meet CULs and containment goals.

The preferred alternative for the landfill was developed as part of the FS, with consideration of multiple technologies and/or alternatives for each of the components required as part of landfill closure.

## 6.2 Required Cleanup Action

MTCA defines specific requirements that must be met for a selected remedy to be protective of human health and the environment and identifies criteria that must be met by each alternative. In addition, the selection of other requirements that must be met to protect human health and the environment is

guided by the MFS. The regulations also ensure that a landfill must continue with operation and maintenance of the selected remedy and the appropriate long-term monitoring to ensure that the remedy is effective.

This section states the components of the cleanup action for the KIP Area. Additional rationale can be found in Sections 10.0 through 16.0 of the RI/FS (Floyd|Snider et al. 2021).

## 6.2.1 Landfill Cap

The cleanup action requires a cap covering all areas of KIP. The primary goal of the cap is to block access or exposure to the wastes and soil; secondary goals are to limit stormwater infiltration and to facilitate the performance of the LFG systems. Minimum standards for the cap and requirements for continued monitoring and maintenance of the cap are discussed below.

### *6.2.1.1 Minimum Standards for Landfill Cap*

All areas of KIP must be covered by a landfill cap, which meets the minimum standards set out below. These requirements presently do not apply in areas that are covered by a structure. However, if redevelopment results in removal of a structure, then a landfill cap meeting these minimum standards must be installed unless another structure covers the same footprint.

The minimum standards for the cap are as follows:

- A minimum thickness of 12 inches of fill material will be placed over the solid waste, CKD or impacted soil. This fill material does not need to meet a low-permeability standard. Existing fill that meets this depth requirement will be considered acceptable. Imported fill must not introduce new contaminants and must be naturally occurring soil or rock (i.e., virgin material) from an established quarry. This material will not require testing prior to use at the Landfill; however, the quarry must provide testing results for the fill material that are current (i.e., within 2 years). If an alternative to these fill specifications is requested by a Subject PLP, a variance request and justification must be submitted to Ecology for approval.

- Additional fill or fill of specific geotechnical specification must be placed in order to meet the structural section requirements of road and foundation base as required by the geotechnical engineer responsible for the pavement design.

- A 3-inch minimum thickness for asphaltic concrete or a 4-inch minimum thickness for cement concrete will cover the fill.

- Pavement sections that fail to meet the primary and secondary goals of a landfill cap must be replaced. For example, a pavement section that fails and develops large cracks, potholes, or settlement issues due to insufficient or incorrect pavement design (as opposed to routine maintenance needed due to age), must be replaced with an appropriate pavement section.

- Areas, such as landscaped buffers and slopes, perimeter landscaping including trees, planter islands, or gravel road shoulders, that will not be paved or receive hardscape (i.e., concrete), will

require a soil layer with a minimum thickness of 24 inches and a distinct visible barrier between the new improvements and the top of the solid waste. The soil used as fill must not introduce new contaminants or contain contaminant concentrations exceeding MTCA industrial CULs.

- Stormwater conveyance and treatment facilities located above solid waste such as swales, ditches, or ponds on the KIP Area are required to have cover, as prescribed by WAC 173-304-460, consisting of a low-permeability layer with a minimum 24-inch thickness of soil and permeability of $10^{-6}$ centimeters per second or less, or an impermeable geomembrane that is at least 50 millimeters thick.

- There are also requirements for construction practices that will provide protection for the workers and ensure that construction at the KIP Area is conducted in a manner that will minimize potential exposure or release of contaminants to the environment. These practices are described in Section 9.4 of the RI/FS (Floyd|Snider et al. 2021).

An investigation will be conducted to collect data to support the design of a landfill cap and preparation of an Engineering Design Report. The draft pre-design investigation work plan is a deliverable detailed in the Schedule.

#### *6.2.1.2 Relationship with Requirements in Minimum Functional Standards*

Although the minimum standards for the cap discussed above are protective of human health and the environment and meet the MTCA requirements, they are a variance to the specific cap design listed in the MFS.

A more detailed rationale for the variance, or waiver, of provisions in the MFS for the landfill cap was approved by Ecology in October 2012 and is available in Appendix B of the Interim Action Work Plan for the SPPD parcel (Farallon 2013).

#### *6.2.1.3 Allowance for Reinterment during Cleanup*

Regrading, including excavation and reinternment of the solid waste, is allowed during the implementation of the cleanup action, as long as the final configuration does not expand the footprint of the Landfill and all solid waste and contaminated soil remains contained beneath the landfill cap.

### 6.2.2 Landfill Gas Controls

The purpose of the LFG monitoring and contingent action is to: 1) prevent the migration of methane away from the KIP Area and onto adjacent properties to the west (i.e., Occidental Avenue South) or south (i.e., W.G. Clark parcel) at concentrations that exceed 5 percent by volume, the lower LEL for methane as outlined in WAC 173-304-460 and County Board of Health Title 10 regulations; and 2) prevent the accumulation of methane in the on-site and off-site buildings within the Landfill Property Boundary beyond critical thresholds identified in the LFGMCP.

Prior conversations with Ecology and the PLPs have established suggested action levels such that continuous methane monitors in facility buildings and structures within the Landfill Property Boundary will be set to 0.5 percent by volume (5,000 ppmv) or 10 percent of the LEL. Action levels of 10 percent

of the LEL and 25 percent of the LEL have been established to trigger specific actions. As defined in WAC 173-350-100, methane concentrations inside the buildings much not exceed 1.25 percent by volume, or 25 percent of the LEL.

Subsurface LFG within the eastern portion of the KIP Area that overlies the landfill is present in modest concentrations (less than 20 percent methane) and has no measurable pressure; compliance LFG probes along South Kenyon Street are currently in compliance with the criteria in Section 6.2.2 above and will continue to be monitored as part of the site-wide LFG monitoring program pursuant to the LFGMCP (Appendix B). Methane concentrations in the two existing probes (GP-24 and GP-25) installed in the historical KIP swale adjacent to the landfill exceed the level allowed at the property boundary, but these probes are located away from the property boundary (Figure 3.2). Monitoring completed at the W.G. Clark parcel during the RI did not detect methane (Herrera Environmental Consultants 2016).

#### *6.2.2.1 Compliance Probes Installation and Monitoring*

Two new compliance LFG probes (GP-KIP1 and GP-KIP2) will be installed along the KIP Area property boundary: one along the western boundary and one along the southern boundary (Figure 4.3). The purpose of these probes is to monitor methane concentrations at the property boundary consistent with Washington Administrative Code (WAC) 173-304-460. The probes will be constructed similar to the existing LFG probes at KIP. Probe GP-KIP1 will be installed near the middle of the western property boundary. Probe GP-KIP2 will be installed near the middle of the southern property boundary between temporary gas probe TGP-20, where elevated methane concentrations were detected during the October 2015 landfill gas investigation of the former swale, and Building 1 located on the adjacent W.G. Clark parcel. As described in Section 3.3.3, Building 2 at the W.G. Clark parcel, which is closer to GP-43, was constructed with a methane mitigation system.

Routine monitoring of the two new LFG probes (GP-KIP1 and GP-KIP2) will be conducted in accordance with the LFGMCP for the KIP Area (Appendix B). The probes will be monitored on a quarterly basis which will be conducted during a period of decreasing barometric pressure. If methane is detected above 5 percent by volume during a quarterly monitoring event, the equipment would be re-calibrated and the concentration re-measured to confirm the results. If the methane concentration is confirmed to exceed 5 percent by volume, then the exceeding LFG probe would be monitored daily for five (5) days or until the concentration of methane is less than 5 percent by volume, then once per month until the next quarterly monitoring event. A request to modify or remove the daily monitoring requirement can be requested to Ecology in the future after additional data is acquired. The additional daily monitoring will be used to determine if the condition is persistent or ephemeral, and to understand if the barometric pressure dynamics affect LFG concentrations at the location. The additional monthly monitoring will be used to understand if the condition is regularly occurring throughout the quarter. Corrective actions and contingent triggering criteria are further discussed in the section on Contingent Actions.

#### *6.2.2.2 Additional Building Protection*

Although methane was not detected in the four buildings at the KIP Area during past monitoring, in 2017 each KIP building was equipped with a continuous methane monitor with an alarm because of the buildings' proximity to the Landfill. The installation of these detectors is consistent with the

requirements for other buildings located at the Landfill and is a requirement of the KIP CAP. Routine operation and maintenance of the continuous methane monitors will be conducted in accordance with the LFGMCP for the KIP Area (Appendix B). Additional details regarding continuous methane monitoring maintenance protocols, location and number of monitors, alarm levels, and contingency actions will be provided to Ecology in a separate deliverable.

#### *6.2.2.3 Contingent Actions*

The methane monitoring results for the LFG probes and continuous methane monitors in the building would then be used to determine if a contingent remedial action is needed, as discussed below.

##### LFG Probes at Property Boundary

If a trigger for action is found, then a contingent action will be required for the property boundary impacted.

- *Trigger for Action:* The trigger for action will be based on methane readings in the perimeter LFG probes GP-KIP1 and GP-KIP2. The following would be considered a triggering condition: one (1) probe with confirmed methane concentrations greater than 5 percent by volume during four or more of the quarterly or monthly events within a twelve (12) month period.
- *Conceptual Design:* The contingent action consists of either a linear series of small-diameter LFG wells or a shallow trench with perforated collection pipes to intercept and ventilate LFG. The interceptor wells or trench would be installed along the southern and/or western property boundary based on monitoring results and the location of potential offsite receptors. The interceptor wells or trench would be connected to one or more manifolds that are routed to atmospheric vents designed to safely release the LFG outside of the breathing zone. It is anticipated that passive ventilation (without a blower system) will be adequate to control the LFG, and that the wells/trench would be constructed at a location selected in cooperation with Ecology with the intent to provide building protection and/or prevent offsite migration.
- *Design Phase:* Once the trigger has been met, remedial design will begin and may be supported by a supplemental investigation to confirm the extent of the landfill gas control system needed.
- *Engineering Design Report and Ecology Approvals:* An Engineering Design Report with attached plans, specifications, and a detailed implementation schedule appropriate for permitting and construction will be submitted to Ecology for approval.
- *Emergency Procedures:*
    - Off-site building monitoring for the buildings at the W.G. Clark parcel following a triggering condition (Probe GP-KIP2 with a confirmed methane concentration greater than 5 percent) will be completed as described in the LGMCP for the KIP Area (Appendix B).
    - If the passive system is unable to bring the LFG concentration into compliance in KIP LFG probe GP-KIP1 or GP-KIP2 as defined by the Trigger for Action above, methane monitoring will be conducted in adjacent off-site buildings to assess compliance and determine if emergency procedures to protect building occupants is warranted.

- Ecology will review the offsite monitoring data in consideration of the nearby LFG probe data and may determine that adequate protectiveness for offsite migration is provided by the mitigation system, demonstrated through limited offsite building monitoring, so that further offsite monitoring may not be required if the contingent action has been implemented.

#### Continuous Methane Monitors Inside Buildings (Additional information provided in LGMCP)

Ecology and the KIP Area property owner have established that continuous methane monitors in the KIP buildings will be set with a warning level alarm at 5,000 ppmv (10 % LEL). The following would be considered a triggering condition: A methane level inside one of the buildings activating the warning level alarm followed by confirmation of the elevated reading (5,000 ppmv or higher) with a handheld unit.

Measures to reduce methane concentration inside a KIP Area building in the event of a confirmed warning level alarm of 5,000 ppmv or higher would include evacuation, improving ventilation within the building, source identification to determine the entry point of the methane, and sealing the entry point if it can be identified. The KIP Area property owner will develop building-specific plans to mitigate and assess elevated levels of methane prior to re-occupying the building.

Additional details regarding continuous methane monitoring property-specific contingency actions will be provided to Ecology in a separate deliverable.

### 6.2.3 Stormwater Controls

The stormwater controls at KIP are designed to capture the bulk of the stormwater before it can contact solid waste or contaminated media. Because the wastes extend into the water table, stormwater controls are not intended to limit infiltration; rather, stormwater controls for the KIP Area are intended to prevent solid waste constituents from contaminating stormwater runoff. The stormwater controls are also intended to minimize the potential for disturbances, erosion, scouring, or otherwise disturbing the landfill cap.

The KIP Area is almost completely covered by impervious surfaces (i.e., buildings, asphalt, and concrete). Stormwater runoff within the parcel is collected in catch basins and conveyed to the 30-inch-diameter KIP main stormwater line that runs north through the property. The KIP main stormwater line connects to the City's MS4 storm drain system in 2nd Avenue South. This system ties into the storm drain system on SR 509 that flows into the wetlands on the west side of SR 509. As part of the cleanup action, this existing stormwater system at KIP will be maintained.

As stated in Section 3.3.2, the historical swale on KIP was filled with CKD (Figure 3.2). The main stormwater line is located within the former swale that was filled with CKD. The KIP Area property owner will be responsible for surveying the pipe system to assess line conditions (holes, cracks, openings, or similar potential breaches in the pipeline under KIP) and whether there is any sign of groundwater infiltration into the pipe, as groundwater in this area could be contaminated with caustic

pH water, petroleum hydrocarbons, benzene, arsenic, and other site contaminants. The pipeline inspection shall be carried out using a camera/video survey with location-tracking.

The KIP Area property owner is the lead for the stormwater pipeline screening inspection within the KIP property boundary.

Should a breach of the pipe be detected, the other PLPs shall be notified and the KIP Area property owner shall report this to the City of Seattle in connection with their MS4 permit. The KIP Area property owner shall follow the City of Seattle's and Ecology's applicable requirements to bring the conditions in the pipe into compliance.

### 6.2.4 Downgradient Groundwater Controls

The Groundwater Monitoring and Contingency Plan (Appendix C) includes long-term groundwater monitoring of CPOC wells including MW-10 and MW-25 (Figure 6.1), which are located downgradient of KIP. Contingent actions may be required if triggers are met due to concentrations rising at these two monitoring wells. The details of the downgradient groundwater controls are described in Appendix C. No additional groundwater cleanup actions or contingent actions are required for the KIP Area pursuant to this KIP CAP.

### 6.2.5 Operations, Maintenance, and Monitoring

To ensure that the selected components of the cleanup action are implemented efficiently and are operating properly, long-term monitoring and maintenance of the various components must be implemented. Requirements that apply to the KIP Area include those applicable to the cap and the stormwater system contained in Landfill Cap Inspection and Maintenance Plan (Appendix A) and perimeter groundwater monitoring per the Groundwater Monitoring and Contingency Plan (Appendix C). Requirements related to LFG at KIP are described in the LFGMCP which is included in Appendix B. If a LFG collection system is required at KIP, as identified in the contingencies of the KIP LFGMCP, then an addendum to the LFGMCP for the KIP Area will be developed for the KIP LFG system. Once approved by Ecology, the addendum to the LFGMCP will be considered part of this KIP CAP. This will not be considered a substantial modification of the CAP and will not require a public notice and comment period.

The landfill cap, consisting of pavement, buildings, and geomembrane/soil layers, as described in Section 6.2.1, must be maintained in such a manner as to prevent contact with solid waste/soil beneath the cap, prevent "short-circuiting" of the LFG controls, and support the stormwater controls that avoid solid waste contamination of the runoff. The landfill cap is not required to entirely block infiltration of stormwater. The cap must be inspected annually, and these records must be maintained for Ecology inspection. Landfill cap maintenance must be reported in accordance with the Landfill Cap Inspection and Maintenance Plan (Appendix A).

### 6.2.6 Site Coordinator Responsibilities

A common Landfill Site Coordinator will be designated to perform the long-term monitoring and reporting. The Landfill Site Coordinator will also be responsible for completing long-term monitoring and

reporting required for the KIP Area. This includes groundwater and landfill gas monitoring, annual reporting, and coordination and submittal of data required for 5-year site reviews. In addition to the monitoring required as part of Groundwater Monitoring and Contingency Plan, the Site Coordinator will conduct the following work for the KIP Area:

- Ongoing monitoring of LFG in perimeter probes GP-KIP1 and GP-KIP2 following procedures specified in the LFGMCP and monitoring of off-site buildings if triggered by the results of the perimeter probe monitoring.
- Annual inspections of the integrity of the KIP Area cap as specified in the Landfill CIMP.
- Annual inspections of surface water drainage effectiveness on the KIP Area.
- Reporting of annual inspection and LFG monitoring results for KIP Area in annual reports.
- Annual reporting of building alarm system and maintenance supplied by the KIP Area property owner.
- Annual reporting of gas system performance data as supplied by the KIP Area property owner in the event that a KIP-specific LFG system is required.
- Creation and submittal of an annual report to Ecology of data/information related to the bullets above.
- Coordination and submittal of data required for Ecology 5-year site reviews, if requested. Informing Ecology of major CAP activities and incidents, acting as a central point of contact for field questions from Ecology, and routing them to the appropriate person, as needed.

If an arrangement other than a common Landfill Site Coordinator is desired, the new arrangement shall requested to be reviewed and approved by Ecology.

### 6.2.7 Environmental (Restrictive) Covenants

WAC 173-340-440 establishes that when the final remedy does not remove all contaminants from the property, appropriate institutional controls shall be established in an environmental (restrictive) covenant on the property. The restrictive covenants shall run with the land and be binding on each owner's successors and assigns.

The Environmental (Restrictive) Covenants for the KIP Area (Figure 6.2) will be prepared according to Ecology policy on Ecology's current template. As required by WAC 173-340-440(9), "the restrictive covenants shall:

a. Prohibit activities on the site that may interfere with the cleanup action, operation and maintenance, monitoring, or other measures necessary to assure the integrity of the cleanup action and continued protection of human health and the environment.

b. Prohibit activities that may result in the release of a hazardous substance that was contained as a part of the cleanup action.

c. Require notice to the department of the owner's intent to convey any interest in the site.

d. No conveyance of title, easement, lease, or other interest in the property shall be consummated by the property owner without adequate and complete provision for the continued operation, maintenance and monitoring of the cleanup action, and for continued compliance with this subsection.

e. Require the landowner to restrict leases to uses and activities consistent with the restrictive covenant and notify all lessees of the restrictions on the use of the property.

f. Require the owner to include in any instrument conveying any interest in any portion of the property, notice of the restrictive covenant under this section.

g. Require notice and approval by the department of any proposal to use the site in a manner that is inconsistent with the restrictive covenant.

h. Grant the department and other property owners the right to enter the property at reasonable times for the purpose of evaluating compliance with the cleanup action plan and other required plans, including the right to take samples, inspect any remedial actions taken at the site, and to inspect records."

## 6.3 Compliance with Model Toxics Control Act Requirements

MTCA cleanup standards for the KIP Area portion of the Site are described in Section 4.0. This section describes how the cleanup action meets cleanup standards.

### 6.3.1 Requirements for Cleanup Actions (WAC 173-340-360(3))

The threshold criteria identified in WAC 173-340-360(3)(a) that must be met by the selected remedy and the reasons why the preferred alternative meets them, are as follows:

***§(a)(i) Protect human health and the environment***

**Cap.** The cap described in Section 6.2.1 will prevent direct contact with solid waste by humans, plants, and animals. It will also ensure that stormwater that leaves the KIP Area through the stormwater conveyance systems has not come into contact with solid waste. By limiting infiltration of stormwater, the cap will also decrease the amount of leachate produced. As discussed in Section 6.2.3, because the wastes are already in contact with groundwater, this decrease in infiltrating stormwater is viewed as a minor benefit that may or may not produce measurable changes in groundwater quality.

**Landfill gas controls.** The LFG monitoring and contingent actions described in Section 6.2.2 meets system requirements for preventing worker and visitor exposure to methane concentrations that pose a risk to human health. The concentrations in buildings adjacent to the landfill are already at acceptable levels; therefore, contingent action will be limited to the KIP Area. Limited off-site emergency actions may be completed in buildings at the W.G. Clark parcel in accordance with Landfill Gas Monitoring and Contingency Plan (Appendix B).

**Stormwater controls.** The stormwater controls described in Section 6.2.3 meet the MTCA requirements by effectively separating the stormwater from the landfill solid waste, CKD, and contaminated soil. The

captured stormwater will be conveyed and discharged off-site in accordance with the stormwater regulations and ordinances.

**Groundwater monitoring.** Long-term groundwater monitoring, with contingent actions, is included in the 2023 Amended CAP. This is an appropriate remedial action for groundwater because groundwater sampling data for the compliance monitoring well network indicate that vinyl chloride, iron, and manganese are the only COCs detected at concentrations greater than CULs for groundwater, are very close to being in compliance, and are continuing to decrease toward compliant concentrations less than CULs. The most recent concentrations of vinyl chloride data collected from CPOC wells (MW-10 and MW-25) range from not detected at <0.02 to 0.99 µg/L. Ecology has established a CUL for vinyl chloride in groundwater of 0.29 µg/L. This value is protective of surface water quality. There are no current or anticipated drinking water wells between the KIP Area and the Lower Duwamish Waterway, located approximately 1,600 feet downgradient.

**Operations, maintenance, and monitoring.** These requirements combined with the Environmental (Restrictive) Covenants will ensure that the cleanup action is maintained over time, is protective of human health and the environment, and meets the expectations in WAC 173-340-7491 for protection of terrestrial receptors.

***§ (a)(ii) Comply with cleanup standards (WAC 173-340-700 through 173-340-760)***

The containment remedy is an effective MTCA remedy for soil that complies with cleanup standards and allows wastes to be left in place as long as the requirements for a containment remedy are met. Groundwater concentrations will comply with the MTCA Method B CULs at the CPOC located downgradient of the KIP Area. The groundwater concentrations of all the historical contaminants except for vinyl chloride, iron, and manganese are already in compliance at the CPOC. As described in Section 6.2.4, the downgradient groundwater will meet the cleanup standards within a reasonable restoration timeframe (10 years for vinyl chloride, iron, and manganese) and will be monitored routinely, as part of the 2023 Amended CAP, to ensure that the groundwater is achieving the desired conditions within a reasonable restoration time. The LFG monitoring and contingent actions comply with the standards developed to prevent LFG levels greater than the permissible percentages of methane.

***(a)(iii) Comply with applicable state and federal laws (WAC 173-340-710)***

The cap specifications meet the alternative cap requirements for the landfill cap and cover allowed by WAC 173-340-710. The cap, in conjunction with the recommended stormwater infrastructure, ensures compliance with these requirements. The LFG control requirements apply to the specific landfill regulations as outlined in Section 11.0 of the RI/FS (Floyd|Snider et al. 2021). The other components of the remedy are consistent with the applicable regulations.

***(a)(iv) Prevent or minimize present and future releases and migration of hazardous substances in the environment***

Ongoing monitoring and maintenance of the landfill cap will minimize the release and migration of hazardous substances by minimizing exposure. Compliance monitoring of LFG and groundwater will help

detect migration, ensuring that the preferred remedy remains protective of human health and the environment.

***(a)(v) Provide resilience to climate change impacts that have a high likelihood of occurring and severely compromising its long-term effectiveness***

A landfill cap meeting the minimum requirements will provide a permanent and resilient remedy.

***(a)(vi) Provide for compliance monitoring (WAC 173-340-410 and WAC 173-340-720 through 173-340-750)***

***Compliance monitoring will be conducted for both LFG and groundwater, as described in Sections 6.2.2 and 6.2.4 of this KIP CAP and appendices.(a)(vii) Not rely primarily on institutional controls and monitoring at the site, or portion thereof, if it is technically possible to implement a more permanent cleanup action***

Based on the large volume of refuse associated with the South Park Landfill and CKD-filled swale, the existing development that has occurred on areas where waste is in place, and the likely effectiveness of the presumptive remedy of a landfill, it was concluded that a more permanent cleanup action on KIP is not practicable. A landfill cap meeting the minimum standards, institutional controls and monitoring were identified as being protective of human health and the environment, while providing the most practical remedy.

***(a)(viii) Not rely primarily on dilution and dispersion unless the incremental costs of any active remedial measures over the costs of dilution and dispersion grossly exceed the incremental degree of benefits of active remedial measures over the benefits of dilution and dispersion***

Based on the large volume of refuse associated with the South Park Landfill and CKD-filled swale, the existing development that has occurred on areas where waste is in place, and the likely effectiveness of the presumptive remedy of a landfill, it was concluded that a more permanent cleanup action on KIP is not practicable. A landfill cap meeting the minimum standards, institutional controls and monitoring were identified as being protective of human health and the environment, while providing the most practical remedy.

***(a)(ix) Provide for a reasonable restoration time frame***

Cleanup actions combined with maintenance requirements in this KIP CAP will ensure protection of human health and the environment. A schedule for implementation of the remedial action is presented in Section 7.0. Groundwater contaminant concentrations are expected to come into compliance within 10 years as residual vinyl chloride degrades and iron and manganese attenuate; there are no current or anticipated uses of or exposures to the groundwater.

***(a)(x) Use permanent solutions to the maximum extent practicable***

The preferred remedy is permanent to the maximum extent practicable for a site containing large volumes hazardous substances at low concentrations. The CAP requirements, along with Environmental (Restrictive) Covenants, ensure that the containment remedy will remain protective over time.

***(d)(i) Public concerns, including the concerns of likely vulnerable populations and overburdened communities, identified under WAC 173-340-600 (13) and (14)***

Ecology will provide this KIP CAP, agreed orders and associated amendments for public review and respond to comments raised by the public. Ecology will finalize these documents after consideration of public input.

***(d)(ii) Indian tribes' rights and interests identified under WAC 173-340-620***

Ecology will provide this KIP CAP, agreed orders and associated amendments for Tribal review and respond to comments raised by the Tribes. Ecology will finalize these documents after consideration of Tribal input.

### 6.3.2 Requirements for Containment Systems (WAC 173-340-740(6)(f))

WAC 173-340-740(6)(f) includes specific requirements of a containment cleanup action that allow soil and solid waste with concentrations greater than the soil CULs to remain in place. These requirements are met by the preferred alternative in the following ways:

***§ (f)(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***

An Environmental (Restrictive) Covenant will be established for the KIP Area to ensure that the requirements of the remedy, including maintenance of the landfill cap, LFG control systems, and groundwater monitoring, are met.

***(f)(v) Compliance monitoring (WAC 173-340-410) and periodic reviews (WAC 173-340-420) are designed to ensure long-term integrity of the containment system***

The cap, LFG, and groundwater maintenance and monitoring plans provide details for the CAP requirements to ensure that the cleanup action components are implemented efficiently and are functioning as intended. In addition, the cleanup actions for the KIP Area include a contingent LFG system that will be designed to ensure the long-term integrity of the system. This monitoring and maintenance information will be compiled and reported to Ecology in an Annual Monitoring Report. Periodic reviews of the remedial action will be done in accordance with WAC 173-340-420.

***(f)(vi) Types, levels, and amount of hazardous substances remaining on-site and the measures that will be used to prevent migration and contact with those substances are specified in the CAP***

The material remaining beneath the cap on the KIP Area is municipal solid waste, CKD, and soil containing hazardous substances. Groundwater monitoring data indicates compliance with CULs is expected within 10 years. Containment of hazardous substances will be accomplished through the installation and maintenance of a landfill cap, as described in Section 6.2.1.

# 7.0 Schedule of Work and Deliverables

The schedule for deliverables described for the Agreed Order for the Kenyon Industrial Park property is presented below. If the date for submission of any item or notification required by this Schedule of Work and Deliverables occurs on a weekend, state or federal holiday, the date for submission of that item or notification is extended to the next business day following the weekend or holiday. Nothing shall limit the Schnitzer Properties LLC s ability to submit documents prior to the completion times listed below.

Where a deliverable due date is triggered by Ecology notification, comments or approval, the starting date for the period shown is the date the Schnitzer Properties LLC received such notification, comments, or approval from Ecology, either by email or certified mail, return receipt requested, unless otherwise noted below. Where triggered by Ecology receipt of a deliverable, the starting date for the period shown is the date Ecology receives the deliverable by email or certified mail, return receipt requested, or the date of Ecology signature on a hand-delivered item.

**Table 7.1**
**Implementation Schedule**

| Item/Milestone | Due Dates |
|---|---|
| Engineer meeting on pre-design investigation | Within 30 days after the effective date of the agreed order |
| Submit pre-design investigation work plan | Within 15 days after the Engineer meeting |
| Implement pre-design investigation work plan | Within 15 days after Ecology approval of work plan |
| Submit report summarizing results of landfill cap pre-design investigation to Ecology | Within 90 days after pre-design investigation work plan is implemented |
| Draft Engineering Design Report for landfill cap | Within 180 days after the effective date of the agreed order |
| Final Engineering Design Report for landfill cap | Within 30 days of receipt of Ecology's comments on the Ecology Review Draft Engineering Design Report and issuance of final permits, whichever occurs later in time[1] |
| Assessment of main stormwater line within CKD impact area | Within 90 days after the effective date of the agreed order |
| Long-term monitoring of LFG (two new compliance probes and continuous methane detectors in on-site buildings) | Within 180 days after the effective date of the agreed order and will continue until no longer needed per LFG Monitoring and Contingency Plan (Appendix B). |

| | |
|---|---|
| Long-term monitoring of cap integrity | Within 180 days following the completion of landfill cap construction |
| Ecology-review Draft Environmental (Restrictive) Covenant for KIP Area | Within 60 days after the effective date of the agreed order |
| Final Environmental (Restrictive) Covenant for KIP Area | Filed with the County Recorder within 45 days after receiving Ecology comments on the Ecology Review Draft Environmental Covenant |
| Begin Construction of landfill cap | Within 1 year of Ecology approval of Final Engineering Design Report unless Ecology approves an alternate schedule |
| Draft As-Built Report for landfill cap | Within 120 days of completion of construction activities |
| Final As-Built Report for landfill cap | Within 30 days of approval of Draft As-Built Report |

1. Ecology will not approve the Final Engineering Design Report until the required permits have been obtained.

Notes:

CAP = Cleanup Action Plan
CKD = cement kiln dust
County = King County
KIP = Kenyon Industrial Park
LFG = landfill gas

# 8.0 References

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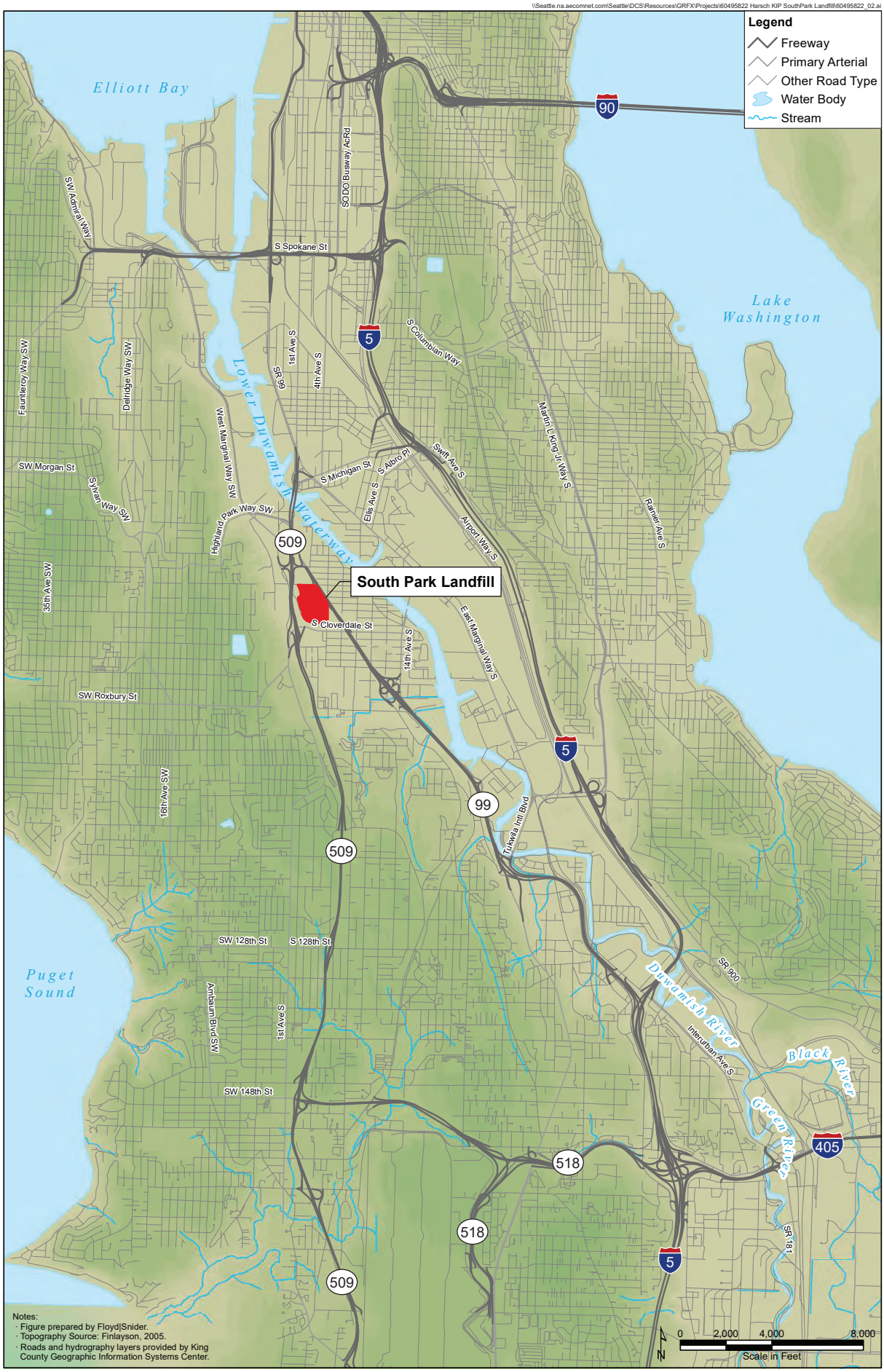


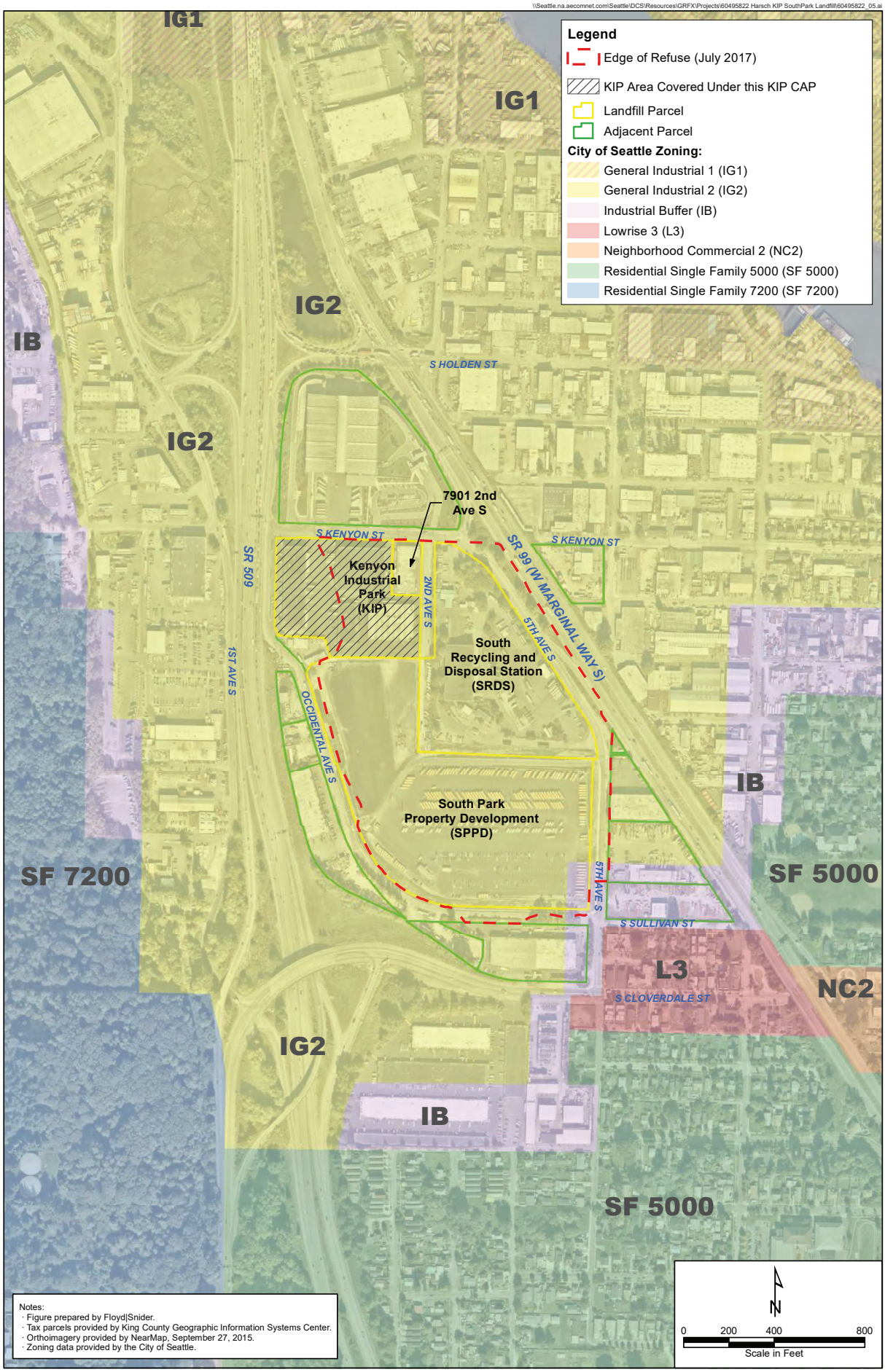

*Source: Ecology 2018*

Figure 1.1
**Vicinity Map**


*Source: Ecology 2023*

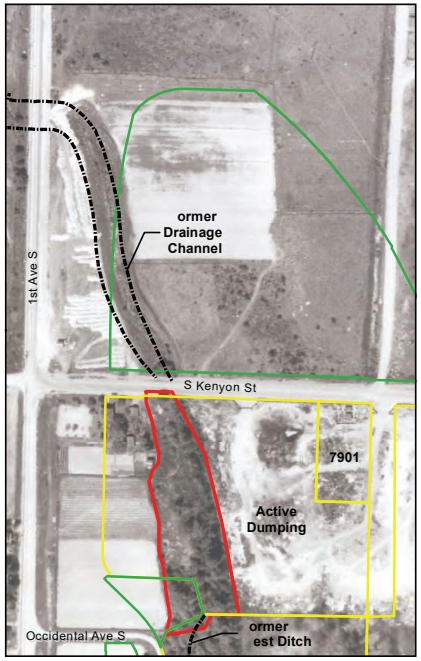
Figure 1.2

**South Park Landfill Parcel Map**

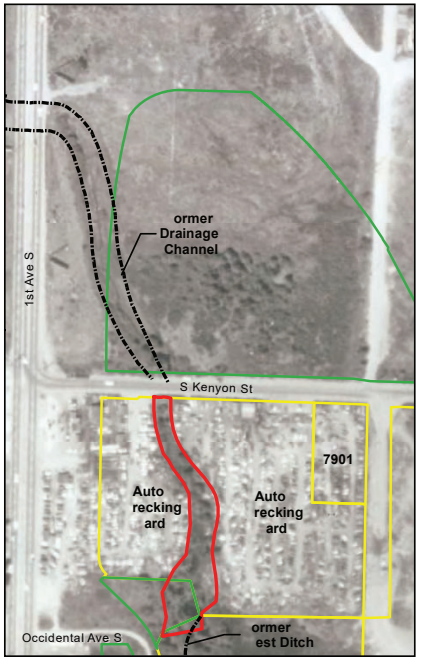



*Source: Ecology 2018*

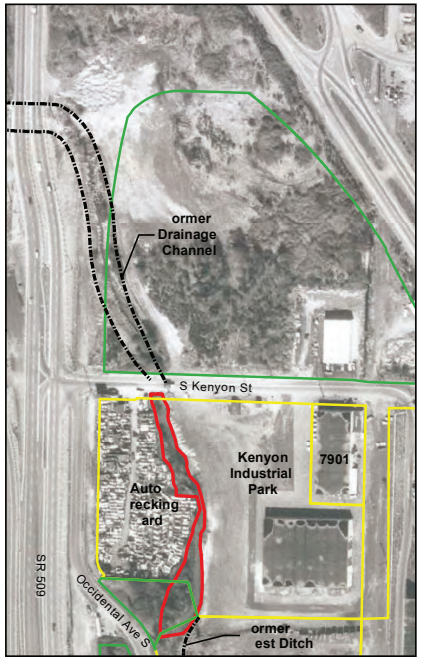
Figure 2.1
**Land Use and Zoning**



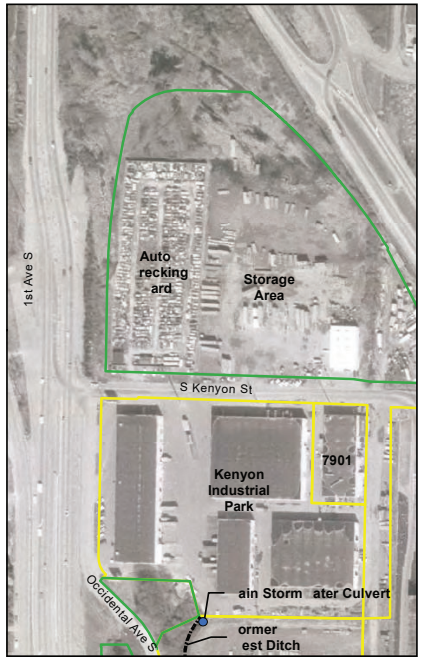

**1946**
Activities on the KIP 7901 parcels include active dumping, farming, commercial operating, and residential.




**1960**
Activities on the KIP 7901 parcels include auto wrecking.




**1969**
Activities on the KIP parcel include auto wrecking and the development of a building on the present day KIP parcel and another on the 7901 parcel.




**1974**
Activities on the KIP parcel include filling of the swale, development of the three remaining buildings, paving, and building of a stormwater collection system.

**Legend**

Landfill Parcel | Adjacent Parcel | KIP Swale Boundary

N

0 150 300 600

Scale in Feet

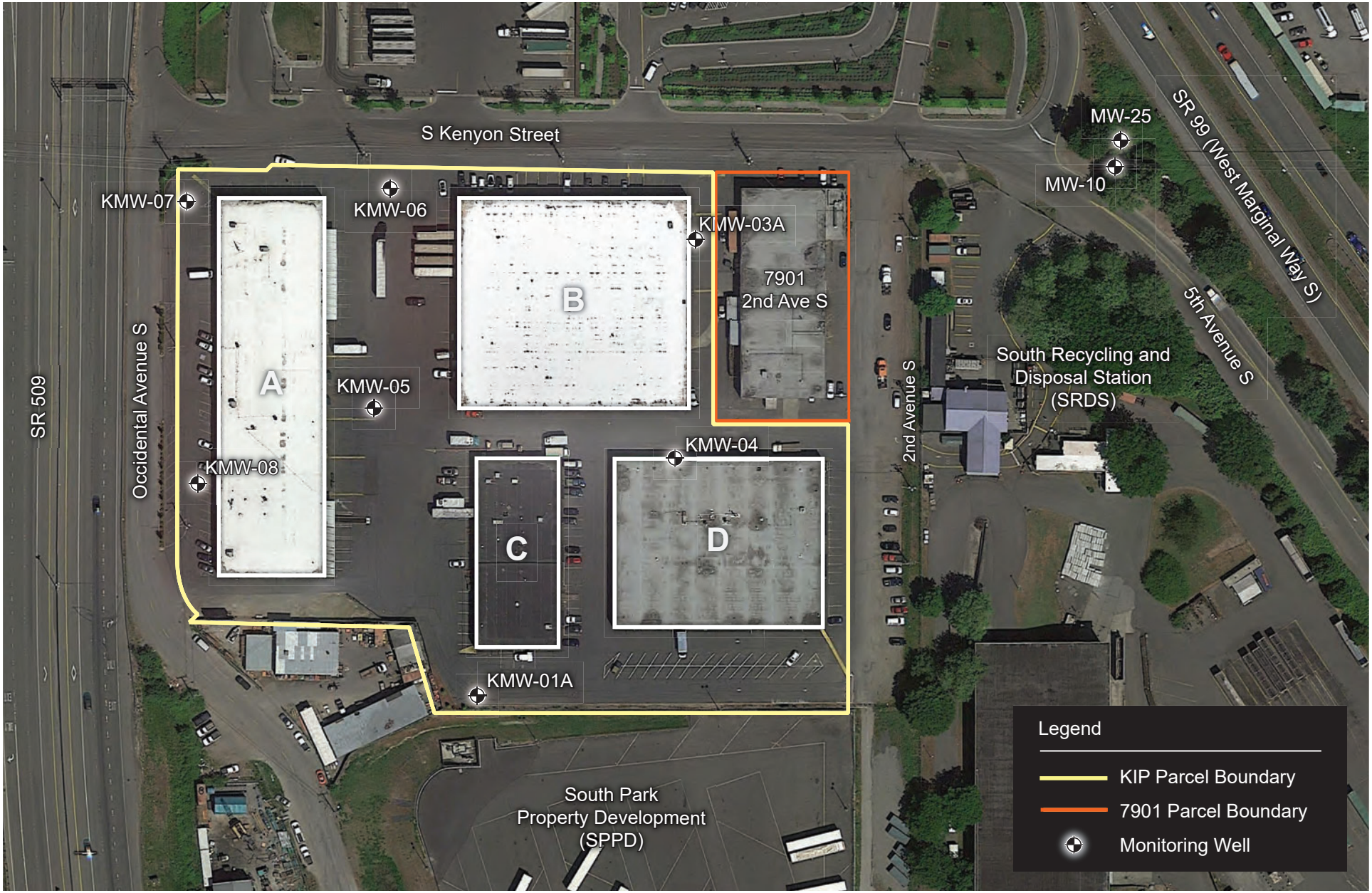
Notes:
· Tax parcels provided by King County Geographic Information Systems Center.
· Aerial imagery provided by Seattle Public Utilities.

Abbreviation:
7901 7901 2nd Ave S, LLC
KIP Kenyon Industrial Park

*Source: Floyd|Snider et al. 2017*

Figure 2.2
**Time Lapse Aerial Photographs of Kenyon Industrial Park**

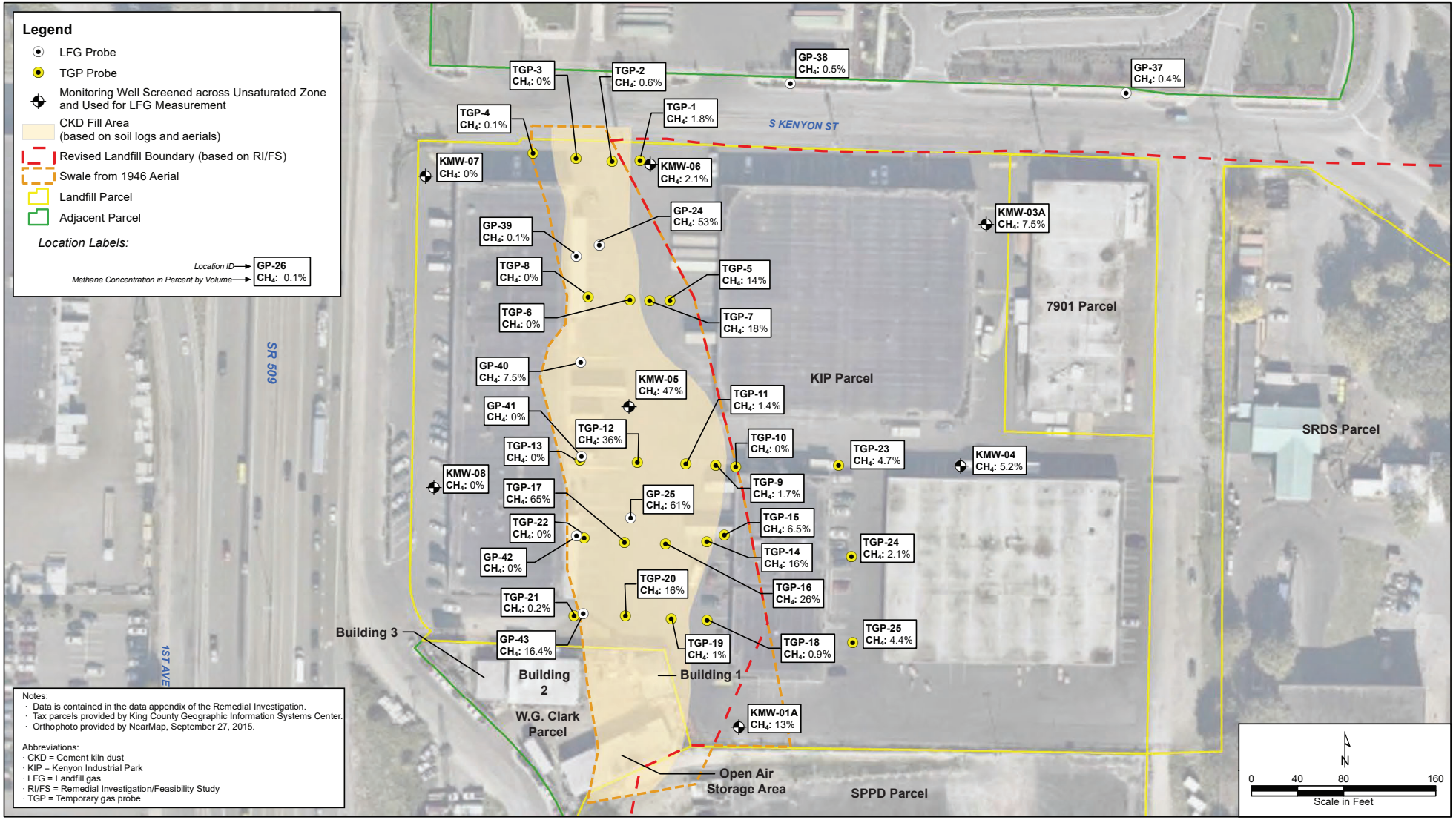
\\Seattle.na.aecomnet.com\Seattle\DCS\Resources\GRFX\Projects\60495822 Harsch KIP SouthPark Landfill\60495822_06.ai




*Source: Google Earth*

Figure 3.1

## Kenyon Industrial Park Site Plan




*Source: Floyd|Snider et al. 2017*

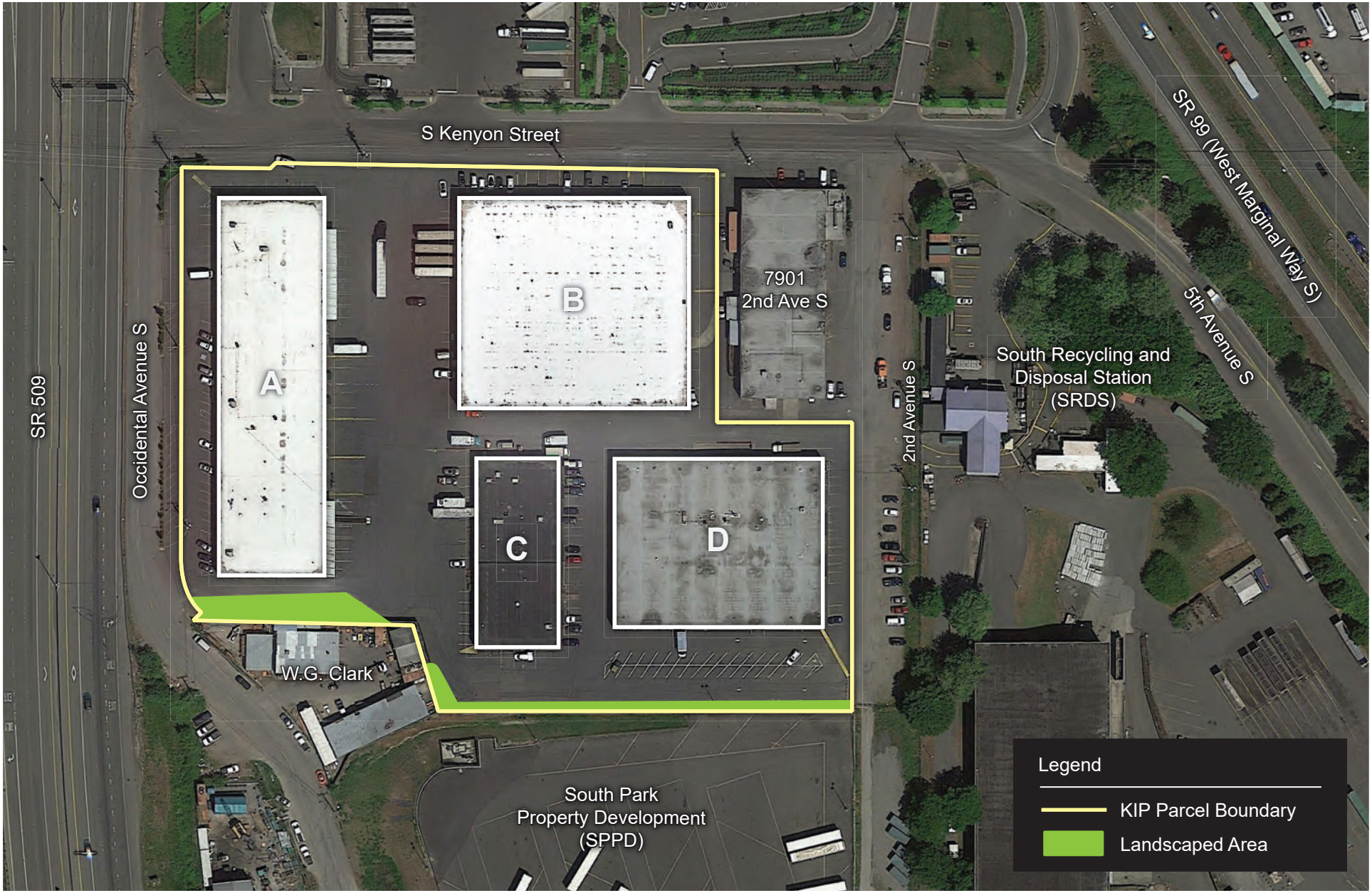
Figure 3.2

**LFG Investigation and Extent of Cement Kiln Dust in Historical KIP Swale**

DEPARTMENT OF ECOLOGY
State of Washington

Cleanup Action Plan
Kenyon Industrial Park
Seattle, Washington

\\Seattle.na.aecomnet.com\Seattle\DCS\Resources\GRFX\Projects\60495822 Harsch KIP SouthPark Landfill\60495822_08.ai

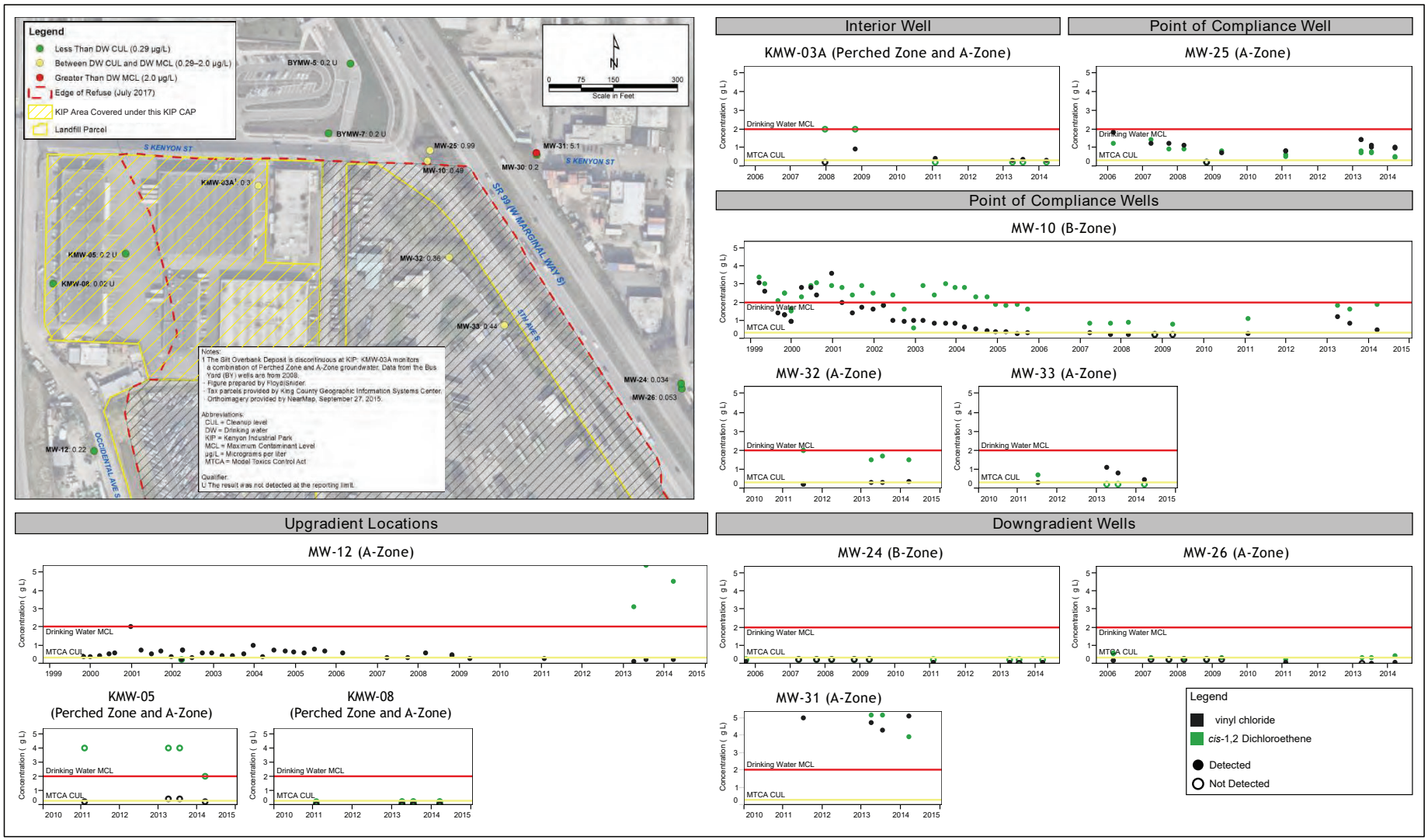



*Source: Google Earth*

Figure 4.1
**Landscaped Areas**

DEPARTMENT OF ECOLOGY
State of Washington

Cleanup Action Plan
Kenyon Industrial Park
Seattle, Washington




*Source: Ecology 2018*

Figure 4.2

**Vinyl Chloride in Groundwater March 2014**

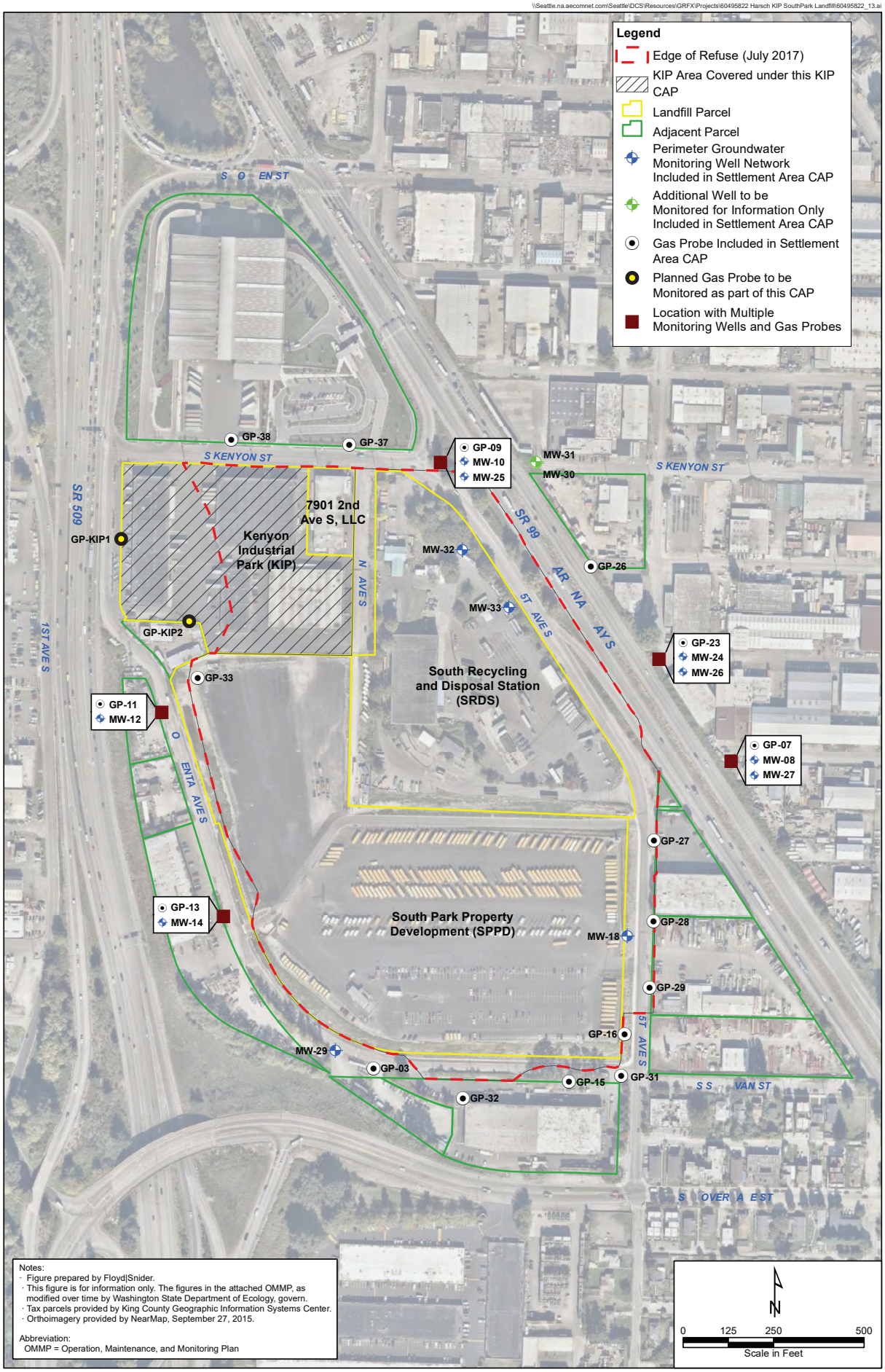
DEPARTMENT OF ECOLOGY
State of Washington

Cleanup Action Plan
Kenyon Industrial Park
Seattle, Washington


*Source: Ecology 2018*

Figure 4.3

**Perimeter Landfill Gas Probes**




*Source: Ecology 2018*

Figure 6.1

**Location of Long-Term Monitoring Wells and LFG Probes**

\\Seattle.na.aecomnet.com\Seattle\DCS\Resources\GRFX\Projects\60495822 Harsch KIP SouthPark Landfill\60495822_14.ai


*Source: Ecology 2018*

Figure 6.2

## Environmental Covenant

DEPARTMENT OF ECOLOGY
State of Washington

Cleanup Action Plan
Kenyon Industrial Park
Seattle, Washington

**South Park Landfill**

# Appendix A
# Landfill Cap Inspection and Maintenance Plan

Table of Contents



List of Exhibits



List of Acronyms, Abbreviations and Terminology

| Acronym/ Abbreviation | Definition |
|---|---|

| | |
|---|---|
| CAP | Cleanup Action Plan |
| CIMP | Cap Inspection and Maintenance Plan |
| City | City of Seattle |
| CPSP | CenterPoint South Park, LLC |
| Ecology | Washington State Department of Ecology |
| Edge of Refuse | The approximate boundary of the area where wastes were placed as part of South Park Landfill operations. |
| Harsch | Harsch Investment Properties, LLC, current owner of the KIP Area parcel (currently known as Schnitzer Properties, LLC) |
| KIP | Kenyon Industrial Park |
| KIP Area | The parcel known as Kenyon Industrial Park (KIP) (tax parcel 3224049007). |
| Landfill Property Boundary | The boundary of the parcels located partially or entirely within the Edge of Refuse. This includes the parcels covered under the SPPD/City Area, the KIP Area, the 7901 2nd Ave S. parcel, and the 2nd Ave S right-of-way where it is located within the Edge of Refuse. The Landfill Property Boundary does not include rights-of-way located to the east and south of these parcels. |
| LFG | landfill gas |
| PPE | personal protective equipment |
| PLP | potentially liable person |
| ROW | right-of-way |

| | |
|---|---|
| Settlement Area | The parcels and rights-of-way covered under the 2019 Consent Decree. This includes the SPPD/City Area and adjacent rights-of-way within the Edge of Refuse. |
| SPPD | South Park Property Development, LLC |
| SPPD/City Area | The portion of the Site that includes the CenterPoint South Park LLC-owned parcel (3224049005) and the City of Seattle-owned parcels (7328400005 and 3224049110), and adjacent City of Seattle and Washington State rights-of-way located within the Edge of Refuse. Parcel 3224049005 was formerly owned by South Park Property Development, LLC. |
| SR | State Route |
| SRDS parcel | South Recycling and Disposal Station and associated City of Seattle-owned property[1] |

[1] Associated City of Seattle-owned property includes two additional strips of land that were incorporated into the original tax parcel in 2003 by City Ordinance 121306.

## 1.0 Introduction

This Landfill Cap Inspection and Maintenance Plan (CIMP) is an appendix to, and an integral and enforceable part of, the Kenyon Industrial Park (KIP) Cleanup Action Plan (CAP) for the KIP Area portion of the South Park Landfill Site. The KIP Area includes the parcel in the northwest portion of the South Park Landfill Site, currently owned by Schnitzer Properties, LLC (tax parcel 3224049007). The South Park Landfill Site is a former municipal solid waste landfill in the South Park neighborhood of Seattle, Washington (Figure 1.1 of the KIP CAP). It is located in the Lower Duwamish Valley near the western valley wall between State Route (SR) 509 and SR 99. Details regarding the KIP Area, environmental conditions, and specific components of the remedy are documented in the KIP CAP.

The monitoring and maintenance requirements for the landfill cap are provided in this Landfill CIMP. The Landfill CIMP implementation will begin 180 days after the end of cap construction on the KIP Area in accordance with the schedule in the KIP CAP.

The purpose of this Landfill CIMP is to confirm that the landfill cap remedy is performing in a manner that protects human health and the environment. The landfill cap consists of pavement, buildings, and geomembrane/soil layers and must be maintained in such a manner to prevent contact with the solid waste/soil beneath the cap, prevent “short-circuiting” of the landfill gas (LFG) controls, and prevent interference with the stormwater controls; the cap is not required to entirely block the infiltration of stormwater. The cap must be inspected annually, and it must be repaired if it is damaged or becomes worn.

Environmental (Restrictive) Covenants on the individual parcels allow continued access for the Washington State Department of Ecology (Ecology) and the Subject potentially liable persons (PLPs) under the agreed order to inspect the remedy, as well as restrictions on future changes which may disturb the landfill cap.

## 2.0 Landfill Parcels and Coordination

The landfill cap is a low permeability surface (i.e., asphalt and concrete) that is present at the KIP Area above areas containing solid waste. The landfill cap prevents direct contact with solid waste by humans, plants, and animals. The limits of the cap are consistent with the Landfill Property Boundary and the extent of solid waste at the landfill, as shown as the red dashed line on Figure 1.2 of the KIP CAP.

The KIP Area consists of an approximately 6.5-acre parcel (King County tax parcel no. 3224049007). The western portion of the KIP Area is beyond the Edge of Refuse of the South Park Landfill but within the Landfill Property Boundary. The KIP Area is developed with four buildings and paved areas covering the surfaces outside of the building footprints. Small landscaped areas are present near the perimeter of the KIP Area. Refer to the KIP CAP for detailed information about the KIP Area.

## 2.1 Coordination and Responsibilities

The agreed order provides that the Subject PLP remain strictly, jointly, and severally liable for the performance of any and all obligations under this Landfill CIMP. To accomplish the work to be performed under this CIMP in the most efficient manner, certain landfill PLPs may elect to take the lead in performing various aspects of the work required. Language in this CIMP reflects this arrangement.

The following sections define the roles required for compliance with this Landfill CIMP; one person may perform more than one role.

### 2.1.1 Parcel Owners

The Parcel Owner owns the parcel and is responsible for filing an Environmental (Restrictive) Covenant and maintaining compliance with the parcel's Environmental (Restrictive) Covenant, which includes inspection and maintenance of the landfill cap. An Environmental (Restrictive) Covenant will be filed and recorded in accordance with the schedule outlined in the KIP CAP. In regards to activities in this Landfill CIMP, the Parcel Owner is expected to perform the following:

Perform on-going inspection and maintenance of the pavement, soil caps, and geomembranes that cover the landfill surface consistent with this plan. The annual inspection and reporting may be performed by the Site Coordinator.

Submit information on repairs to Ecology as part of annual reporting. This may be completed per Section 4.3 to the Site Coordinator as part of their annual reporting to Ecology.

Grant access, as needed, for cap inspection by Ecology and/or the Site Coordinator.

### 2.1.2 Subject Potentially Liable Person

The Subject PLP is responsible for compliance with the KIP CAP including this Landfill CIMP, communications with Washington State Department of Ecology (Ecology) and reporting of on-parcel activities. The landfill PLPs are responsible for annual inspection and reporting to Ecology. This work may be achieved through the Site Coordinator. In addition, in the event that Ecology becomes aware that a landfill PLP is unable to maintain the cap on their parcel, Ecology shall provide written notice to the Subject PLPs that the Parcel Owner is unable to complete the work. Upon the receipt of such notice, the Subject PLPs will repair the parcel's cap to meet minimum standards consistent with Section 6.2.1 of the KIP CAP.

### 2.1.3 Site Coordinator

The Subject PLP is presumed to coordinate activities with other PLPs for the South Park Landfill Site to complete annual inspections and reporting. Additional clarification of their duties exists in the KIP CAP, and in later sections of this Landfill CIMP. If another arrangement is desired for cap inspection and maintenance, this can be requested in writing to Ecology.

## 3.0 Description of Landfill Cap Requirements

The cleanup action requires a landfill cap covering all areas in the KIP Area that contain solid waste. The primary goal of the landfill cap is to block access or exposure to the solid waste and soil; a secondary goal is to limit stormwater infiltration. Minimum standards for the landfill cap and requirements for continued monitoring and maintenance of the cap are discussed in Section 6.2.1 of the KIP CAP.

## 4.0 Landfill Cap Inspection and Maintenance Requirements

This Landfill CIMP establishes an inspection and maintenance program to identify damaged cap systems, provide for timely repair and replacement needed to restore damaged or intruded cap systems, specify measures to minimize the potential for disturbances of solid waste, and specify requirements for record-keeping of inspections, repairs and reporting.

### 4.1 Landfill Cap Inspections

A complete inspection of the KIP landfill cap must be conducted on an annual basis in late spring to allow for repairs in the dry season. Inspections will be conducted by the Subject PLP or Site Coordinator. Routine cap inspections for all parcels will consist of a visual survey of the entire cap surface exterior to buildings, including drainage features and surface components of stormwater conveyance (i.e., catch basins, swales). The integrity of the cap across the entire KIP Area must be documented via notes, sketches, and photographs. The main objective of the annual inspection is to document areas of the cap that are compromised and require maintenance. To facilitate the inspection, a cap inspection and maintenance field form must be completed during each routine annual inspection; a blank cap inspection and maintenance field form is included in Exhibit A.1.

If the following disturbances to the cap are identified, they must be noted on the cap inspection and maintenance field form and documented via sketches (for location) and photographs.

Cracking

Uneven settlement or potholes

Pooling or ponding of stormwater

Separation of pavement from curbs, gutters, or catch basins

Sloughing or crumbling of edge materials

Erosion

Any other signs of cap damage, failure, deterioration, or disturbance

If any of the above are identified during an inspection, a recommendation for repairs should be included on the field inspection and maintenance form.

## 4.2 Landfill Cap Maintenance

If the results of the annual inspection indicate that an area of the cap requires maintenance, the following procedures should be followed.

Notify Ecology of the repair needed and the intent to follow the procedure below within a timeframe specified in the notice, unless additional planning and approval are required by Ecology.

Repair the cap with similar materials and construction procedures; refer to the KIP CAP Section 6.2.1 for specifications.

Make all cuts into the cap with neat continuous lines (i.e., saw cut).

Make sure there is a complete and effective bond between the newly placed surface and the existing surface.

In the case of the asphaltic concrete cap, seams and seals must be properly constructed per standard paving practices and in such a way that no cracks or weak seams occur after repair that would be conduits for transmitting infiltrating stormwater or that would present an exposure pathway to the soil beneath.

In the case of the low-permeability membrane cap, seams and seals must be properly constructed per manufacturer directives and in such a way that cracks that could be conduits for transmitting infiltrating stormwater or that would present an exposure pathway to the soil beneath do not occur.

Use a seal coat to seal cracks.

The following scheduling guidelines should be followed if cap inspection indicates that cap maintenance is necessary.

If a crack, depression, or pothole is identified that exposes the underlying material, maintenance and repair activities should be scheduled as soon as practical (within 60 days).

Minor surface cracks or ponding (not temporary puddles that form during rainstorms) that reduces the pavements ability to transport rainfall/stormwater to catch basins, but does not expose underlying material, will require a follow-up inspection within 3 to 6 months. If the follow-up inspection indicates that differential settlement in these areas is worsening (i.e., deeper, larger footprint, or cracking), then maintenance or repair must be completed

within 6 months of the follow-up inspection. If there is no change to the area during the follow-up inspection, then monitoring of the area should continue at a frequency of every 6 months.

Repairs of minor cracks, potholes, or otherwise damaged or deteriorated cap surfaces that do not expose underlying material should be made within the calendar year before they can get worse or provide a direct conduit for infiltration.

All maintenance activities should be documented on a cap inspection and maintenance field form, with supporting sketches, figures, and/or photographs attached. An example form is provided in Exhibit A.1.

### 4.4 Stormwater Infrastructure Maintenance

A visual inspection of all surface components of stormwater conveyance and management facilities that are within the cap boundaries shall be performed during each annual cap inspection to document any disturbance, erosion, or penetration concerns. Field observations must be documented on the cap inspection and maintenance field form, along with documentation of any necessary maintenance or repairs.

### 4.5 Fencing

Several of the parcels contain security fencing isolating some or all of the parcel from public access. Security fencing that does not penetrate the cap may be repaired as needed. Fencing that does penetrate the cap and contacts refuse will need Ecology notification and approval for repairs.

### 4.6 Unforeseen Events

An unforeseen emergency or extreme weather event, such as earthquakes, fires, or floods, or other natural or man-made disaster would trigger an out of sequence cap inspection to ensure that the cap integrity is maintained. Such unforeseen events could cause a sudden differential settlement of the cap that could affect the integrity of the cap, which may result in exposure to the underlying material or methane gas. The following criteria for unforeseen events would trigger an inspection of the landfill cap.

An earthquake along the Seattle fault that registers 4.0 or greater on the Richter scale.

An earthquake within 100 miles of Seattle that registers 5.0 or greater on the Richter scale.

A flood or major storm that produces greater than 3.0 inches of rainfall within a 24-hour period.

Any fire that occurs on or below the cap.

Any other damage in the area of the Landfill observed by the Parcel Owners and facility workers or the public, such as damage sustained by high winds, facility or vehicular accidents.

If any of the above unforeseen events occur, then the Subject PLP or Site Coordinator should schedule a cap inspection with the appropriate personnel as soon as safe and practical (generally within 48 hours). Inspection and maintenance activities must be documented on a cap inspection and maintenance field form, with any supporting sketches, figures, and photographs attached. If the integrity of the cap is significantly compromised as a result of an unforeseen event, Ecology must be notified within 1 business day of the discovery of the event and repairs initiated as soon as practicable.

## 5.0 Health and Safety

Maintenance personnel and contractors must follow general health and safety procedures while performing cap inspection and maintenance activities at the KIP Area. Each building within the KIP Area will have vehicular traffic and other potential hazards associated with active operation. Maintenance personnel and contractors must be aware of these hazards and take appropriate precautions while performing the work outlined in this Landfill CIMP. At a minimum, personnel preforming routine inspections and maintenance must wear a high visibility safety vest at all times and should be aware of traffic patterns and facility operations. If work on a specific parcel/facility requires other specific personal protective equipment (PPE), such as a hard hat or steel-toed boots, then the additional PPE requirements must be met to complete the inspection and maintenance work.

The work associated with this Landfill CIMP would not typically involve exposure to contaminated media beneath the cap; therefore, a site-specific health and safety plan is not necessary for this work

## 6.0 Reporting and Record Keeping

To document compliance with this Landfill CIMP, the Subject PLP or Site Coordinator must keep the following records to document the completion of each monitoring and maintenance event.

Inspection Records. These should include a completed Annual Cap Inspection and Maintenance Field Form and associated sketches and photographic documentation. These should also include any recommendations for maintenance.

In addition, the maintenance contractor must document the following and provide copies to the Subject PLP or Site Coordinator within 60 days of the completion of a maintenance event.

Maintenance Records. These should include a description of the maintenance area and type of repair. These should also include photographic documentation and a field sketch and/or figure documenting the location.

In accordance with the KIP CAP, the results of the cap inspections and any necessary maintenance will be reported to Ecology annually in the CAP Annual Report which is due on March 31 of each year for the previous calendar year's operations and maintenance activities. The Subject PLP or Site Coordinator is responsible for compiling the necessary documentation and submittal of the CAP Annual Report covering at least the KIP Area.

# South Park Landfill

## Cap Inspection and Maintenance Form

Date: _____ Location: _____

Inspector: _____ Owner: _____

☐**Annual Inspection** ☐**Non-Routine Inspection**

Annual Inspection must include a visual survey of the entire cap surface, including drainage features on surface components for stormwater systems. Complete the checklist (Form A) and attach to this form for documentation.

For Non-Routine Inspections, provide reason:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Attach documentation as necessary (photographs, sketches, notes).

☐**Maintenance Event, provide reason:**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Complete Maintenance Documentation (Form B) and attach for documentation.

# South Park Landfill

## Cap Inspection Form A

Date: _____ Location: _____

Inspector: _____ Owner: _____

☐ **Annual Inspection** ☐ **Non-Routine Inspection**

Reason: _____

**VISUAL INSPECTION CHECKLIST**

**Asphaltic Concrete**

| | Yes | No | Needs Repair | If Yes, Describe: |
|---|---|---|---|---|
| Minor Cracking | ☐ | ☐ | ☐ | _____ |
| Open Cracks/Ruts | ☐ | ☐ | ☐ | _____ |
| Differential Settlement | ☐ | ☐ | ☐ | _____ |
| Pot Holes | ☐ | ☐ | ☐ | _____ |
| Pooling or Ponding | ☐ | ☐ | ☐ | _____ |
| Separation of Pavement from Curbs, Gutters, or Catch Basins | ☐ | ☐ | ☐ | _____ |
| Sloughing or Crumbling of Edge Materials | ☐ | ☐ | ☐ | _____ |
| Erosion | ☐ | ☐ | ☐ | _____ |
| Other Signs of Cap Damage, Failure, Disturbance | ☐ | ☐ | ☐ | _____ |

Recommended Maintenance or Repair Type/Location:

_____

_____

**Low-Permeability Membrane**

| | Yes | No | Needs Repair | If Yes, Describe: |
|---|---|---|---|---|
| Erosion of Cover Soil | ☐ | ☐ | ☐ | _____ |
| Exposed Geotextile Barrier | ☐ | ☐ | ☐ | _____ |
| Holes/Signs of Unauthorized Digging | ☐ | ☐ | ☐ | _____ |

Recommended Maintenance or Repair Type/Location: _____

_____

**Stormwater Management Facilities**

| | Yes | No | Needs Repair | If Yes, Describe: |
|---|---|---|---|---|
| Signs of Water Infiltration below Structures | ☐ | ☐ | ☐ | _____ |
| Erosion of Soil | ☐ | ☐ | ☐ | _____ |
| Exposed Geotextile Membrane | ☐ | ☐ | ☐ | _____ |
| Holes/Signs of Unauthorized Digging | ☐ | ☐ | ☐ | _____ |
| Invasive/Deep-Rooted Plants | ☐ | ☐ | ☐ | _____ |

Recommended Maintenance or Repair Type/Location: _____

_____

Attach necessary documentation such as photographs, sketches, and additional notes.

# South Park Landfill

## Cap Maintenance Form B

Date: _____ Location: _____ Owner: _____

Maintenance Contractor: _____

Reason for Maintenance: _____

_____

Describe maintenance location (attach sketch, photographs).

_____

_____

_____

Describe maintenance or repair performed (attach photos and additional documentation as necessary).

_____

_____

_____

_____

_____

_____

_____

Is the maintenance activity complete? ☐ Yes ☐ No

If no, explain:

_____

_____

_____

_____

Approval/inspection of maintenance/repair:

_____ _____

SITE COORDINATOR DATE

All maintenance and repair documentation must be provided to the Site Coordinator within 60 days of the completion of the maintenance/repair OR by March 1 if the activity is completed within 60 days prior to March 1.

**South Park Landfill**

# Appendix B
# Landfill Gas Monitoring and Contingency Plan

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List of Exhibits



List of Acronyms, Abbreviations and Terminology

| Acronym/ Abbreviation | Definition |
|---|---|
| CAP | Cleanup Action Plan |
| City | City of Seattle |
| Ecology | Washington State Department of Ecology |
| GP | gas probe |
| KIP | Kenyon Industrial Park |
| KIP Area | The parcel known as Kenyon Industrial Park (KIP), (tax parcel 3224049007). |
| LEL | lower explosive limit |
| LFG | landfill gas |
| LFGMCP | Landfill Gas Monitoring and Contingency Plan |
| mL | milliliter |

| Acronym/ Abbreviation | Definition |
|---|---|
| MTCA | Model Toxics Control Act |
| PLP | Potentially Liable Person |
| PPE | Personal protective equipment |
| ppmv | parts per million by volume |
| Site | South Park Landfill Site |
| SPPD | South Park Property Development, LLC, former owner of Parcel 3224049005 |
| SR | State Route |
| WAC | Washington Administrative Code |
| W.G. Clark | W.G. Clark Construction |

## 1.0 Introduction

This Landfill Gas Monitoring and Contingency Plan (LFGMCP) is an appendix to the Cleanup Action Plan (CAP) for the Kenyon Industrial Park (KIP) (also referred to as the "KIP Area") portion of the larger South Park Landfill Site. In addition to the KIP Area, the South Park Landfill Site includes the South Park Property Development LLC (SPPD)/City of Seattle (City) Area (SPPD/City Area) and the 7901 Parcel. The SPPD/City Area includes the two largest parcels owned by the City and CenterPoint South Park, LLC (CPSP)[1] and certain adjacent City and Washington State rights-of-way. The South Park Landfill Site is a former municipal solid waste landfill in the South Park neighborhood of Seattle, Washington (Figure B.1). It is located in the Lower Duwamish Valley near the western valley wall, between State Route (SR) 509 and SR 99. Details regarding the KIP Area, environmental conditions, and specific components of the remedy are documented in the KIP CAP.

The KIP CAP requirements related to landfill gas (LFG) for the KIP Area are provided in this LFGMCP. The monitoring procedures in this LFGMCP apply to four buildings on KIP, three off-site buildings adjacent to KIP on the W.G. Clark Construction (W.G. Clark) parcel, and two new landfill gas probes (GP-KIP1 and GP-KIP2) that will be installed on the KIP parcel. The LFGMCP implementation will begin within 180 days after the effective date of the Agreed Order in accordance with the schedule in the KIP CAP.

### 1.1.1 Purpose and Applicability

The goal of LFG operations, maintenance and monitoring described in this plan is to confirm that the landfill remedy is performing in a manner that protects human health and the environment. Specifically, this requires meeting the following LFG criteria under the Minimum Functional Standards, as defined in Washington Administrative Code (WAC) 173-304-460 and King County Board of Health Title 10 regulations:

- On-Site Facility Structures. Methane concentrations inside facility buildings and structures (as defined in WAC 173-351-100) within the landfill property boundary must not exceed 1.25 percent by volume, or 25 percent of the lower explosive limit

[1] On September 9, 2022, CPSP purchased the SPPD parcel from SPPD. For continuity of drafting, the CPSP-owned parcel will continue to be referred to as the SPPD parcel in CAP text and figures, but title to the SPPD parcel is with CPSP, and SPPD is not a party to the Amended Consent Decree.

(LEL). This criterion is typically measured in the buildings/structures with either calibrated hand-held monitors or installed building monitors/alarms.

- Contingency actions (including reporting and communications) beyond those set out in WAC 173-304-460 for

    - on-site facility structures have been established by Ecology and the PLPs. These monitoring requirements are laid out in further detail in Section 2.2.

- Perimeter Gas Probes. Methane concentrations in soil at the landfill property boundary must not exceed 5 percent by volume, the LEL for methane. This criterion will be measured by LFG probes along the property boundary.
- Off-Site Structures. Methane concentrations inside buildings and structures within 100 feet of the landfill boundary must not exceed the monitoring requirements. Indoor monitoring is triggered by an exceedance in a perimeter gas probe. Concentrations are typically measured in the buildings/structures with calibrated hand-held monitors. Action levels for methane concentrations in off-site buildings are discussed in Section 2.2.

## 1.2 Coordination and Responsibilities

The agreed order provides that the Subject PLP remain strictly, jointly, and severally liable for the performance of any and all obligations under this LFGMCP. To accomplish the work to be performed under this LFGMCP in the most efficient manner certain landfill PLPs may coordinate certain common activities, such as annual monitoring, maintenance, and reporting. Language in this LFGMCP reflects this arrangement. However, the potentially liable persons (PLPs) who signed the Amended 2019 Consent Decree and Harsch Investment Properties, LLC (identified in an Agreed Order, currently known as Schnitzer Properties LLC) remain strictly, jointly, and severally liable for the performance of any and all obligations under this LFGMCP. In the event the party identified as a lead should fail to timely and properly complete performance of all or any portion of its work, the other party or parties must perform that remaining work, if any.

LFG monitoring is conducted throughout the KIP Area by the Subject PLP or Site Coordinator to document methane concentrations and check for potential off-site migration. The following sections define the roles required for compliance with this LFGMCP; one person may perform more than one role.

### 1.2.1 Parcel Owners

The Parcel Owner owns the parcel and is responsible for filing an Environmental (Restrictive) Covenant and maintaining compliance with the parcel's Environmental

(Restrictive) Covenant. In regard to activities in this LFGMCP, the Parcel Owner for the KIP Area is responsible for the day-to-day operations and maintenance of the building methane detectors and alarms. .

The responsibilities in this document do not supersede or exclude other relevant regulations for owners of properties located on landfills, such as Seattle Building Code 1811.2 for protection of structures from methane intrusion.

### 1.2.2 Subject Potentially Liable Persons

The Subject PLP is responsible for compliance with the KIP CAP including this LFGMCP, communications with Washington State Department of Ecology (Ecology), and reporting of on-parcel activities. For the LFG monitoring program, the Subject PLP is responsible for maintaining their on-parcel building methane detectors and alarms, report quarterly to Ecology or the Site Coordinator, provide notifications to Ecology and Public Health–Seattle & King County, and implement contingent actions based on the on-parcel monitoring results.

### 1.2.3 Site Coordinator

The Subject PLP is presumed to coordinate activities with other PLPs for the South Park Landfill Site to complete annual inspections and reporting. Additional clarification of their duties exists in the KIP CAP and in later sections of this LFGMCP.

## 2.0 Landfill Gas Monitoring Plan

The primary goal of perimeter probe monitoring is to evaluate potential lateral off-site LFG migration and the primary goal of building monitoring is to protect human health. This monitoring is necessary at KIP to document conditions and determine if a LFG system(s) is needed to control off-site LFG migration at KIP.

Throughout this section (and consistent with common terminology in LFG discussions), the term "monitoring" will refer to field measurements using calibrated meters, while the term "sampling" refers to the collection of a LFG, soil vapor, or ambient air sample for analysis at a laboratory. Perimeter gas probes can be monitored with meters or sampled for later analysis at a laboratory.

### 2.1 Perimeter Probe monitoring

Methane concentrations in soil at the landfill boundary must not exceed 5 percent by volume, the LEL for methane. This criterion will be measured by monitoring LFG probes along the property boundary (perimeter probes) on a quarterly basis. The locations of the perimeter probes that will be installed within the KIP Area (GP-KIP1 and GP-KIP2) are shown in Figure B.2.

#### 2.1.1 General Procedures for Perimeter Probe Monitoring

The preferred condition for LFG probe monitoring is low barometric pressure following at least 2 hours of falling barometric pressure, with a drop of at least 0.25 inches mercury. Barometer charts available at the following links will be used to forecast appropriate monitoring conditions. The first link provides a graphical barometric record over the previous 6 days from accessing the link; the second link provides a 10-day forecast map:

- http://www-k12.atmos.washington.edu/k12/grayskies/nw_weather.html (Tillman and Johnson 2022)
- http://www.wunderground.com/weather-forecast/US/WA/Seattle.html (The Weather Channel 2022)

LFG probe monitoring will be conducted as summarized below:

- Calibrate Landtec GEMTM 2000 (Plus) or equivalent meter using two different span gases: one with a mix of 4 percent oxygen and balance nitrogen and one with a mix of 50 percent methane and 35 percent carbon dioxide, according to the instrument's instruction manual.
- Connect the meter to the LFG probe using silicone or polyethylene tubing and filter. Typically, the probe will have a labcock or pressure fitting plug with a quick connect. Open the labcock or connect the quick connect and measure the barometric and static pressure at each probe with the meter prior to purging

- If possible, measure the water level in the gas probe to determine the water level and to confirm that static water is not above the top of the probe screen. If the water level is above the probe screen, then the probe cannot be monitored.
- Purge the gas probe until methane, carbon dioxide, and oxygen percentages stabilize, defined as when readings change by less than 10 percent for three consecutive measurements over 10-second intervals. Document the purge concentrations and rate on the gas probe monitoring field form included in Exhibit A.1.
- Evacuate a minimum of one probe volume before recording the final instrument readings. Note that 3/4-inch-diameter Schedule 40 polyvinyl chloride (PVC) probe volume is 100 milliliters (mL) per foot and 2-inch-diameter Schedule 40 PVC probe volume is 620 mL per foot. For reference, the GEM flow rate is 300 mL per minute.
- A SKC Inc. brand pump or equivalent (AirChek Sampler–intrinsically safe) may be used for deeper probes with larger casing volumes to decrease evacuation time. The pump has the capacity to evacuate at 3,000 mL per minute and would be connected directly to the LFG probe and then the meter with a barbed tee connector. Results for each perimeter monitoring event must be recorded on the Gas Probe Monitoring Field Form included in Exhibit B.1 (electronic forms, including those that download directly into a database, are also acceptable).

### 2.1.2 Criteria for Reduction of Monitoring Locations and Frequency

LFG production is expected to continue to decline over time. A reduction of monitoring frequency may be allowed if perimeter monitoring results in the KIP Area are consistently less than criteria thresholds.

As part of the CAP Annual Report, the Subject PLP may request reductions in sample locations and/or frequency (on a probe-by-probe basis). The request will include supporting data and rationale. The request will become effective once approved by Ecology.

## 2.2 Building Monitoring

All occupied KIP buildings within the Landfill Property Boundary (on-site buildings) must have continuous (i.e., operate 24 hours per day, 7 days per week) methane detectors with alarms. Methane concentrations inside KIP buildings and structures (as defined in WAC 173-350-100) within the landfill boundary must not exceed 1.25 percent by volume, or 25 percent of the LEL; methane alarm meters in all buildings are set at or below 10 percent of the LEL or 5,000 ppmv, based on the property owner's preference. Quarterly inspections of these alarms must be completed in accordance with the manufacturer's recommendations to ensure proper operation and protection of human health. Some inspections will also include calibrating the methane detector consistent with the manufacturer's operating manual. The Honeywell

E3Point gas monitors equipped with methane detectors currently installed inside all four KIP buildings call for calibration every 6 months.

Off-site building monitoring at the three W. G. Clark buildings adjacent to KIP will be conducted as indicated in the flow chart presented in Figure B.3. Methane concentrations are typically measured in the buildings/structures with handheld equipment. It should be noted that each building is different, so the specific protocol for each building is field dependent.

Monitoring indoor air for methane if needed for off-site buildings at the W.G. Clark parcel will be conducted in accordance with the following general procedures.

- Notify the Parcel Owners and tenants and offer to perform building monitoring.
- Inspect the building to assess construction characteristics, such as heating, ventilation, and air conditioning systems, and for possible sources of volatile contaminants that may influence monitoring results, such as petroleum hydrocarbons and chemical products.
- Monitor interiors of buildings using a detector capable of measuring methane to below 100 ppmv according to manufacturer instructions.
- Complete a walk-through of the building with the monitoring instrument operating continuously; pay particular attention to cracks in concrete slab floors or other features with a potential for LFG flow.
- Record measurements when methane is detected, noting locations and concentrations.
- Results for each off-site building monitoring event must be recorded on the Off-Site Building Monitoring Field Form included in Exhibit B.1.

### 2.2.1 Contingency Actions

If the methane concentrations described in Sections 2.1 and 2.2 are exceeded, then additional contingency actions must occur. Triggers for action and the contingency actions are described below. If a trigger for action is confirmed, Ecology and the PLPs will be notified.

8¡8¡7¡7 LFG.Gas.Probe.Monitoring

If methane is detected above 5 percent by volume during a quarterly monitoring event in either of the new LFG probes (GP-KIP1 and GP-KIP2), the equipment will be re-calibrated and the concentration re-measured to confirm the results. If the methane concentration is confirmed to exceed 5 percent by volume, then the exceeding LFG probe will be monitored daily for 5 days or until the concentration of methane is less than 5 percent by volume, then once per month until the next quarterly monitoring event. A request to modify or remove the daily monitoring requirement can be submitted to Ecology in the future, after additional data are acquired. The additional daily monitoring will be used to determine if the condition is persistent or ephemeral and to understand if the barometric pressure dynamics affect LFG concentrations at the

location. The additional monthly monitoring will be used to understand if the condition is regularly occurring throughout the quarter.

Contingent actions and triggering criteria based on LFG probe monitoring are discussed below.

- Trigger.for.Action¿The trigger for action at the KIP Area will be based on methane readings in the perimeter LFG probes GP-KIP1 and GP-KIP2. The following would be considered a triggering condition: one probe with confirmed methane concentrations greater than 5 percent during four or more of the quarterly or monthly events within a 12-month period.
- Conceptual.Design¿The contingent action consists of either a linear series of small-diameter LFG wells or a shallow trench with perforated collection pipes to intercept and ventilate LFG. The interceptor wells or trench would be installed along the southern and/or western property boundary based on monitoring results and the location of potential off-site receptors. The interceptor wells or trench would be connected to one or more manifolds that are routed to atmospheric vents designed to safely release the LFG outside of the breathing zone. It is anticipated that passive ventilation (without a blower system) will be adequate to control the LFG, and that the wells/trench would be constructed at a location selected in cooperation with Ecology with the intent to provide building protection and/or prevent off-site migration.
- Design.Phase¿Once the trigger has been met, remedial design will begin and may be supported by a supplemental investigation to confirm the extent of the landfill gas control system needed.
- Engineering.Design.Report.and.Ecology.Approvals¿An Engineering Design Report with attached plans, specifications, and a detailed implementation schedule appropriate for permitting and construction will be submitted to Ecology for approval.

If a LFG collection system is required at KIP, as described above, then an addendum to this LFGMCP will be developed to include the KIP LFG system. Once approved by Ecology, the addendum to the LFGMCP will be considered part of the KIP CAP. This will not be

considered a substantial modification of the CAP and will not require a public notice and comment period.

If the passive system is unable to bring the LFG concentration into compliance in KIP LFG probe GP-KIP1 or GP-KIP2 as defined by the Trigger for Action above, methane monitoring will be conducted in adjacent off-site buildings to assess compliance and determine if emergency procedures to protect building occupants is warranted. Ecology will review the off-site monitoring data in consideration of the nearby LFG probe data and may determine that adequate protectiveness for off-site migration is provided by the mitigation system, demonstrated through limited off-site building monitoring, so that further off-site monitoring may not be required if the contingent action has been implemented.

8¡8¡7¡8 Off_Site.Building.Monitoring

Off-site building monitoring will be completed in all three buildings at the W.G. Clark parcel following a triggering condition in the GP-KIP2 LFG probe. Refer to the off-site building monitoring flow chart (Figure B.3) for off-site building monitoring requirements and contingent actions. The locations of the three buildings on the W.G. Clark parcel are depicted in Figure B.5.

A request to modify or remove the daily monitoring requirement for off-site building monitoring can be submitted to Ecology after additional data are acquired and adequate building protection has been demonstrated.

8¡8¡7¡9 On_Site.Building.Monitoring

Methane concentrations in each of the four buildings on KIP will be monitored with a continuous methane monitor. Contingent actions and triggering criteria based on continuous methane monitoring are discussed below. Refer to the on-site building monitoring flow chart (Figure B.4) for on-site building monitoring requirements and contingent actions. The locations of the four buildings on the KIP parcel are depicted in Figure B.5.

Continuous methane monitors in the KIP buildings will be set with a warning level alarm at 5,000 ppmv (10% LEL). The following would be considered a triggering condition: A methane level inside one of the buildings activating the warning level alarm followed by confirmation of the elevated reading (5,000 ppmv or higher) with a handheld unit.

Measures to reduce methane concentration inside a KIP Area building in the event of a confirmed warning level alarm of 5,000 ppmv or higher would include evacuation, improving ventilation within the building, source identification to determine the entry point of the methane, and sealing the entry point if it can be identified. The KIP Area property owner will develop building-specific plans to mitigate and assess elevated levels of methane and prior to re-occupying the building.

In the event of a trigger, additional details regarding continuous methane monitoring property-specific contingency actions will be provided to Ecology in a separate deliverable.

## 2.3 Unforeseen Events

An unforeseen emergency or extreme weather event, such as earthquakes, fires, or floods, or other natural or human-caused disaster would trigger a requirement for an immediate landfill-wide inspection to ensure the integrity of the controls are maintained. Such unforeseen events could cause a sudden differential settlement of the landfill contents and/or cap that could affect the integrity of the landfill cap and the infrastructure below, including the monitoring probes in the KIP Area. The following criteria for unforeseen events would trigger an inspection of the landfill cap and LFG probes in the KIP Area:

- An earthquake along the Seattle fault that registers 4.0 or greater on the Richter scale
- An earthquake within 100 miles of Seattle that registers 5.0 or greater on the Richter scale
- A flood or major storm that produces greater than 3.0 inches of rainfall within a 24-hour period
- Any fire that occurs on or below the landfill cap

Any other damage in the KIP Area observed by the Parcel Owners and workers at KIP, or the public, such as damage sustained by high winds, or vehicular accident(s)

If any of the above unforeseen events occur, then the Subject PLP or Site Coordinator should schedule an inspection with the appropriate personnel as soon as safe and practical (generally within 48 hours). If the integrity of the landfill cap or LFG probes in the KIP Area is significantly compromised as a result of an unforeseen event, Ecology must be notified, and repairs must be initiated as soon as practicable.

## 3.0 Health and Safety

Maintenance personnel and contractors must follow general health and safety procedures while performing LFG operations, maintenance, and monitoring activities at the KIP Area. The KIP Area has vehicular traffic and other potential hazards associated with active operation. Maintenance personnel and contractors must be aware of these hazards and take appropriate precautions while performing the work outlined in this LFGMCP. At a minimum, personnel performing routine operations, maintenance and monitoring activities must wear a high-visibility safety vest at all times and should be aware of traffic patterns and operations that occur at KIP. If work at KIP requires other specific personal protective equipment (PPE), such as a hard hat or steel-toed boots, then the additional PPE requirements must be met to complete the inspection and maintenance work.

## 4.0 Reporting and Record Keeping

To document compliance with this LFGMCP, the Subject PLP or Site Coordinator must keep the following records to document the completion of each maintenance and monitoring event:

- Routine monitoring records for the LFG probes in the KIP Area, which, at a minimum, should include copies of the gas probe monitoring field form, direct upload into a database, or a tabular summary of routine monitoring data. Off-building monitoring field forms should also be submitted if a trigger event occurs.
- Maintenance records, which should include a description of the maintenance performed and reason/type of repair. This should also include photographic documentation if appropriate.

The results of the LFG operation, maintenance, and monitoring will be reported annually to Ecology in the CAP Annual Report, which is due on March 31 of each year for the previous calendar year's operation, maintenance, and monitoring activities. The Subject PLP or Site Coordinator is responsible for compiling the necessary operation, maintenance, and monitoring documentation and submitting the CAP Annual Report. A brief discussion of any important or relevant changes in KIP Area conditions or personnel changes will be included in the annual monitoring reports. In addition, recommendations for a reduction in frequency or location for the perimeter probe monitoring network will be included, as applicable.

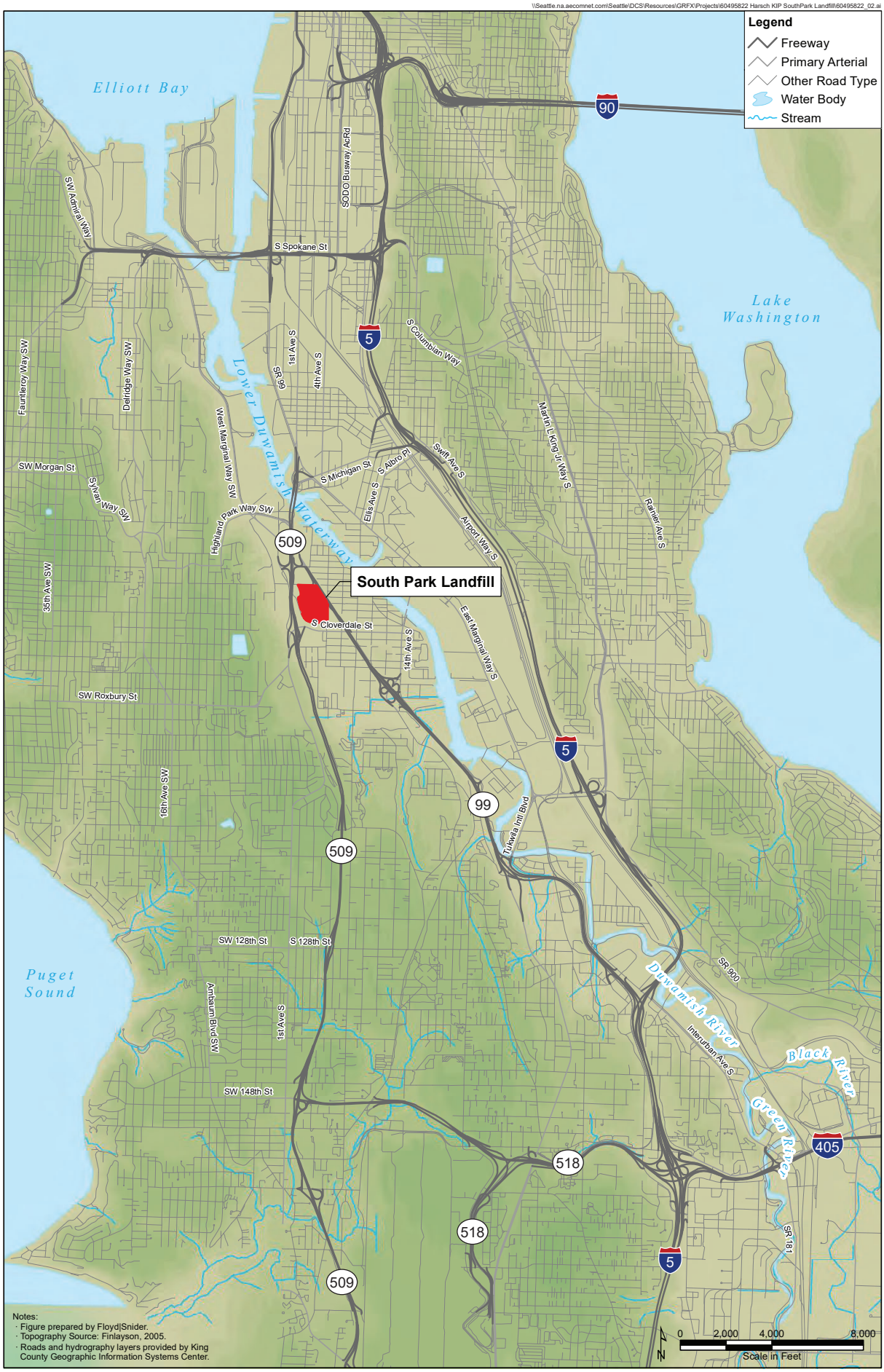
All records, reports, documents, and underlying data relevant to the implementation of this LFGMCP shall be maintained by the Subject PLP or Site Coordinator for a period consistent with requirements in the Agreed Order.

## 5.0 References

The Weather Channel, LLC. 2015. Weather Underground. Accessed December 22, 2022. http://www.wunderground.com/.

Tillman, James E., and Neal C. Johnson. 2015. Live from Earth and Mars. Department of Atmospheric Sciences, University of Washington; supported by NASA IITA Program, Office of Aeronautics; in collaboration with Pathfinder Project, NASA JPL, Office Space Sciences. Accessed December 22, 2022. http://www-k12.atmos.washington.edu/k12/.

Figures



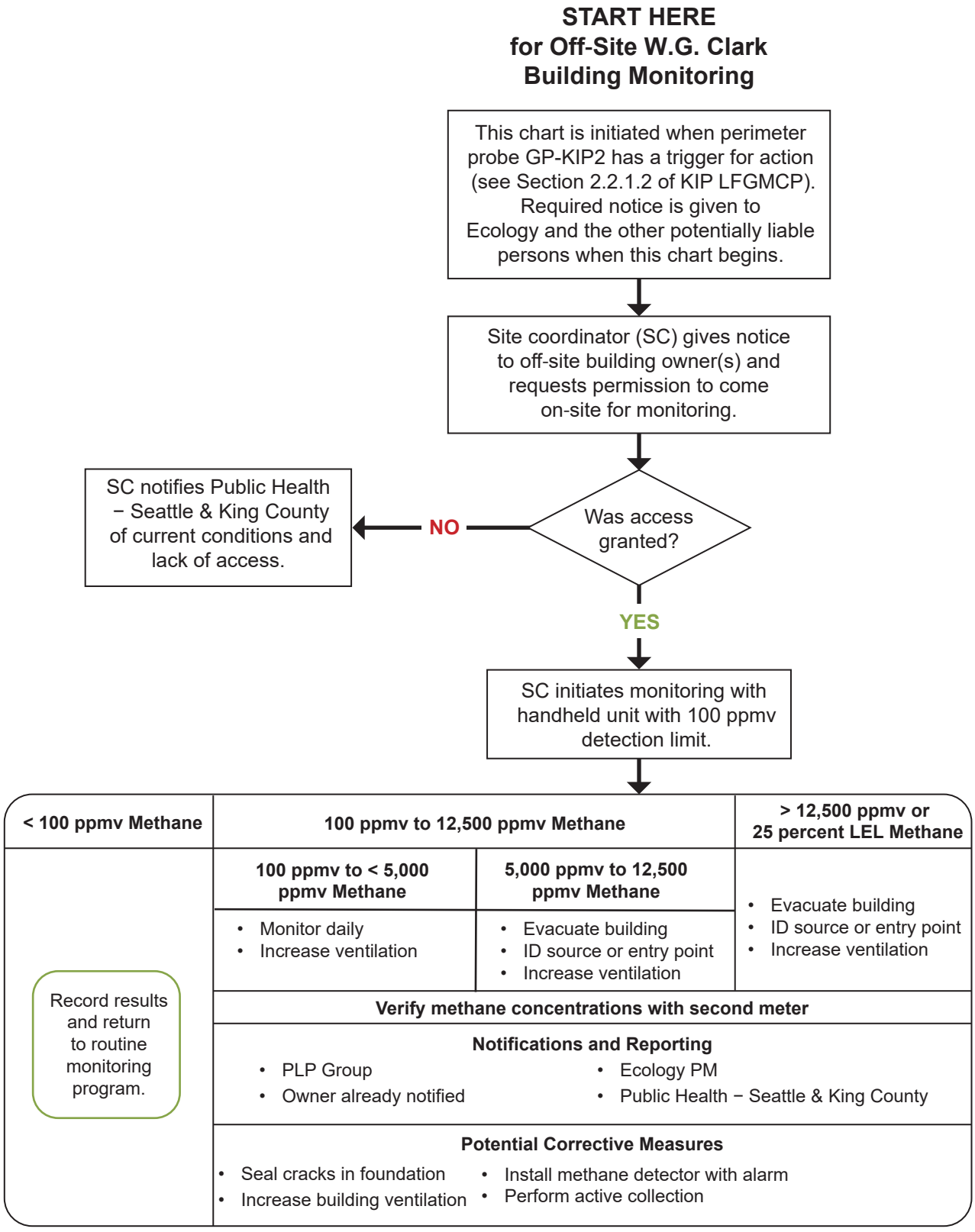

*Source: Ecology 2023*

Figure B.1
**Vicinity Map**


*Source: Ecology 2023*

Figure B.2

**Perimeter Landfill Gas Probes**

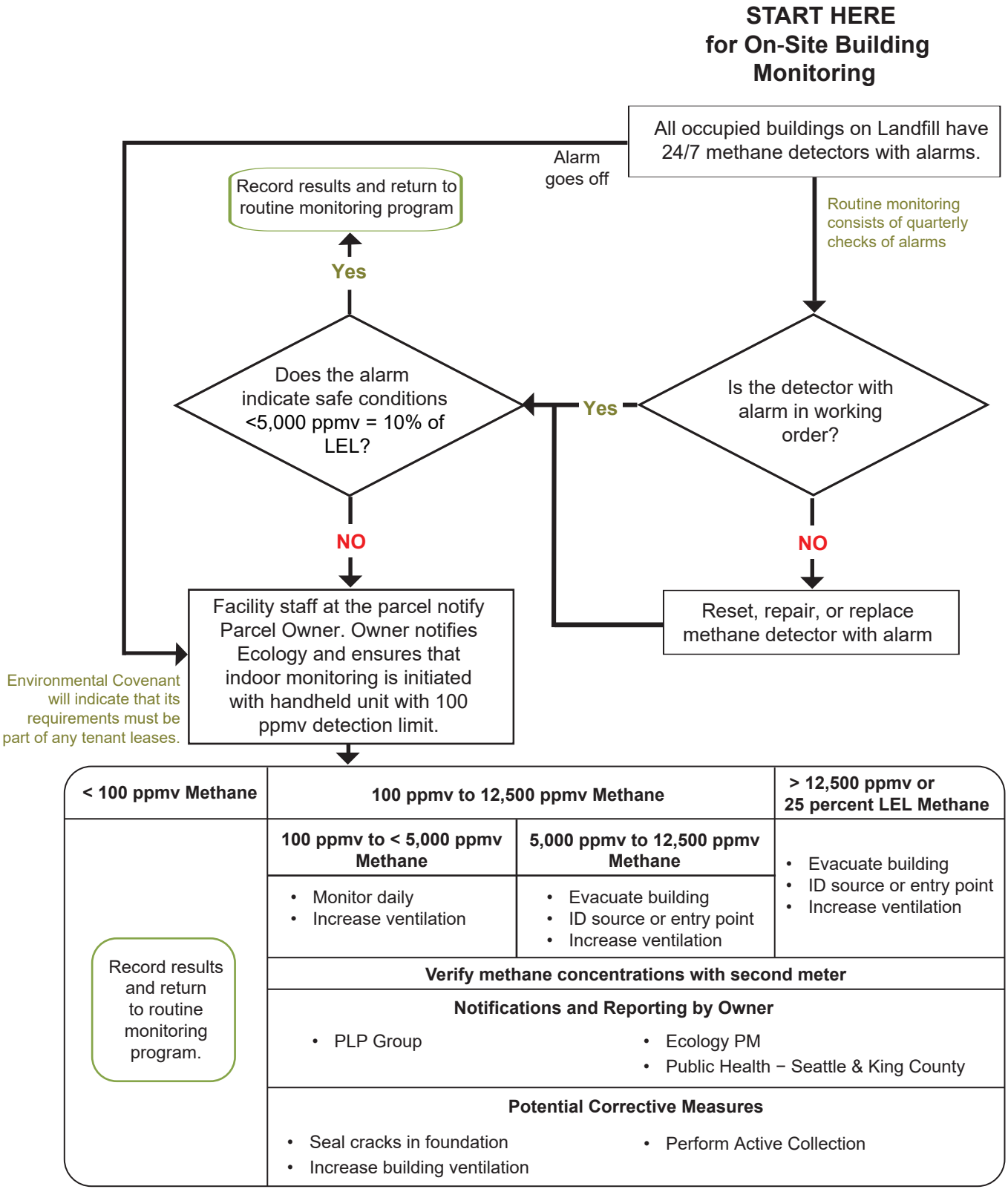



Abbreviations:
Ecology = Washington State Department of Ecology
KIP = Kenyon Industrial Park
LEL = Lower explosive limit
LFG = Landfill gas
LFGMCP = Landfill Gas Monitoring and Contingency Plan
PLP = Potentially liable person
PM = Project Manager
ppmv = Parts per million by volume
SC = Site coordinator

Figure B.3

## Flow Chart for Triggers and Contingent Actions for LFG Monitoring in Off-Site Buildings

Kenyon Industrial Park Cleanup Action Plan
South Park Landfill
Seattle, Washington




| < 100 ppmv Methane | 100 ppmv to 12,500 ppmv Methane | | > 12,500 ppmv or 25 percent LEL Methane |
|---|---|---|---|
| Record results and return to routine monitoring program. | 100 ppmv to < 5,000 ppmv Methane | 5,000 ppmv to 12,500 ppmv Methane | • Evacuate building<br>• ID source or entry point<br>• Increase ventilation |
| | • Monitor daily<br>• Increase ventilation | • Evacuate building<br>• ID source or entry point<br>• Increase ventilation | |
| | **Verify methane concentrations with second meter** | | |
| | **Notifications and Reporting by Owner**<br>• PLP Group<br>• Ecology PM<br>• Public Health − Seattle & King County | | |
| | **Potential Corrective Measures**<br>• Seal cracks in foundation<br>• Increase building ventilation<br>• Perform Active Collection | | |

Abbreviations:
Ecology = Washington State Department of Ecology
LFG = Landfill gas
PLP = Potentially liable person
PM = Project Manager
ppmv = Parts per million by volume
LEL = Lower explosive limit

Figure B.4

## Flow Chart for Triggers and Contingent Actions for LFG Monitoring in On-Site Buildings


*Source: Ecology 2023*

Figure B.5

**South Park Landfill Parcel Map**

# South Park Landfill

## Attachment A

## Kenyon Industrial Park

## Landfill Gas Monitoring and Contingency Plan

## Exhibit B.1
## Perimeter Probe and Off-Site Building Monitoring Field Forms

# South Park Landfill

## Gas Probe Monitoring Field Form

**Gas Probe ID:** _____ **Date and Time:** _____

| Casing Volume Purged | Volume Purged (cc) | Purge Rate (ml/min) | Purge Time | | | | $CH_4$ (% Volume) | $CO_2$ (% Volume) | $O_2$ (% Volume) | $H_2S$ (% Volume) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | 0 | min | 0 | sec | | | | |
| 1/4 | | | | min | | sec | | | | |
| 1/2 | | | | min | | sec | | | | |
| 3/4 | | | | min | | sec | | | | |
| 1 | | | | min | | sec | | | | |
| 1-1/4 | | | | min | | sec | | | | |
| 1-1/2 | | | | min | | sec | | | | |
| 1-3/4 | | | | min | | sec | | | | |
| 2 | | | | min | | sec | | | | |
| 2-1/4 | | | | min | | sec | | | | |
| 2-1/2 | | | | min | | sec | | | | |
| 2-3/4 | | | | min | | sec | | | | |
| 3 | | | | min | | sec | | | | |

**Comments/Special Instructions:**

**Barometric Pressure:** _____ **Well Diameter:** _____

**Well Head Pressure:** _____ **Water Level/Well Bottom:** _____ **Screen:** _____

**Equipment Used:** Gem™ 2000 (Plus), Water Level Meter, SKC Pump, Other: _____

## Off-Site Building Monitoring

**Date:** _____ **Location:** _____

**Inspector:** _____ **Owner:** _____

**Reason for Monitoring:** _____

_____

_____

_____

_____

**Instrument Used:** _____

**Describe monitoring; include locations, building type, cracks in foundation or floors, etc.:**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

**South Park Landfill**

# Appendix C
# Groundwater Monitoring and Contingency Plan

**Table of Contents**



**List of Tables**

**List of Acronyms, Abbreviations, and Terminology**

| Acronym/ Abbreviation | Definition |
|---|---|
| CAP | Cleanup Action Plan |
| CPSP | CenterPoint South Park, LLC |
| City | City of Seattle |
| COC | Chemical of concern |
| CPOC | Conditional point of compliance |
| CUL | Cleanup level |
| DCE | Dichloroethene |
| Ecology | Washington State Department of Ecology |
| Edge of Refuse | The approximate boundary of the area where wastes were placed as part of South Park Landfill operations. |
| GWMCP | Groundwater Monitoring and Contingency Plan |
| KIP | Kenyon Industrial Park |
| KIP Area | The parcel within the Site known as Kenyon Industrial Park (KIP), owned by Schnitzer Properties, LLC (tax parcel 3224049007). |
| µg/L | Micrograms per liter |
| MTCA | Model Toxics Control Act |
| NAVD 88 | North American Vertical Datum of 1988 |
| OMM | Operations, maintenance, and monitoring |
| PLP | Potentially liable person |
| PPE | Personal protective equipment |
| ROW | Right-of-way |
| SAP | Sampling and Analysis Plan |

| Acronym/ Abbreviation | Definition |
|---|---|
| Settlement Area | The parcels and rights-of-way covered under an Amended Consent Decree. This includes the SPPD/City Area, and adjacent rights-of-way within the Edge of Refuse. It does not include the 7901 2nd Ave S parcel. |
| SPPD | South Park Property Development, LLC |
| SPPD/City Area | The portion of the Site that includes the CenterPoint South Park, LLC -owned parcel (3224049005) and the City of Seattle-owned parcels (7328400005 and 3224049110), and adjacent City of Seattle and Washington State rights-of-way located within the Edge of Refuse. Parcel 3224049005 was formerly owned by South Park Property Development, LLC. |
| SR | State Route |
| QAPP | Quality Assurance Project Plan |

## 1.0 Introduction

This Groundwater Monitoring and Contingency Plan (GWMCP) is an appendix to, and integral and enforceable part of, the Kenyon Industrial Park (KIP) Cleanup Action Plan (CAP). The potentially liable person (PLP) for the KIP Area is one of several PLPs for the larger South Park Landfill Site (Site). In addition to the KIP PLPs, there are groundwater monitoring and contingency requirements for the PLPs of the SPPD/City Area. The SPPD/City Area includes the two largest parcels owned by the City of Seattle (City) and formerly owned by South Park Property Development, LLC (SPPD), and certain adjacent City and Washington State rights-of-way (ROWs) within the South Park Landfill Site.

The South Park Landfill Site is a former municipal solid waste landfill in the South Park neighborhood of Seattle, Washington (Figure 1.2 of the KIP CAP). It is located in the Lower Duwamish Valley near the western valley wall between State Route (SR) 509 and SR 99. Details regarding the KIP Area (tax parcel 3224049007), environmental conditions, and specific components of the remedy are documented in the KIP CAP.

In accordance with the Model Toxics Control Act (MTCA), the KIP CAP for the site requires long-term groundwater monitoring to continue until all groundwater chemicals of concern (COCs) are in compliance at the conditional point of compliance (CPOC). This plan presents the framework for that monitoring. The operations, maintenance, and monitoring (OMM) requirements related to groundwater are provided in this GWMCP. The GWMCP was implemented in July 2025.

The PLPs for the South Park Landfill Site remain strictly, jointly, and severally liable for the performance of any and all obligations for the Site. Due to the overlapping requirements for the SPPD/City Area, Ecology recommends that this GWMCP be implemented in coordination with the SPPD/City Area.

### 1.1 Purpose and Applicability

The goal of long-term groundwater monitoring is to confirm that the cleanup action is performing in a manner protective of human health and the environment. This includes assessing current groundwater concentrations and monitoring trends to confirm that vinyl chloride, *cis*-1,2-dichloroethene (DCE), benzene, arsenic, iron, and manganese concentrations continue to decrease over time and in a reasonable restoration timeframe. Long-term monitoring will confirm that trends in the concentrations either remain stable or decrease further, especially after cleanup actions are implemented.

### 1.2 Groundwater at the Landfill

The physical conceptual site model for the landfill is discussed in greater detail in Section 3.1 of the KIP CAP. At the landfill, groundwater has been investigated in three zones:

**The Perched Zone.** A shallow zone of groundwater and infiltrating stormwater, typically less than 1 foot in thickness perched on top of the Silt Overbank Deposit where it is present. This zone reflects very localized conditions.

**A-Zone Groundwater.** The groundwater in the Duwamish Valley Aquifer beneath the Silt Overbank Deposit, generally located at an elevation from 0 to -15 feet North American Vertical Datum of 1988 (NAVD 88).

**B-Zone Groundwater.** Groundwater deeper in the Duwamish Valley Aquifer, generally at an elevation from -15 to -35 feet NAVD 88 but above the estuarine/marine deposits. This zone does not exist along the upgradient edge of the landfill near the valley wall because the Shallow Aquifer becomes thinner and only the A-Zone is present.

Groundwater migration through the Duwamish Valley Aquifer is through both the A-Zone and the B-Zone.

## 1.3 Coordination And Responsibilities

To effectuate the work to be performed under this GWMCP in the most efficient manner, Ecology recommends that this GWMCP be implemented in coordination with the SPPD/City Area. Certain PLPs may elect to take the lead in performing various aspects of the required work. However, the PLPs remain strictly, jointly, and severally liable for the performance of any and all obligations for the Site.

Ecology recommends that long-term groundwater monitoring is conducted by the Site Coordinator for the area that includes the SPPD/City and the KIP Area. The following sections define the roles required for compliance with this GWMCP; one person may perform more than one role. The language below is intended to clarify those roles for groundwater monitoring. In the event the party identified as a lead should fail to timely and properly complete performance of all or any portion of its work, the other party or parties must perform that remaining work, if any.

### 1.3.1 Parcel Owners

The Parcel Owner is responsible for filing an Environmental (Restrictive) Covenant on their property and for compliance with the Environmental (Restrictive) Covenant, which includes prohibitions and requirements on groundwater use, groundwater monitoring, access, and noninterference with remedial action. Environmental (Restrictive) Covenants will be filed and recorded in accordance with the schedule outlined in the KIP CAP.

### 1.3.2 Subject Potentially Liable Persons

The Subject PLPs are responsible for compliance with the CAPs associated with their respective parcels, communications with Washington State Department of Ecology (Ecology), and reporting.

If groundwater contingent actions are triggered during monitoring, the Subject PLPs will be responsible for working with Ecology to develop an approach, scope of work, and schedule consistent with the KIP CAP requirements and later sections of this GWMCP.

### 1.3.3 Site Coordinator

The Subject PLP is presumed to coordinate activities with other PLPs for the South Park Landfill Site to complete groundwater monitoring and reporting. Groundwater monitoring and reporting is currently taking place at the landfill under a Site Coordinator, and this GWMCP describes the scope of that work. Barring a triggering event or other circumstance, no change in groundwater monitoring or reporting is anticipated under the KIP CAP. Additional clarification of the Site Coordinator duties exists in the KIP CAP, and in later sections of this GWMCP. A change to this arrangement should be requested in writing from Ecology.

## 2.0 Long-Term Groundwater Monitoring

The discussion in this section is intended to establish expectations regarding the scope of the groundwater monitoring program. Given that groundwater monitoring is currently taking place under a Site Coordinator, the details of groundwater monitoring presented in this GWMCP are informational and are not anticipated to change as the CAP is implemented.

With Ecology's written approval, the GWMCP may be modified in the future as needed to support long-term monitoring as detailed in Section 4.2 of the KIP CAP. Modifications may include changes in the monitoring well network, analytical requirements, or sampling frequency, and will be conducted in accordance with the KIP CAP and Enforcement Order requirements.

### 2.1 Monitoring Well Network

A long-term groundwater monitoring well network at and near the Site includes 14 wells, as described in this section. The existing monitoring well network will be used to monitor groundwater conditions at, and downgradient of, the Site. The locations of the wells are shown on Figure 6.1 of the KIP CAP, and the wells are described in Table C.1.

**Table C.1**
**Monitoring Well Network**

| Monitoring Well | Location | Zone | Screened Interval (feet bgs) |
|---|---|---|---|
| **Upgradient Wells Representing Quality of Groundwater Entering the Landfill** | | | |
| MW-12 | Upgradient | A-Zone | 10–15 |
| MW-14 | Upgradient | A-Zone | 11.5–21.5 |
| MW-29 | Upgradient | A-Zone | 20–30 |
| **Downgradient Wells Representing Conditions at the Edge of Refuse (POC wells)** | | | |
| MW-18 | Edge of Refuse | B-Zone | 30–40 |
| MW-25 | Downgradient | A-Zone | 22–27 |
| MW-32 | Edge of Refuse | A-Zone | 19–24 |
| MW-33 | Edge of Refuse | A-Zone | 20–25 |
| MW-26 | Downgradient | A-Zone | 15–25 |
| MW-27 | Downgradient | A-Zone | 10–20 |
| MW-10 | Downgradient | B-Zone | 35–45 |

| Monitoring Well | Location | Zone | Screened Interval (feet bgs) |
|---|---|---|---|
| MW-24 | Downgradient | B-Zone | 35–45 |
| MW-08 | Downgradient | B-Zone | 35.5–45.5 |
| **Downgradient Wells Representing Conditions near the Former Glitsa Property** | | | |
| MW-30 | Downgradient | Perched Zone | 8–13 |
| MW-31 | Downgradient | A-Zone | 18–23 |

Abbreviations:

bgs Below ground surface

Glitsa Glitsa American, Inc.

POC Point of compliance

TBD To be determined

## 2.2 SITE-wide Groundwater Monitoring Components

Groundwater monitoring will consist of measuring groundwater levels, sampling groundwater for the site-specific COC (such as vinyl chloride and other relevant chemicals), and reporting the groundwater flow directions and laboratory analytical results for each monitoring event. A SAP/QAPP for details regarding the monitoring components, field methods, and associated sampling procedures are not included in this plan.

## 2.3 Analytical Schedule

Groundwater samples will be analyzed for the COCs (vinyl chloride, iron, manganese, benzene, *cis*-1,2-DCE, and arsenic), and parameters useful for understanding geochemical conditions. These parameters, presented in Table C.2, shall be monitored during each routine groundwater monitoring event in accordance with the schedule provided in Section 2.4. After the first 10 years of monitoring, requests can be made by the Subject PLPs to the Ecology to decrease this analytical schedule (including locations and analytes), as appropriate.

**Table C.2**
**Analytical Schedule**

| Chemical/Parameter | Analytical Method[1] | Monitoring Well |
|---|---|---|
| Vinyl chloride | SW846 – 8260 Short List | All wells |

| Chemical/Parameter | Analytical Method[1] | Monitoring Well |
|---|---|---|
| Iron, total | SW846 – 6020 Short List | All wells |
| Manganese, total | SW846 – 6020 Short List | All wells |
| Benzene | SW846 – 8260 Short List | MW-25 |
| *cis*-1,2-DCE | SW846 – 8260 Short List | All wells |
| Arsenic, dissolved | SW846 – 6020 Short List | MW-12, MW-08, MW-10, MW-18, MW-24, MW-25, MW-26, MW-27, MW-32, and MW-33 |
| Specific conductivity | Field parameter | All wells |
| pH | Field parameter | All wells |

Note:

1 An equivalent, U.S. Environmental Protection Agency-approved method may be substituted.

## 2.4 Monitoring Frequency

Long-term monitoring will have the following schedule:

**Years 1 through 5:** Monitoring occurs quarterly but will be reported annually unless a contingency trigger occurs. Long-term groundwater monitoring includes vinyl chloride, iron and manganese, cis-1,2-DCE (the precursor for vinyl chloride) in wells where vinyl chloride is measured, benzene in one well in the northern part of the landfill (MW-25) to track a localized plume that appears to originate in upgradient of the SPPD/City Area, and arsenic in wells MW-12, MW-08, MW-10, MW-18, MW-24, MW-25, MW-26, MW-27, MW-32, and MW-33. Note that MW-27 is not a CPOC well for arsenic. If benzene remains in compliance in MW-25 for 2 years (eight additional quarters), benzene analysis would be terminated. If iron and manganese concentrations are stable or decreasing for 2 years (eight additional quarters) decreased frequency of monitoring may be requested. If arsenic remains in compliance in MW-08, MW-10, MW-18, MW-24, MW-25, MW-26, MW-32, and MW-33 for 2 years (eight additional quarters), arsenic analysis would be terminated.

**Years 6 through 10:** Monitoring occurs semi-annually in the wet and dry seasons, but wells that have been in compliance for the previous 2 years would be dropped from the sampling requirements. The list of analyses would also be decreased to field parameters

and those COCs that remain out of compliance. Monitoring results would be reported annually unless a contingency trigger occurs.

**Year 11 and below:** Monitoring would continue on an annual basis, if and only if one or more wells remained out of compliance. Monitoring would be limited to those wells and COCs that are not in compliance. Monitoring results would be reported annually unless a contingency trigger occurs.

## 2.5 Unforeseen Events

An unforeseen emergency or extreme weather event, such as earthquakes, fires, or floods, or other natural or man-made disaster would trigger an inspection of the monitoring well network. Such unforeseen events could cause a sudden differential settlement of the cap that could affect the integrity of the monitoring wells. The following criteria for unforeseen events would trigger an inspection of the monitoring well network.

An earthquake along the Seattle fault that registers 4.0 or greater on the Richter scale.

An earthquake within 100 miles of Seattle that registers 5.0 or greater on the Richter scale.

A flood or major storm that produces greater than 3.0 inches of rainfall within a 24-hour period.

Any fire that occurs on or below the cap.

Any other damage in the area of the Site observed by the parcel owners and facility owners or the public, such as damage sustained by high winds, facility, or vehicular accident.

If any of the above unforeseen events occur, then the Site Coordinator should schedule an inspection of the monitoring well network with the appropriate personnel as soon as safe and practical (generally within a few weeks). If the integrity of critical monitoring wells is significantly compromised as a result of an unforeseen event, Ecology must be notified and repairs or replacement must be initiated as soon as practicable.

## 3.0 Groundwater Contingency Action Triggers

The landfill has been closed for almost 50 years, and groundwater conditions over the last decade indicate that only vinyl chloride, arsenic, iron, and manganese exceed the groundwater cleanup levels (CULs) at the CPOC; and that these concentrations are continuing to decrease slowly by means of natural attenuation. A long-term groundwater monitoring well network at and near the Site includes 14 wells. This existing well network will be used to monitor groundwater conditions at, and downgradient of, the Site. Contingency action is discussed below.

### 3.1 Trigger Conditions for Vinyl Chloride

Two conditions that trigger contingent actions will be monitored in the existing compliance monitoring well network:

**Condition 1.** Condition 1 (the concentration trigger) is based on groundwater concentrations. In about half of the downgradient wells, the vinyl chloride concentrations exceed the CUL of 0.29 micrograms per liter (µg/L), with concentrations in one well (MW-25) fairly consistently between 0.7 and 1.4 µg/L. If concentrations in any downgradient well exceed 1.45 µg/L (5 times the CUL) for two consecutive sampling events, this constitutes Condition 1, and a contingent response is triggered. This trigger is not applied to MW-30 and MW-31, whose concentrations are affected by a non-landfill source in addition to the landfill.

**Condition 2.** Condition 2 (the trend trigger) is based on the trend of groundwater concentrations over time in the monitoring wells. Condition 2 is reported using trend plots supported with simple statistical tools in ProUCL.[1] Condition 2 is designed to capture statistically meaningful increases in groundwater concentrations. The trend identification will use a well-established, non-parametric statistical method for trend analysis available in ProUCL called the Mann-Kendall method and will be applied to downgradient wells where the concentration of vinyl chloride is greater than the CUL. The trend analysis will include MW-31 (which is screened in the alluvial aquifer), but not MW-30 (which is screened in the Silt Overbank Deposit). The trend test will be performed at a 95 percent confidence interval.

### 3.2 Contingent Actions to Trigger Conditions for Vinyl Chloride

If either or both of the trigger conditions occur, the following actions will be implemented:

[1] ProUCL is currently approved by Ecology for use for this test. Other software may be used in the future but will require approval by Ecology.

1. Ecology will be notified within 30 days of data validation to report that a trigger condition has occurred.
2. Within 90 days of the notification, the Subject potentially liable persons (PLPs) will submit a written evaluation that considers the following:
    A. Is the cause of the trigger event (source of the contamination) known?
    B. Does it likely represent a transient condition or a new condition?
    C. Do the data indicate that the most likely source is the Site?
    D. Does a focused exposure assessment indicate an exposure threat to human health or the environment?
    E. If the source is likely within the Site, what actions are appropriate at this time? Actions may include, but are not limited to, one or more of the following:
        i. Continued monitoring to confirm that it is a transitory effect. For example, construction that disturbs the Silt Overbank Deposit may cause a short-term increase that may be acceptable to Ecology as part of the construction project.
        ii. Modified sampling to understand the cause or source.
        iii. Changes in operations of landfill gas systems.
        iv. Changes in some site-related activity, if practicable.
        v. Additional investigation at the Site.
        vi. Confirmation that natural attenuation conditions are stable and favorable and possible implementation of in situ modification (such as the addition of a reducing agent or microbial enhancement), if needed.
        vii. Pump and/or treat if determined to be appropriate and effective.
        viii. Other technologies that are appropriate to the situation.
    F. If additional remedial action beyond the above actions is considered, it will be evaluated in a manner consistent with a focused feasibility study under MTCA, leading to a proposed corrective action.

If an increasing trend is observed for MW-31, the following actions will be implemented:

1. Ecology will be notified within 30 days of data validation to report that a trigger condition has occurred.
2. Because monitoring wells MW-25, MW-32, and MW-33 are between the Site and MW-31, if an increasing trend is observed in MW-31, the concentrations at these wells will be evaluated to determine if the source could be the Site or if it is another location. If concentrations at the Site indicate that the probable source is the Site, the Subject PLPs will proceed with the action in 2e above. If Ecology determines the data at the Site indicates that the Site is not the cause of the increasing trend, it is Ecology's expectation that no additional action is required under the Agreed Order.

### 3.3 Contingent Triggers and Actions for Iron and Manganese

Iron and manganese are elevated at concentrations greater than background in several downgradient CPOC wells, as discussed in Section 4.2 of the KIP CAP. Trend plots shown in Appendix J of the Remedial Investigation/Feasibility Study indicate that concentrations are slowly decreasing and are expected to come into compliance within 10 years (Floyd|Snider et al. 2021). As long as the concentrations are stable or decreasing, no further action is required beyond monitoring. If concentrations show an increasing trend, monitoring will continue while the Subject PLPs and Ecology evaluate the situation to determine next steps. Once a dataset of eight quarterly events has been collected for iron and manganese during long-term monitoring, Ecology may approve a decreased frequency of monitoring for iron and manganese.

### 3.4 Contingent Triggers and Actions for Arsenic

There are known cement kiln dust deposits upgradient of the Edge of Refuse in the KIP Area. As long as the concentrations of arsenic are stable or decreasing in downgradient wells MW-08, MW-10, MW-18, MW-24, MW-25, MW-26, MW-32, and MW-33, no further action is required beyond monitoring. If arsenic remains in compliance with the CUL for 2 years (eight additional quarters), arsenic analysis would be terminated.

## 4.0 Health and Safety

Groundwater sampling personnel must follow general health and safety procedures while performing groundwater monitoring activities at the Site. Each monitoring well is in an area that will have vehicular traffic and other potential hazards associated with active facility operations. Sampling personnel must be aware of these hazards and take appropriate precautions while performing the work outlined in this GWMCP. At a minimum, personnel performing routine groundwater monitoring must wear a high visibility safety vest at all times and should be aware of traffic patterns and facility operations. If work on a specific parcel or facility requires other specific personal protective equipment (PPE), such as a hard hat or steel-toed boots, then the additional PPE requirements must be met to complete the sampling.

Groundwater monitoring will be conducted in accordance with a site-specific Health and Safety Plan, which will be prepared by the Subject PLP or Site Coordinator prior to conducting monitoring.

## 5.0 Reporting and Record Keeping

To document compliance with this GWMCP, the Subject PLP must maintain and compile the following records after the completion of each monitoring event:

Routine monitoring field forms/notes

Analytical reports

Updated trend plots for vinyl chloride, benzene, cis-1,2-DCE, arsenic, iron, and manganese

Groundwater level measurements and updated groundwater contour maps

Well maintenance records, if necessary, which should include a description of the maintenance performed and reason/type of repair, as well as photographic documentation, if appropriate

In accordance with the KIP CAP, the results of the long-term groundwater monitoring will be reported annually, unless a trigger condition occurs, which would require special reporting considerations, discussed in Section 3.0 of this GWMCP. An Annual Report will be prepared by a Site Coordinator on March 31 of each year for the previous calendar year's sampling. A brief discussion of any important or relevant changes in the landfill conditions will be included in the annual monitoring reports. The Subject PLP is responsible for compiling any necessary documentation necessary for reporting.

## 6.0 References

Floyd|Snider, Aspect Consulting, Herrera Environmental Consultants, and BHC Consultants. 2021. *Remedial Investigation/Feasibility Study Revised Final*. Prepared for City of Seattle and South Park Property Development, LLC. February.