Engineering Design Report
for
Sudbury Road Landfill Remedial Action
Walla Walla, Washington

January 6, 2016

Prepared for:

City of Walla Walla

Prepared by:

Schwyn Environmental Services
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Spokane, WA 99223
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Prepared for

City of Walla Walla
55 Moore Street
Walla Walla, WA 99362

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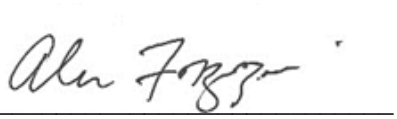

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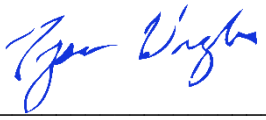

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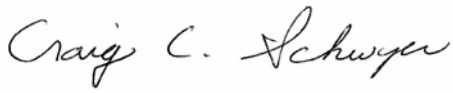

Craig C. Schwyn, LHG
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Principal Hydrogeologist

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LIST OF ABBREVIATIONS AND ACRONYMS

AO	Agreed Order No. 8456
ARARs	Applicable or relevant and appropriate requirements
bgl	Below ground level
City	City of Walla Walla, Washington
CAP	Cleanup Action Plan
CFR	Code of Federal Regulations
CH_4	Methane
CO_2	Carbon Dioxide
Decree	Consent Decree 15-2-00536-8
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EIMS	Environmental Information Management System
EW	Extraction well
ET	Evapotranspiration
Freon 11	Trichlorofluoromethane
Freon 12	Dichlorodifluoromethane
GCCS	Gas Collection and Control System
GW	Gas monitoring well
HDPE	High-density polyethylene
HWA	HWA GeoSciences, Inc.
H:V	Horizontal to vertical
LEL	Lower Explosive Limit
LFG	Landfill gas
µg/L	Micrograms per liter
MSW	Municipal solid waste
MSWLF	Municipal solid waste landfill
MTCA	Washington State Model Toxics Control Act
NOI	Notice of Intent
O&M	Operations and Maintenance
O_2	Oxygen
PCE	Tetrachloroethene
PLP	Potentially Liable Person
RCW	Revised Code of Washington

RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
scfm	Standard cubic feet per minute
SDR	Standard dimension ratio
Site	Sudbury Road Landfill
TCE	Trichloroethene
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound
WAC	Washington Administrative Code
WSP	Washington State Penitentiary
WWCHD	Walla Walla County Health Department

1.0 INTRODUCTION

This Engineering Design Report (EDR) presents the design criteria and engineering justification for the selected cleanup action, as specified in the final Cleanup Action Plan (CAP) prepared by the Washington State Department of Ecology (Ecology) for the City of Walla Walla, Washington (City) Sudbury Road Landfill (Site) (Facility Site #4446540, Cleanup Site #2485). This EDR has been prepared pursuant to the requirements of the Model Toxics Control Act (MTCA) regulations (Chapter 173-340 WAC) and Consent Decree 15-2-00536-8 (Decree) filed with the Walla Walla Superior Court on August 19, 2015.

The draft EDR was submitted to Ecology for review and approval in accordance with the Decree and WAC 173-340-400(4)(a). Ecology Approval of the draft EDR was received on January 4, 2016. This final EDR presents the design criteria to fulfill the CAP, and includes a compliance monitoring plan prepared consistent with WAC 173-340-400(4)(b)(viii) and WAC 173-340-410, a financial assurance plan as required in WAC 173-340-440(11), and a schedule for the completion of plans and specifications, operations and maintenance (O&M) plan, and construction and documentation of the remedies.

1.1 REPORT ORGANIZATION

This EDR is organized into the following sections:

- Section 2 summarizes existing data and information related to the Site;
- Section 3 describes the cleanup standards for the Site;
- Section 4 presents the engineering design for the cleanup actions; and
- Section 5 provides references for the sources of information cited throughout the report.

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2.0 SUMMARY OF SITE CONDITIONS AND AFFECTED MEDIA

2.1 SITE DESCRIPTION AND SETTING

2.1.1 OWNERSHIP

The City is the owner and operator of the Sudbury Road Landfill that receives municipal solid waste from the Walla Walla and Columbia County region. Ecology has identified the City as a potentially liable person for groundwater contamination at the Site and the City will be responsible for the implementation of the CAP.

2.1.2 SITE LOCATION

The Sudbury Road Landfill is generally located at 414 Landfill Road (formerly Sudbury Road), Walla Walla, Washington 99362, about 4 miles west of the city of Walla Walla and 0.25 mile north of Highway 12 (Figure 1). The landfill and facilities cover approximately 125 acres. The designated Site area described in the Decree is composed of seven active and former disposal areas (Areas 1 through 7) covering an area of 94.44 acres (HDJ 2015). The landfill is located within the western portion of an 828.86-acre City-owned parcel of land that is zoned and used for various waste management purposes (Figure 2). The landfill is located in rural southeastern Washington and entirely surrounded by large expanses of rolling hills used for dry-land wheat farming.

2.1.3 LOCAL POPULATIONS

The closest residential populations are located approximately 2,000 feet or more south of the Site. Four residential properties located northwest, west, and southwest of the Site maintain their own domestic wells for water supply and are, in general, hydraulically downgradient of the landfill.

The Washington State Penitentiary (WSP) and its inmate population are located immediately east of the City's property boundary and more than 1.2 miles east of the Site itself. Groundwater under the WSP property is hydraulically upgradient of the Site.

2.1.4 SITE GEOLOGY

The Site lies on the northern flank of the Walla Walla Valley. The subsurface geology beneath the landfill consists of (from upper to lower) Palouse silt; reworked lacustrine silt and clay of the Touchet beds; interbedded alluvial gravels in a clayey, silty, or sandy matrix, informally termed the "old gravel and clay"; and Columbia River basalt. The unconsolidated to semi-consolidated deposits overlying the Columbia River basalts may be 600 feet or more in thickness.

Vadose zone soils in the landfill area consist of silt, clayey silt, and fine sandy silt, which are interpreted to be soils of the Palouse Formation and the Touchet beds. These silty soils exhibit laboratory permeabilities in the range of 10^{-6} to 10^{-5} centimeters per second. Underlying the silty soils is a unit

consisting of consolidated to semi-consolidated, poorly-graded gravel, silty gravel, and silt, which are interpreted to correlate with the "old gravel and clay" unit.

2.1.5 HYDROGEOLOGY

Groundwater beneath the Site is first encountered at depths from approximately 30 to 87 feet below ground level (bgl) in the lower silt horizon of the Touchet beds and/or the underlying alluvial gravel aquifer. The inferred groundwater flow direction is to the west and southwest, with an approximate horizontal gradient of 0.004 feet per foot beneath the landfill. A hydraulic conductivity of 1.4×10^{-2} cm/sec was calculated from pumping tests conducted in the gravel and clay aquifer at MW-15D during the remedial investigation (RI). The calculated groundwater velocity is about 190 feet/year. The groundwater levels in the vicinity of the landfill have been declining, and since 1997, the water level in MW-12 has declined as much as 10 feet.

A second, more regional, deep aquifer is present in the underlying Columbia River basalts. Information from the driller's water well reports, within the vicinity of the Site, indicated that the basalt aquifer had a potentiometric surface in the range of 150 to 200 feet bgl and a positive upward gradient (EMCON 1995).

2.2 LANDFILL AND GROUNDWATER MONITORING HISTORY

2.2.1 DISPOSAL HISTORY

The Sudbury Road Landfill is currently operating in accordance with the standards of Chapter 173-351 WAC, Criteria for Municipal Solid Waste Landfills (Ecology 1993) and a Municipal Solid Waste Landfill Permit issued by the Walla Walla County Health Department (WWCHD). The initial Conforming Permit for the landfill was issued on June 27, 1977, and news publications announced that the "New City Landfill on Sudbury Road" was opened to the public on July 10, 1978 (*Walla Walla Union Bulletin* 1978). Municipal solid waste (MSW), asbestos waste, and medical waste have been placed on the landfill property since that time.

MSW has been placed in five separate areas, commonly referred to as Areas 1, 2, 5, 6, and 7. Area 1, 2, 5, and 6 are unlined. Area 7 has a bottom liner and is actively receiving MSW. Asbestos waste has been disposed of in two separate cells (Areas 4a and 4). A single medical waste cell has been used (Area 3). In 2006, a temporary composting facility was constructed above the former asbestos Area 4 and medical waste cells, and a permanent composting facility that complied with Chapter 173-350 WAC was constructed and opened in 2009. The approximate limits of the refuse disposal areas are shown on Figure 2. The practices used to fill the waste disposal areas are fully described in the RI/FS Report (Schwyn 2014).

2.2.2 GROUNDWATER MONITORING HISTORY

As part of their solid waste handling permit requirements, the City has monitored groundwater on a quarterly schedule since July 1978. A number of VOCs [including chloroform, trichloroethene (TCE), and tetrachloroethene (PCE)] were first detected in upgradient wells on the eastern boundary of the City's property (over 1.4 miles east, and upgradient, of the landfill) in 1993 and they persist in samples collected as recently as 2013. This area-wide VOC impact to groundwater is not attributed to the landfill, but does contribute to the contaminant concentrations in the landfill wells.

In July 2001, monitoring well MW-15 was installed in the northwest corner of the landfill to monitor the groundwater quality of the uppermost aquifer immediately downgradient of Area 5. VOCs, including TCE, PCE, trichlorofluoromethane (Freon 11), dichlorodifluoromethane (Freon 12), vinyl chloride, chloroethane, 1,1-dichloroethane, and cis-1,2-dichloroethane, and inorganic constituents, including calcium, sodium, bicarbonate/alkalinity, chloride, and total dissolved solids, were detected at higher concentrations in MW-15 relative to the concentrations in other Site wells and the area-wide background concentrations of PCE, TCE, and chloroform. These exceedances of Site-specific Chapter 173-351 WAC compliance levels prompted further investigation at the Site.

2.3 SUMMARY OF INVESTIGATIONS AND CLEANUP ACTIONS

2.3.1 ASSESSMENT MONITORING AND DOMESTIC WELL SAMPLING

In September 2002, an assessment monitoring program was initiated in accordance with WAC 173-351-440. Assessment monitoring increases the number of constituents tested from the number routinely tested during detection monitoring. The tests resulted in only one additional constituent found to be present at concentrations greater than background concentrations – Freon 12. Freon 12 was subsequently added to the routine monitoring program for the landfill.

Groundwater monitoring for VOCs in three domestic wells (Small, Camp, and Kinman) was initiated in 2002. Chloroform, PCE, and TCE were detected in groundwater samples collected from the Small well, and PCE was detected in groundwater samples collected from the Camp Well. These wells are located hydraulically downgradient of the landfill and, approximately 0.75 to 1.5 mile west and northwest of the landfill, respectively. VOCs were not reported in the Kinman well. Periodic sampling continued into 2013. A review of VOC concentrations in the domestic wells by the Washington State Department of Health in 2012 (WDOH 2012) indicated that the concentrations were safe for individuals who use the groundwater for drinking, showering, bathing, and cooking.

2.3.2 INDEPENDENT REMEDIAL INVESTIGATION

Preliminary remedial studies were initiated in 2004 to characterize the MW-15 contamination and fulfill the requirements of WAC 173-351-440. The City prepared an RI work plan and initiated the work

in 2005. The investigation was stalled in 2006 before the City could complete all of the tasks due to factors such as insufficient funds and off-Site access.

2.3.3 SITE MTCA LISTING AND AGREED ORDER

In January 2010, Ecology submitted an Early Notice Letter to the City and followed up with a Potentially Liable Person (PLP) Status Letter in March 2010 (Ecology 2010). Agreed Order No. 8456 (AO) was subsequently initiated between the City and Ecology and became effective May 26, 2011. The AO required the City to conduct a RI/FS to investigate the nature and extent of contaminants of concern in groundwater associated with the Sudbury Road Landfill.

2.3.4 INTERIM ACTIONS

Interim actions were initiated at the Site in 2010 consistent with the Revised Interim Action Plan (Schwyn 2010). The interim actions included:

- Area 6 closure design and construction; and
- Design and construction of stormwater controls on the north side of Area 5.

The Area 6 closure consisted of (1) placement of an evapotranspiration (ET) cover over the refuse area, (2) installation of a LFG collector and control system, and (3) improvements to the stormwater collector and conveyance system. Construction of stormwater drainage control located on the north side of Area 5 and 6 (commonly referred to as the north drainage ditch) included (1) a sedimentation basin, (2) filling of depressions in the valley bottom and grading to direct stormwater flow to the west, (3) installation of a culvert under the western perimeter roadway to allow the stormwater to flow off-Site, and (4) installation of erosion control mats in the stormwater channel.

2.3.5 REMEDIAL INVESTIGATION

In 2012 and 2013, the City conducted an RI in accordance with the AO and the RI Work Plan (Schwyn 2011). The City conducted geophysical surveys of the refuse areas, installed many groundwater and landfill gas monitoring wells, sampled on- and off-Site groundwater, sampled soils beneath buried waste, inspected stormwater controls and cover over landfill areas, tested landfill gas composition and production, and checked existing gas control systems at the Site. The RI provided the basis to evaluate the nature and extent of the contamination and evaluate remedial actions appropriate for the Site. The methods and findings of the RI, a conceptual site model, an evaluation and recommendation of applicable cleanup alternatives for the Site were presented in the RI/FS Report (Schwyn 2014).

2.4 SUSPECTED SOURCES OF HAZARDOUS SUBSTANCES

Most of the waste disposed of at the Site is MSW from the City, as well as Walla Walla and Columbia Counties, which are predominantly rural counties with an agricultural economic base and little manufacturing or heavy industry. Permitted waste disposal at the Site has been limited to MSW, asbestos, and medical wastes. Based on the RI data, the suspected source of hazardous substances is MSW from Areas 1, 2, and 5. VOCs were detected in soil samples beneath the MSW in these areas. This may be an indicator of downward leachate migration or an indicator of LFG impact, or a combination of both. These areas are unlined, have no leachate collection system, and no gas control system with the exception of one passive gas vent in Area 5. MSW may be impacting groundwater from the following:

- LFG from Areas 1, 2, and 5;
- Leachate from Areas 2 and 5; and
- Direct disposal of MSW in groundwater at Area 5.

Based on groundwater sampling results, LFG and/or leachate are considered the primary pathways by which contaminants from MSW may have reached groundwater.

2.4.1 LANDFILL GAS

During the RI, LFG was observed in all of the MSW disposal areas. Laboratory results of the LFG indicated the presence of some VOCs at concentrations high enough to potentially impact groundwater quality. Without controls (e.g. liner under MSW, gas extraction system, etc.), the LFG has the potential to transfer contaminants to underlying groundwater by means of chemical equilibrium processes. Area 1, 2, and 5 do not have LFG control systems in place. The LFG from these areas are suspected to contribute contaminants to groundwater.

In 2010, a LFG collection and control system (GCCS) was installed in Area 6 that extracts LFG and combusts the LFG at a flare station. The system performance was assessed during the RI. The evaluation indicated that the system was effectively controlling LFG in Area 6 and preventing LFG movement beyond its boundary. The radius of influence was assessed in eleven Area 6 gas extraction wells and the results indicated that lower methane concentrations at wells near the Area 6 boundary than wells more centered in Area 6. Additionally, no methane was measured at a perimeter gas probe outside Area 6. Based on these results, the system appears to be controlling LFG from this area. LFG from Area 6 may have contributed LFG contaminants prior to installation of the gas system, but it is not a suspected source that continues to contribute.

2.4.2 LEACHATE

Leachate could be a contributing source of hazardous substances as a result of the following:

- Infiltration of precipitation and stormwater into MSW due to insufficient soil cover over most of Area 2 and portions of Area 5.
- Infiltration of stormwater into, or near the MSW. There are three areas of concern:
  - An unlined stormwater drainage channel that extends along the north side of Area 5 approximately 30 to 40 feet from where MSW is buried.
  - Stormwater run-on observed in the southwestern portion of Area 5
  - Poor grading of the Areas 1 and 2 soil covers.

2.4.3 MUNICIPAL SOLID WASTE IN CONTACT WITH GROUNDWATER

A relatively small amount of MSW was disposed at depths below the groundwater level in the northern part of Area 5 when landfilling began in Area 5 around 1978. MSW was discovered below the water table in one soil boring; however, several borings along the northern part of Area 5 had wet soils near the base of MSW. Results of soil sampling beneath MSW along the northern part of Area 5, and groundwater sampling from three wells along the northern part of Area 5, show that VOCs do not increase downgradient of the area where MSW is in groundwater. Given these test results and a declining elevation of the regional groundwater table that will provide greater separation between the MSW and groundwater, the limited volume of MSW in groundwater does not appear to be a significant source of contaminants to groundwater.

2.5 CONTAMINATED MEDIA

2.5.1 GROUNDWATER

Based on the RI findings, the environmental medium that requires cleanup is groundwater. Exceedances of the groundwater cleanup levels for PCE and vinyl chloride have been detected only at well MW-15, which is located at the downgradient property boundary. Vinyl chloride has not been detected at any other well included in the RI/FS. Off-property migration of contaminants in groundwater has occurred; however, there were not exceedances of the cleanup levels in samples from the off-Site monitoring and domestic wells nearest to MW-15.

2.6 CLEANUP ACTION PLAN

Ecology prepared a draft CAP for public review and comment, and finalized the CAP in May 2015. The objective of the CAP remedy is to comply with WAC 173-340-360, be protective of human health and the environment, and be consistent with the preference for permanent solutions to the maximum extent practicable consistent with Revised Code of Washington (RCW) 70.105D.030(1)(b). The CAP remedy selected by Ecology for the Site consists of improved capping of several solid waste cells, capture and destruction of landfill gas (LFG), and controls on stormwater. It also requires long-term monitoring and institutional controls.

3.0 CLEANUP STANDARDS

The MTCA cleanup regulations provide that a cleanup action must comply with the site-specific cleanup standards described in WAC 173-340-700, which include cleanup levels for hazardous substances at the Site, the locations or points of compliance where the cleanup levels must be met, and applicable or relevant and appropriate requirements (ARARs) based on federal and state laws.

3.1 SITE CLEANUP LEVELS

Groundwater is the contaminated media at the Site. PCE and vinyl chloride were the only chemicals with concentrations that exceeded their respective MTCA screening levels and are the indicator hazardous substances at the Site. Other VOCs have been detected in groundwater, but at concentrations below the screening levels. The highest concentrations of PCE and vinyl chloride were detected in monitoring well MW-15, with vinyl chloride detected in MW-15 only.

MTCA Method B groundwater cleanup levels were developed for PCE and vinyl chloride based on the protection of human health related to drinking water as the highest beneficial use. The Method B cleanup levels were developed as follows:

- The cleanup level for PCE is based on the most stringent of the ARARs and is 5 µg/L.
- The cleanup level for vinyl chloride was calculated to be 0.29 µg/L. This is based on the overall site risk from the presence of both indicator hazardous substances and protection of human health. The concentration is protective of human health when the hazard index does not exceed 1 and the total excess cancer risk does not exceed 1 in 100,000 (1×10^{-5}).

The Site PCE and vinyl chloride cleanup levels are provided in the following table, along with the associated risk.

Constituent of Concern	Cleanup Level (µg/L)	Associated Risk Values	
		Excess Cancer Risk	Hazard Quotient
Tetrachloroethene (PCE)	5.0	2.3×10^{-7}	0.1
Vinyl chloride	0.29	9.9×10^{-6}	0.01
	Total Risk	1.0×10^{-5}	0.11

µg/L = micrograms per liter

3.2 POINT OF COMPLIANCE

Cleanup levels are applied at the point of compliance with the cleanup standard. The standard point of compliance for groundwater under MTCA is "throughout the site from the uppermost level of the saturated zone extending vertically to the lowest depth which could potentially be affected by the site" [WAC 173-340-720(8)(b)]. For landfills, where hazardous substances remain on site, a conditional point of compliance is used that sets the point of compliance as close as practicable to the source of the

hazardous substances; either the downgradient edge of the waste cells, or the landfill boundary, whichever is closer [WAC 173-340-720(8)(c)].

For the Site, the downgradient boundary coincides with the western edge of Area 5 and the location of well MW-15. MW-15 is the only well with groundwater that has exceeded cleanup levels and it is an on-site well. Therefore, a conditional point of compliance is set at the western property boundary of the Sudbury Road Landfill.

3.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with MTCA, all cleanup actions must comply with applicable state and federal laws [WAC 173-340-710(1)]. MTCA defines applicable state and federal laws to include legally applicable requirements and those requirements Ecology determines, based on consideration of the criteria in WAC 173-340-710(4), are relevant and appropriate requirements. Collectively, these requirements are referred to as ARARs. The ARARs for this project include the following:

- MTCA Cleanup Regulation (Chapter 173-340 WAC);
- Minimum Functional Standards for Solid Waste Handling (Chapter 173-304, WAC);
- Criteria for Municipal Solid Waste Landfills (Chapter 173-351 WAC);
- Solid Waste Handling Standards (Chapter 173-350 WAC);
- Dangerous Waste Regulations (Chapter 173-303 WAC);
- State Environmental Policy Act (SEPA) Rules (Chapter 197-11 WAC);
- Safe Drinking Water Act, Primary Drinking Water Regulations [Code of Federal Regulations Title 40, Part 141 (40 CFR 141)]
- State Water Code and Water Rights (Chapters 173-150 and 173-154 WAC);
- Underground Injection Control Program (Chapter 173-218 WAC);
- State Water Pollution Control Act (Chapter 90.48 RCW);
- Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 RCW);
- Washington Clean Air Act (Chapter 70.94 WAC);
- General Regulations for Air Pollution Sources (Chapter 173-400 WAC);
- Operating Permit Regulation (Chapter 173-401 WAC);
- Occupational Safety and Health Act (29 CFR 1910.120);
- Washington Industrial Safety and Health Act (Chapter 49.17 RCW);
- Uniform Environmental Covenants Act (Chapter 64.70 RCW); and
- Accreditation of Environmental Laboratories (Chapter 173-50 WAC).

4.0 CLEANUP ACTION PLAN DESCRIPTION

The cleanup action described in this section was selected and determined by Ecology to comply with the MTCA requirements in WAC 173-340-360. The cleanup action will include active remediation components, compliance monitoring and institutional controls, all of which are described below.

4.1 OVERVIEW OF THE CLEANUP ACTION

The CAP remedy for the Site consists of improved capping of several solid waste cells, capture and destruction of LFG, and controls on stormwater to prevent leachate generation. It also includes provisions for long-term monitoring and institutional controls. The components of the selected cleanup action for the Site consist of:

- Landfill cap improvement using an ET cover over Areas 2 and 5, including grading design to move stormwater away from the refuse areas.
- Stormwater controls:
  - Cast-in-place concrete for the north drainage ditch;
  - Erosion control berm for Area 5 runoff; and
  - Diversion of run-on from the southwest side of Area 5.
- Active LFG extraction and destruction in Areas 1, 2, and 5.
- Long-term monitoring of:
  - Groundwater;
  - LFG;
  - Landfill cap; and
  - Stormwater controls.
- Long-term maintenance of:
  - Groundwater monitoring systems;
  - LFG extraction and monitoring systems:
  - Landfill cap; and
  - Stormwater controls.
- Institutional controls.

The general details for each component of the CAP remedy are presented below.

4.1.1 FACILITY CHARACTERISTICS

No facility characteristics are identified that would adversely impact the cleanup action. The cleanup action will be conducted on closed portions of the Sudbury Road Landfill and will not affect the active facility operations; except that temporary traffic flow rerouting to the compost facility or shutdown of the Area 6 landfill gas system may be required for short periods during construction. According to the Solid Waste Permit Application (Shaw 2005) for Area 7, the landfill is not located in a 100-year flood plain, the landfill is not located in an unstable area, and the nearest fault is more than 12 miles away. According to the permit application, the landfill is located in a seismic impact zone as defined in WAC

173-351-130(6); however, the results of a dynamic earthquake acceleration study conducted by Shaw indicated that the landfill containment systems will remain stable and intact. Extreme temperatures in the Walla Walla region [record high (114 °F) and low (-24 °F)] could cause temporary disruption to the GCCS; however, the GCCS components will be winterized to minimize the potential for cold weather impacts. Public comment on the CAP did not identify any local planning or development issues that would impact the cleanup action.

4.2 LANDFILL CAP

An ET cover will be constructed over Area 2 and Area 5. An ET cover was the final cover selection for the Area 6 closure in 2010; therefore, several key aspects of the design have already been completed. As described in a geotechnical report prepared by HWA GeoSciences, Inc. (HWA 2010), a 4.8-foot-thick layer of native soils loosely compacted in 24-inch lifts at 85 percent of maximum compaction was the design solution for the Area 6 cover. The top foot of the cover incorporated Class B biosolids from the Walla Walla Wastewater Treatment Plant as well as compost from the compost facility at the Site to create an organic topsoil layer in which dry land vegetation would thrive. Follow-up inspections indicate that the Area 6 cover is performing well. Therefore, the same ET cover design will be used at Areas 2 and 5.

4.2.1 AREA 2

Test pits from the RI/FS Report noted existing soil cover on Area 2 varies from 6 inches to 11 feet; however, the vast majority of test pits at Area 2 indicate existing soil cover is less than 5 feet thick. During development of the Construction Plans, a grading plan will be developed based on test pit information from the RI/FS Report to ensure at least 4.8 feet of soil cover is present everywhere on Area 2. The grading plan for Area 2 will be constructed with flat faces that will blend into existing contours. The steepest slope is expected to be approximately 5H:1V. Because waste was found to be present all the way to the edge of the southern access road, a small retaining wall will likely be necessary along the south edge of Area 2 to retain the cover soil without covering access road. A simple ecology block wall is proposed to retain the cover soil. All soil cover material will be imported from an on-site borrow location, which is expected to be located near the existing leachate lagoon. A proposed conceptual grading plan for Area 2 is depicted in Figure 3.

4.2.2 AREA 5

At Area 5, the existing soil cover ranges in thickness from 1.5-15 feet. The vast majority of the RI test pits indicate that the soil cover is more than 5 feet thick. However, cover soil thickness less than 5 feet were found on the south side and northeast corner of Area 5. There are also several deep ruts on the west side and depressions from access roads along the north face of Area 5. During development of the

construction plans, a grading plan will be developed based on test pit information from the RI/FS Report to ensure at least 4.8' of soil cover is present everywhere on Area 5. The grading plan for Area 5 will be constructed with flat faces that will blend into existing contours. The existing access roads along the north face of Area 5 will be removed. The tree on the north face will also be removed. The steepest slope of Area 5 is expected to be 3H:1V. Because some of northern portions of Area 5 have a cover depth in excess of 5 feet, some of this material may be used as borrow and fill for smooth grading and consistent cover depth over Area 5. Any additional fill material needed on Area 5 will be imported from the borrow site. A proposed conceptual grading plan for Area 5 is depicted in Figure 4.

4.2.3 BORROW SITE

The borrow area for the ET cover material will be located east of Area 7 in a possible future cell location (see Figure 4). The proposed haul road for bringing borrow material to Area 2 and Area 5 is along the existing perimeter access road as shown in Figures 3 and 4. The haul road use may be increased by approximately 5,000 trips during construction, depending on the equipment type chosen by the contractor. The haul road will require improvement before, likely during, and after the haul activity to minimize dust and maintain the road in a usable condition. There is an existing pile of reinforced concrete rubble, as shown on Figure 4, that will be crushed, processed to remove rebar, and used as surfacing material for the road improvements. The construction documents will include specifications for a crusher to be brought onsite to crush and process the material. It is estimated that this rubble pile will produce approximately 10,000 cubic yards of crushed material that will be available for road surfacing.

4.2.4 CONSTRUCTION SEQUENCING

Construction of the ET cover will consist of 6 steps: 1) clearing and grubbing, 2) rough grading, 3) installing gas collection system, 4) final grading, 5) compost layer, and 6) hydroseeding. The top 4 inches of material from Areas 2 and 5 will be cleared and grubbed and stockpiled in order to be mixed into the top foot of cover material. Rough grading will include constructing the top 4 feet of the ET cover at Areas 2 and 5. The rough grading will include cutting the existing site down to a pre-determined subgrade. The soil will then be replaced at design compaction specification to an elevation of one foot below finish grade. There is expected to be an excess of cut material from Area 5 that can be placed on portions of Area 2; however, some imported fill will be necessary to complete the rough grading for Area 2. Upon completion of the rough grading, the gas extraction wells and gas collection system will be constructed. After the gas system is constructed, any areas compacted by the drilling equipment will be scarified and the final foot of cover material will be imported from the borrow site and graded to plan. Biosolids from the City's Wastewater Treatment Plant, as well as organic material from the clearing and grubbing, will be incorporated into this final top foot of cover. Compost from the City's Compost Facility

will then be placed on top of the final cover. The compost will be applied at an approximate one inch depth and worked into the surface by track walking low ground pressure equipment up and down the slopes. Finally, hydroseeding mulch and tackifier will be applied. The same dryland hydroseed mix used at Area 6 will be specified on Areas 2 and 5.

4.3 STORMWATER CONTROLS

Stormwater controls will be constructed on the north, west, and south sides of Area 5. The stormwater controls include improvement to the north drainage ditch channel, Area 5 stormwater runoff features, repair of erosion features on the Area 5 cover, and surface elevation regrading to prevent stormwater run-on to Area 5 from the south.

Regrading of Areas 2 and 5 will also be performed during the placement of the ET covers as described in Section 4.2. The stormwater controls required for the north drainage ditch and Area 5 runoff and run-on are summarized in the following subsections.

4.3.1 NORTH DRAINAGE DITCH

A cast-in-place concrete channel will be constructed in the location of the existing stormwater channel ("North Drainage Ditch") along the north side of Area 5 (see Figures 4 and 5). The concrete cast-in-place channel will have a slope at 0.7% toward the west, which will promote a "scouring" velocity that is designed to flush sediments from the ditch flow line. The concrete channel will transition into the existing culvert at the western edge of the landfill as show on Figure 4.

A geomembrane will provide secondary protection underneath the concrete channel. The geomembrane will terminate approximately 30 feet west of the western boundary of Area 5 and approximately 20 feet east of the western culvert. The termination of the geomembrane will allow a place (downgradient and away from MSW) for drainage of any water that might collect on the geomembrane liner underneath the concrete channel. Moisture accumulation on the geomembrane is expected to be minor; however, a drain mechanism is required to prevent freeze damage to the overlying concrete channel.

Although the ditch will be designed to be self-cleaning, the City may wish to occasionally remove sediment and wind-blown debris. Therefore, the east end will be sloped for equipment access and the cross-sectional shape of the ditch will be rectangular (5 feet wide by 1 foot deep) to allow a typical skid steer to be driven within the ditch. The cast-in-place concrete channel design will include reinforced concrete and a pea gravel base to provide the structural support needed for the skid steer. A cross section of the general design is shown on Figure 5.

The cast-in-place concrete channel will be designed to allow sheet runoff from the north face of Area 5 to enter into the ditch. The design will include a strip of geomembrane that is bolted to the top of

the concrete channel and covered with an erosion control mat on the south side of the ditch to prevent undermining and rutting as the sheet flow enters the channel (Figure 5).

4.3.2 AREA 5 EROSION CONTROL BERM

An erosion control berm will be constructed to impede stormwater run-on and direct any Area 5 stormwater run-off into the north drainage ditch. The erosion control berm will consist of a 1.5 foot tall berm with a 4 foot wide top surface. The erosion control berm will extend along the entire southern boundary and west side of Area 5 and will be sloped to convey stormwater runoff from Area 5 to the north drainage ditch, as shown on Figure 4. A portion of the berm will include a V-shaped drainage channel lined with an erosion control mat as shown on Figure 5. The total length of the berm will be about 1,500 feet, and it will have a maximum 4 percent slope. A portion of this berm will be formed by the embankment from the reconstructed compost access road, as described in the following section.

4.3.3 AREA 5 STORMWATER RUN-ON

An elevated soil berm and roadway will be constructed north of the compost facility to prohibit stormwater generated south of Area 5 from flowing north onto Area 5. The existing culvert will be removed and replaced with a new culvert that will direct stormwater from the roadside ditch on the north side of the compost access road onto the compost pad, and ultimately into the compost facility lagoon. Reconstruction of approximately 200 linear feet of the existing compost access road is needed in order to raise the grade of the road and prevent stormwater from flowing onto Area 5. The compost access road will be realigned to provide better maneuverability for tractor-trailer traffic, but will not infringe upon Area 5. The configuration is shown on Figure 4.

All drainage from roadway structures outside of Area 5, and drainage off the asphalt surface, will be to the south into the compost lagoon. The area to the north of the new compost access road will receive an ET cover similar to the rest of Area 5. The area immediately to the north of the compost pad will be graded to drain westerly and runoff will be gathered in a new roadside ditch on the east side of the haul road.

As noted in the RI/FS Report, the additional stormwater from a 25-year, 24-hour rainfall event diverted into the compost facility lagoon is calculated to cause an approximately 3 inch rise in the water level within the lagoon, which the lagoon has capacity to handle in accordance with the surface impoundment standards of chapter 173-350 WAC. Additionally, daily monitoring and the ability to pump water from the lagoon and use it in the compost process or move excess water to landfill leachate lagoons mitigates any effects that an anomalous storm event could have on pond sizing.

4.4 LANDFILL GAS CONTROLS

The current LFG extraction and gas treatment system for Area 6 will be expanded to include Areas 1, 2 and 5. The existing flare is currently operating at 180 to 200 standard cubic feet per minute (scfm). Design capacity of the flare is 350 scfm and the system is permitted for 300 scfm. LFG from Areas 1, 2, and 5 is projected at approximately 80 scfm which will bring the total flow no higher than 280 scfm, and therefore the operations will be in compliance with the current permit. The flare and permit have capacity for the additional flow, however, upgrades to the flare are required to facilitate operation in the winter. As part of the design development for Areas 1, 2 and 5, a Notice of Intent (NOI) for construction form will be filed in coordination with Ecology.

4.4.1 LFG EXTRACTION SYSTEMS

The operation of the Area 6 LFG collection and control system (GCCS), installed in 2010, has demonstrated that extraction well spacing intervals of 150 feet effectively collects LFG generated in Area 6. This system was evaluated as part of the RI and is working as designed. For this reason, controls for Areas 1, 2, and 5 will be similarly designed.

A total of ten LFG extraction wells will be installed as part of this project. At Area 1, one extraction well will be located near GW-11 and a second extraction well will be installed approximately 140 feet northeast of GW-11. Considering the small size of Area 2, one extraction well that is centrally located in the MSW should effectively capture LFG within that area. Seven Area 5 extraction wells will be spaced with a radius of 150 feet; comparable to the spacing of the extraction wells in Area 6, which appear to provide uniform and overlapping influence.

Extraction well design will incorporate a telescoping 3-inch diameter Schedule 80 PVC upper well pipe and a lower 4-inch diameter Schedule 80 PVC pipe configuration allowing settlement of the waste without compromising the well. A slip coupling will be installed connecting the upper and lower well sections. The extraction well screens will extend across the bottom one-third of the refuse with the bottom starting within the bottom 3 feet of refuse. A gravel well pack will be placed around the well screen, and a minimum 2-foot thick bentonite seal will be placed above the screen section. Soil backfill will extend from the bentonite seal to 7 feet below the final ET cover grade. An additional 3-foot bentonite seal will be placed just below finished grade to complete the well installation. Each well will be equipped with a vertical well head, valve, and monitoring station.

The extraction wells will be connected via lateral piping to a header pipe that will convey LFG to the existing header network and ultimately to the flare station for destruction. Gas flow meters will be installed at the main-line piping connections at Area 5 and Area 1. The Area 2 gas line will connect at the Area 5 flow meter. A field calibration check of the flow meters will be required annually and a factory bench calibration of each flow meter will be required in accordance with manufacturer recommendations.

A third flow meter will be purchased to serve as a "floating" or backup flow meter that can be rotated into service as flow meters are being calibrated at the factory. This will ensure flow is monitored at all times.

The extraction well laterals will be oriented to provide positive drainage to the header at a minimum 1 percent grade to ensure condensate does not impede collection vacuum or flow. Similarly, the headers will provide positive drainage to a proposed sump in at the base of Area 5, the existing sump near Area 1, and back into the proposed well in Area 2. Each extraction well will be equipped with a valve and monitoring station to regulate induced vacuum, the resulting flow, and to allow monitoring of LFG composition and temperature. Optimization of the extraction well layout and lateral/header orientation will be coordinated with the final grading of the cap. Optimization of the layout will be to minimize lateral run lengths, drain condensate in the direction of flow (where possible) and to minimize header lengths, bends, and fittings to reduce friction. Piping alignments will be coordinated with landfill access roads and drainage features to provide efficient access and to minimize grade conflicts preventing positive drainage. Refer to Figure 2 for the locations of the proposed LFG expansion system components.

4.4.2 CONDENSATE CONVEYANCE

The Area 5 LFG header low point is located near the northwest corner of Area 5. Condensate will drain by gravity into a new sump and pump system located off refuse just north of Area 5. The new sump and pump systems are similar in design to the Area 6 sumps. The sump pump will discharge the condensate via a 1½-inch HDPE forcemain. The forcemain will be installed in the same trench as the condensate drain line and LFG header, and connect to the Area 6 forcemain at the existing blind flange. The Area 6 forcemain connects to the leachate forcemain and discharges into the existing leachate evaporation ponds. For Area 1, the two new extraction wells will be connected to the existing Area 6 header and condensate sump system to provide vacuum and facilitate condensate drainage and removal. For Area 2, the LFG header low point is located at the extraction well. Because the Area 2 refuse cell is smaller in size with inconsistent pockets of waste and low temperatures, the LFG flow is expected to be minimal and therefore the condensate volume will not require a collection and pump system. Condensate will drain by gravity back into the extraction well. The conceptual condensate line and sump locations are shown on Figure 2.

4.4.3 VENT DECOMMISSIONING

The existing Area 5 LFG vent will be decommissioned to prevent short-circuiting of the LFG to surface or intake of surface air. A variance from the requirements of the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC) will be required because there is no construction log for the vent, and the equipment to perforate or remove the casing (a requirement of the regulation) would present an undue explosion and toxicity risk to workers. The variance request will

describe a procedure in which the 24-inch diameter steel vent would be filled from the bottom to near surface with a bentonite concrete grout. The vent pipe would be cut approximately 2 or 3 feet below the top of the final ET cover grade, and the ET cover would be constructed over the decommissioned vent. The variance is justified because the pipe is situated entirely in MSW, does not penetrate soil horizons beneath the MSW, and the bottom of the vent is separated from the regional water table by approximately 20 feet of low permeability silt (silty soils on-Site exhibit permeabilities in the range of 10^{-6} to 10^{-5} centimeters per second). Prior to decommissioning, the driller will file a NOI with Ecology's Water Resource Program and a variance report will be submitted after the vent is decommissioned.

4.4.4 COLLECTOR SYSTEM AND FLAIR MODIFICATIONS

Currently, the existing blower/flare station is not properly winterized for cold climates and shut-downs occur during cold weather events as condensate in piping and components freeze. To facilitate year-around operation and accommodate cold weather use, the piping and control appurtenances at the flare station will be outfitted with self-regulating heat tracing and insulation around the autovalve, flame arrestor, control valves, moisture knock-out-pot (KOP) and associated drains.

4.4.5 CONSTRUCTION QUALITY ASSURANCE AND CONTROL

Construction quality assurance and quality control will be addressed in the contract specifications. In addition, a Construction Quality Assurance (CQA) Manual will be prepared and submitted to Ecology for review and approval along with the construction plans and specifications. The CQA Manual will outline CQA procedures, roles, data collection, and record keeping during construction. A full-time construction observer will be on-site every day during construction and daily construction reports will be prepared. Documentation and certification of designed and specified materials and products (soil, aggregate, hot mix asphalt (HMA), concrete, HDPE pipe) will be provided by the contractor and verified by the construction manager and design engineer. Construction verification testing will also be performed by the contractor and include cover thickness verification, nuclear density testing for compaction and particle size analysis for aggregates. Post-construction surveying will verify that the ET covers and stormwater controls are built to the elevations shown in the construction plans. Testing of installed piping systems will be specified in the contract specifications and will include cleaning, visual inspection, and low pressure air testing to verify and document system installation and integrity. As part of contract closeout and system commissioning (stipulated in the construction contract specifications), the contractor will provide an as-built survey of all installed systems and all product technical detail cut-sheets and manufacturer supplied operation and maintenance documents. Additionally, the contractor will coordinate with the City or their representatives to balance the LFG extraction system to demonstrate system functionality prior to contract closeout.

4.4.6 SYSTEM STARTUP

Once the LFG collector system expansion has been constructed, the new portions of the GCCS will be connected to the existing system and LFG will begin to be recovered from Areas 1, 2, and 5. During the system startup, frequent monitoring of the extraction wells will be required in order to find the preferential vacuum setting on each well that prevents over-pull. Monitoring and GCCS adjustments will be performed at least monthly during the first year of operation, based on the system response after full build-out, to ensure that the LFG control system is operating effectively. After the first year the frequency of the operational monitoring will be adjusted, commensurate with the system needs.

Performance of the GCCS will be based on not exceeding the methane lower explosive limit (LEL) at the Site boundary, and diminishing VOC concentrations in groundwater at the conditional point of compliance. LFG extraction system adjustment and monitoring will be performed in conjunction with the compliance monitoring to balance the extraction, collection and conveyance systems to meet the perimeter compliance requirements. Mitigating actions associated with LFG control will also take current landfill regulations [WAC 173-351-200(4)] into account, requiring monitoring and compliance with gas control standards.

The wellfields in Areas 1, 2, and 5 will be monitored, tuned, and the collected data will be recorded for each of the wells. Monitoring will be conducted using a portable LFG monitoring instrument to analyze LFG at each wellhead/control point in the LFG collection system. Parameters to be monitored are CH_4, CO_2, O_2, balance gas, static pressure (vacuum), flow, and LFG temperature. These parameters will be recorded at each extraction wellhead/control point, including the flare station system. Applied vacuum at each well will be adjusted to optimize the recovery of LFG without over-pulling the wells and causing air intrusion.

4.5 COMPLIANCE MONITORING

Compliance monitoring will be conducted in accordance with WAC 173-340-410 and the Sampling and Analysis Plan presented in Appendix A. The following sections describe the monitoring requirements for the landfill to ensure that the remedy is effective and provides long-term protection of human health and the environment.

Compliance monitoring will include:

- Groundwater sampling and analysis;
- Field monitoring of LFG;
- GCCS inspection;
- Landfill cover inspection; and
- Stormwater system inspection.

Compliance monitoring of these items will be conducted as described in the sections below for a minimum period of 5 years after completing the construction of the remedy and for at least 2 years after conditions have stabilized or improved and groundwater cleanup levels are met. When the confirmational monitoring of groundwater is completed, groundwater monitoring, field monitoring of LFG, and landfill cover and stormwater system inspections will revert to the requirements of the Municipal Solid Waste Landfill (MSWLF) Permit.

4.5.1 GROUNDWATER

The goal of groundwater monitoring is to confirm that the cleanup action is working to reduce PCE and vinyl chloride concentrations in groundwater at the conditional point of compliance. Compliance groundwater monitoring for the cleanup action will be conducted as a complement to the existing landfill detection and assessment monitoring program that is performed in accordance with the MSWLF Permit. When the confirmational monitoring of groundwater is completed (a minimum of five years after completing construction and when conditions have stabilized or improved and cleanup levels in groundwater are achieved for a two year period), groundwater monitoring will revert to the requirements of the MSWLF Permit.

Per the MTCA, there are three types of compliance monitoring: protection, performance, and confirmational. Protection monitoring is designed to protect human health and the environment during the construction, operation, and maintenance phases of the cleanup action. Performance monitoring confirms the cleanup action is meeting cleanup and/or performance standards. Confirmational monitoring confirms the long-term effectiveness of the cleanup action once cleanup standards have been achieved or other performance standards have been attained. During this remedial action the monitoring frequency, analytical, and reporting requirements of the protection, performance, and confirmational will be the same.

4.5.1.1 Sample Locations and Analysis

On-site, conditional point of compliance and downgradient off-Site groundwater will be tested to monitor changes in groundwater quality after implementation of the cleanup actions. Monitoring of these wells will help determine when conditions are stable or improving over time and when the cleanup levels are achieved. The contaminant concentrations in downgradient off-Site groundwater currently meet the cleanup levels; therefore, the groundwater will be monitored to ensure that the conditions are stable or improving over time.

Protection, performance, and confirmational monitoring will consist of the collection and analysis of VOC samples from monitoring wells MW-11, MW-12b, MW-14b, MW-15, MW-19 and MW-20. Monitoring wells MW-11, MW-12b, MW-14b, and MW-15 are currently being sampled quarterly in

accordance with the MSWLF Permit, and the groundwater samples are analyzed for WAC 173-351-990 Appendix I and II detection monitoring constituents, which include VOCs. The sampling of the additional wells necessary for cleanup action compliance monitoring will be done at the same time as the detection/assessment monitoring so that only one set of VOC samples will be collected and analyzed during each sampling event.

The samples to be analyzed for VOCs will be collected from the monitoring wells using dedicated groundwater sampling pumps following the procedures described in the SAP (Appendix A). The samples will be submitted for analysis to an Ecology-accredited laboratory in accordance with Chapter 173-50 WAC (Ecology 2002). Standard VOCs [including PCE with a Method Reporting Level (MRL) of 0.5 µg/L] will be analyzed by USEPA Method 8260. Vinyl chloride will also be analyzed by USEPA Method 8260 SIM to reach an MRL of 0.02 µg/L. Quality control and assurance procedures will be performed in accordance with the SAP.

4.5.1.2 Frequency and Duration

Compliance groundwater monitoring, including protection, performance, and confirmational monitoring, will be conducted on a quarterly schedule (every 3 months, 4 times per year). The monitoring events will coincide with the detection/assessment monitoring program schedule.

Protection monitoring will begin during the scheduled March 2016 monitoring event and continue on a quarterly sequence through the construction period.

Performance monitoring will begin during the regularly scheduled detection/assessment monitoring event immediately after the construction is completed. Performance monitoring will continue on a quarterly frequency until conditions have stabilized or improved and the PCE and vinyl chloride concentrations in groundwater meet or drop below the Site cleanup levels.

Confirmational monitoring will continue on a quarterly frequency for a minimum period of 5 years after completing the remedy construction and for a minimum 2-year period after conditions have stabilized or improved and cleanup levels for PCE and vinyl chloride in groundwater are achieved. Confirmational monitoring and the cleanup action compliance monitoring program will terminate after conditions have stabilized or improved and after the concentrations of PCE and vinyl chloride in groundwater are equal to or less than the cleanup levels (5 µg/L and 0.29 µg/L, respectively) at the conditional point of compliance for eight consecutive monitoring events, or after five years, whichever is longer.

4.5.2 LANDFILL GAS

Protection and performance LFG monitoring will be conducted during the active compliance groundwater monitoring period of the remedial action. Protection monitoring will begin when

construction starts and continue on a monthly frequency through the construction period. Performance monitoring of LFG will occur during the active compliance groundwater monitoring period and will be conducted on a quarterly frequency.

Protection and performance monitoring will be conducted at the landfill perimeter using existing gas monitoring probes (GW-7S, GW-7D, GW-8, GW-9, GW-10, and GW-12) and within Areas 1 and 5 using GW-5, GW-6 and GW-11.

The following parameters will be monitored at each gas probe:

- Methane (CH_4);
- Carbon Dioxide (CO_2);
- Oxygen (O_2); and
- Static Pressure.

During each monitoring event the barometric pressure trend will be obtained from local atmospheric sources. The barometric pressure will be recorded and it will be noted whether the pressure during the monitoring event was falling, stable, or rising.

4.5.3 LANDFILL GAS EXTRACTION AND CONTROL SYSTEM

Inspection of the GCCS will be conducted during each GCCS operation monitoring and adjustment event (conducted to balance the extraction, collection and conveyance systems). At a minimum, the following GCCS conditions will be observed and documented annually:

- Appearance and condition of the GCCS;
- Condition of each extraction wellhead/control point including any settlement around the well, or air leaks;
- Alignment of aboveground horizontal LFG collection piping will be inspected for low spots that can collect condensate and reduce vacuum from reaching individual extraction wells; and
- Sump pumps will be inspected and the condensate sump pump cycle counters will be recorded.

Other equipment calibration, maintenance and repairs will be implemented in accordance with the manufacturer's recommendations or on an as-needed basis. An inspection log will be prepared for each monitoring event and included in an annual summary report. The inspections will likely be combined with the inspections already being conducted per the Post-Closure Plan for Area 6.

4.5.4 LANDFILL COVER

Annual landfill cover inspection, maintenance and repair procedures will be conducted to preserve the intended function of the ET covers. The following cover conditions will be observed and documented:

- Appearance and condition of the vegetation;
- Vegetation stress or death due to LFG;
- Deposition of eroded soil at the toe of steep slopes;
- Soil erosion;
- Rills or cracks in the cover;
- Changes in the surface slope and settlement of waste;
- Intrusion by humans or animals;
- Holes of any kind that allow surface runoff to enter the MSW directly;
- Wildlife trails created on the cover; and
- Damage by vehicles or maintenance machines.

Maintenance and repairs will be conducted on an as-needed basis to maintain the integrity of the ET covers. Long term care will continue until a registered professional engineer certifies to the WWCHD and Ecology that post closure activities are no longer needed. The inspections will likely be combined with the inspections already being conducted per the Post-Closure Plan for Area 6.

4.5.5 STORMWATER CONTROLS

Inspection of stormwater controls will be conducted on an annual schedule consistent with the inspection of the ET covers. Inspections will document disturbances that result in erosion, settlement, ponded stormwater, and blockage of ditch flow lines. Maintenance and repairs will be conducted on an as-needed basis.

4.6 REPORTING

Reports will be prepared and issued to Ecology to document work performed for compliance with the Decree and to meet MTCA regulatory requirements for the cleanup action. Reports to be prepared to document implementation of the cleanup action and reports prepared on a routine basis to address reporting requirements specified in the Decree are described below. Routine reporting will include progress reporting and reporting results from monitoring the cleanup actions addressed by this EDR.

4.6.1 PROGRESS REPORTS

Progress reports will be prepared by the consultant on a quarterly basis during the pre-construction period and on a monthly basis during the construction period. The progress reports describe

upcoming work, and document work that has been completed during the reporting period. Each progress report will be submitted to Ecology via email, no later than the 10th day of the month following the reporting period.

The first quarterly progress report will be submitted to Ecology three months after the Decree's effective date (November 10, 2015). Progress reports will continue on a quarterly frequency thereafter until construction crews mobilize to the Site. During the construction period, progress reports will be prepared and submitted on monthly basis. Progress report submittals will terminate when the draft cleanup action report is submitted to Ecology.

4.6.2 COMPLIANCE MONITORING REPORTS

The cleanup action compliance monitoring program data results will be incorporated into the landfill's detection/assessment monitoring quarterly and annual reports. Data reports will be prepared on a quarterly basis after each monitoring event under the oversight of a Washington State licensed hydrogeologist. An annual report will be prepared to summarize changes throughout the year. Laboratory analytical data will be received in an electronic data deliverable format suitable for direct importation into Ecology's Environmental Information Management (EIM) system. All analytical data will be entered into the EIM system within 60 days of receiving the laboratory analytical reports.

Each quarterly monitoring report will include:

- Summary tables of the LFG measurements with comparison to the methane LEL;
- PCE and vinyl chloride laboratory analytical data reports and data summary tables for the sampling period;
- Comparison of the PCE and vinyl chloride concentrations to the Site cleanup levels;
- Static water level readings in each compliance monitoring well;
- Potentiometric surface elevation map depicting groundwater flow direction;
- Groundwater flow rate calculations; and
- Other information provided in the landfill's detection/assessment monitoring program report.

The annual monitoring report will include a summary of:

- PCE and vinyl chloride analytical results for the year with comparison to the Site cleanup levels;
- LFG monitoring results for the year with comparison to the methane LEL;
- Notification of any exceedances of the cleanup levels or LFG compliance levels;
- Documentation of the LFG extraction and control system, landfill cover, and stormwater system inspections; and
- Other information provided in the landfill's annual detection/assessment monitoring program report.

4.6.3 CLEANUP ACTION REPORT

A Cleanup Action Report will be prepared to meet the requirements of WAC 173-340-400(6)(b) and the Decree after the cleanup action construction has been completed. This report will document construction of the remedy components described in this EDR. Drawings will be included showing actual locations and installation notes for underground lines and provide specifications for equipment and piping. Well logs will be included for all extraction wells installed for the Site remedy. Survey reports will be appended to the Completion Report. Deviations from design drawings and/or specifications will be described in the Completion Report; the rationale for deviations will also be documented. The report will describe construction techniques as appropriate and will include results of relevant tests and measurements made during remedy construction.

The Completion Report will be prepared under oversight of a Professional Engineer licensed in Washington State. The report will include an opinion by the Professional Engineer as to whether the cleanup action has been constructed in substantial compliance with the plans and specifications and related documents included in this EDR. The Professional Engineer's opinion will be based upon observations, testing, and inspections.

4.7 INSTITUTIONAL CONTROLS

Institutional controls for the Site will include an environmental covenant and financial assurance measures. The institutional controls will be implemented in accordance with both MTCA and solid waste regulations; WAC 173-340-440 and WAC 173-351-500(1)(h), respectively. Therefore, the environmental covenant will carry through the remedial action and into the landfill post-closure period. Financial assurance for the remedial action will transition into the City's existing post-closure financial assurance account.

4.7.1 ENVIRONMENTAL COVENANT

To ensure that the components of the remedial action are operated and maintained properly, an environmental covenant will be used as a legal measure to provide a clear record of the responsibilities and land use restrictions for the landfill. An environmental covenant is required for the Site because:

- A conditional point of compliance has been established for groundwater at the Site;
- MSW will remain on the Site after completion of the remedial action and landfill closure; and
- During the post-closure care period, the owner or operator is required, under the terms of the MSWLF Permit, to maintain and operate components of the landfill such as the cover, leachate control systems, and gas and groundwater monitoring systems on the Site.

The environmental covenant for the Site will prohibit activities that:

- Threaten the integrity of any cover, waste containment, stormwater control, gas, leachate, public access control, or environmental monitoring systems;
- May interfere with the operation and maintenance, monitoring, or other measures necessary to ensure the integrity of the landfill and continued protection of human health and the environment; and
- May result in the release of solid waste constituents or otherwise exacerbate exposures.

The purpose of the environmental covenant is to prohibit activities that may interfere with a cleanup action, operation and maintenance, or monitoring or activities that may result in the release of a hazardous substance that was contained as a part of the cleanup action. Environmental covenants must be recorded in order to provide adjoining property owners, future purchasers, and tenants, as well as the general public, notice of the restrictions on use of the property. Property owners are also required to notify Ecology prior to any lease or sale of the restricted property.

The environmental covenant for the Site will be executed no more than 10 days following Ecology approval of the Final Cleanup Action Reports. The environmental covenant will be prepared pursuant to the MTCA, chapter 70.105D RCW; Uniform Environmental Covenants Act, chapter 64.70 RCW; and Solid Waste Management – Reduction and Recycling, chapter 70.95 RCW. A proposed draft environmental covenant for the Site is provided in Appendix B.

4.7.2 FINANCIAL ASSURANCE

The City will establish and maintain financial assurance in accordance with the requirements of WAC 173-340 440(11). Financial assurances will be of sufficient amount to cover the costs associated with the operation and maintenance of the cleanup action, including compliance monitoring, and corrective measures.

4.7.2.1 Remedial Action Financial Assurance Period

The duration of the cleanup action for financial assurance purposes will be based on a 9-year period to account for two years of confirmational monitoring after expecting to achieve cleanup levels within 6-7 years of construction completion.

4.7.2.2 Financial Assurance Funding

Funding for the 9-year cleanup action financial assurance period is estimated to be $599,311. The fund is based on third party performance of work in 2015 dollars inflated at 3 percent annually for the compliance monitoring actions described in Section 4.5. The cost estimate calculations are provided in Appendix C.

The remedial action fund will be placed in a reserve account by the City no more than 60 days following Ecology approval of the cost estimate. The fund will be reviewed and adjusted annually to reflect changed assumptions for inflation, interest rates, and cost and work modifications. Funds that are

budgeted but not expended in any given year during the remedial action period will be retained in the reserve fund. Excess funds remaining when the remedial action is completed will transition into the landfill post-closure account, as needed.

4.8 PERIODIC REVIEW

WAC 173-340-420 states at sites where a cleanup action requires an institutional control, a periodic review shall be completed no less frequently than every five years after the initiation of a cleanup action. Since the waste materials will remain on-site and institutional controls will be required, periodic reviews shall take place at this Site to assess the effectiveness of the cleanup action. Site conditions and monitoring data shall be reviewed by Ecology on a frequency of no less than every five years until the groundwater conditions have stabilized or improved and groundwater cleanup levels are met. At least ninety (90) days prior to each periodic review, a report will be submitted to Ecology that documents whether human health and the environment are being protected based on the factors set forth in WAC 173-340-420(4).

4.9 IMPLEMENTATION SCHEDULE

The implementation schedule described in this section is based on the estimated duration of work for the items required in the CAP and Decree, and has been prepared consistent with the requirements of the MTCA regulations for implementing cleanup actions (WAC 173-340-400). Implementation of the CAP requires installation of LFG extraction systems in Areas 1, 2, and 5; soil cap reconstruction over Areas 2 and 5; and stormwater controls for Area 5 and the north drainage ditch. Nearly all of this work must be completed when dry conditions prevail. Therefore, it will be necessary to carefully coordinate the engineering design and preparation of design documents, so that construction of the remedial action can be completed during the spring, summer and/or fall of 2016.

The projected implementation schedule for the cleanup actions is provided on Table 1. The projected schedule commences when the EDR is approved by Ecology. The remedial action fund will be placed in a reserve account by the City and the documentation will be provided to Ecology no more than 60 days following Ecology approval of the EDR containing the cost estimate.

Preparation of the plans and specifications will be the first task conducted after the approval of the EDR. Obtaining permits and contractor bidding are expected to occur during the spring of 2016. It has been assumed that the City will issue one contract for the remedial action construction. Construction of the remedy is scheduled to begin during the summer of 2016 after the plans and specifications and accompanying documents have been formally approved by Ecology. Construction and commissioning of the LFG extraction system will likely be completed by December 2016. The remedial action report with operation and maintenance plan will be submitted to Ecology for review no more than 60 days after the

completion of the construction. An environmental covenant for the property will be filed no more than 10 days after the final remedial action report is approved by Ecology.

5.0 REFERENCES

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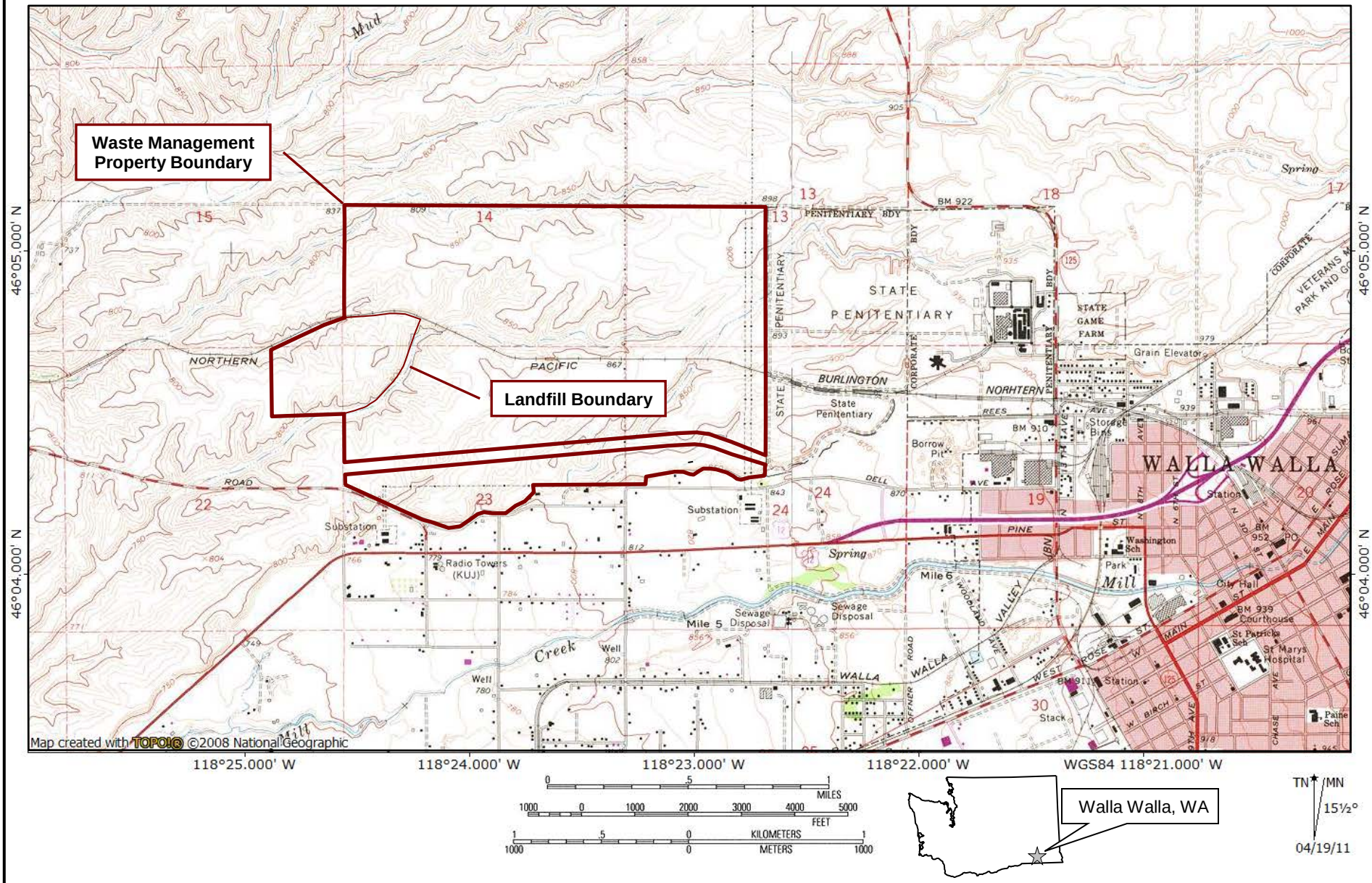
TABLE 1
REMEDIAL ACTION IMPLEMENTATION SCHEDULE
Sudbury Road Landfill
City of Walla Walla, Washington

Task	Task Duration (Days)	Start Date	Finish Date	Days from Start (9/2/2015)
Consent Decree (Effective Date)		**9/2/2015**		
Engineering Design Report				
Prepare Draft EDR w/schedule	46	9/2/2015	10/18/2015	46
ECY review/comment	14	10/18/2015	11/1/2015	
Final EDR to ECY	60	11/1/2015	12/31/2015	120
Final Engineering Design Report	120	Amended Date	1/8/2016	128
Plans and Specifications				
90% submittal to ECY	75	11/1/2015	1/15/2016	135
ECY review/comment	21	1/15/2016	2/5/2016	156
Final submittal to ECY	15	2/5/2016	2/20/2016	171
Final Plans and Specifications	111			171
Cleanup Action Construction				
Bidding and Contract Execution	90	Spring 2016		
Construction	150 (app.)	Summer-Fall 2016		
Cleanup Action Report With Operations and Maintenance Plan				
Draft Cleanup Action Report	Due to ECY 60 days after completion of construction			
Final Cleanup Action Report	Due to ECY 60 days following receipt of Ecology's comments			
Environmental Covenant Documentation				
Draft Environmental Covenant	Due to ECY 60 days after completion of construction			
Final Environmental Covenant	Due to ECY 10 days after final CAR submittal			
Original	Due to ECY within 30 days of recording			
Financial Assurance				
Fund documentation	Due to ECY 60 days after EDR and cost estimate approval			
Compliance Reports				
Progress Reports				
10th day of each quarter until construction	3 mo.	9/10/2015	6/8/2016	
Monthly during construction	1 mo.	6/8/2016	11/8/2016	
Compliance Monitoring	3 mo.	Four quarterly and one annual report		
ECY 5 yr. reviews	5 yr	Five year cycle following construction		

Notes:
EDR = Engineering design report
ECY = Dept. of Ecology
O&M = Operations and Maintenance
CAR = Cleanup Action Report
app. = Approximate
mo. = Month
yr. = Year



Schwyn Environmental Services

Engineering Design Report Sudbury Road Landfill Walla Walla, Washington	**Site Location**	Figure 1

Notes:
- Landfill gas extraction system design details provided by Herrara.
- Map created by Floyd|Snider, Inc.
- Orthoimage provided by City of Walla Walla and dated 2012.

LEACHATE EVAPORATION POND
MW-12b
GW-8
NORTH DRAINAGE DITCH
GW-7D
GW-7S
MW-19
GW-6
GW-5
AREA 7
MW-20
MW-15
AREA 5
GW-3
AREA 4a (Asbestos Area)
PROPOSED SOIL BORROW AREA
MW-16
GW-12
Well #2
AREA 6
COMPOST AREA (Green)
GW-9
AREA 1
GW-11
AREA 4 (Asbestos Area)
AREA 2
GW-10
MW-11
MW-14
Landfill Gas Blower and Flare
AREA 3 (Medical Waste Area)
COMPOST LAGOON
SCALE HOUSE & OFFICE
12

Legend

Existing Features
- Gas Vent
- Landfill Gas Monitoring Well
- Landfill Gas Extraction Well
- Compliance Wells
- Water Well (non-potable)

- Proposed Landfill Gas Extraction Well
- Proposed Condensate Sump
- Proposed HDPE Gas Line
- Proposed Condensate Pipe
- Condensate Sump
- Condensate Pipe
- Landfill Gas Collection System
- Drainage Pipe
- Creek
- Spring
- Intermittent Creek
- Street
- Highway
- Landfill Areas
- Landfill Boundary
- City Property Boundary
- Proposed Soil Borrow Area
- Compost Area
- Compost Lagoon
- North Drainage Ditch
- Sedimentation Pond

I:\GIS\Projects\Schywn-Sudbury\MXD\EDR\Figure 2 Site Plan.mxd 12/9/2015

Schwyn Environmental Services

0 200 400 800
Scale in Feet
1:4,810

N

Engineering Design Report
Sudbury Road Landfill
Walla Walla, Washington

Landfill Gas System for Area 5

Figure 2

PROPOSED HAUL ROAD
(EXISTING HEAVY EQUIPMENT ROAD)

AREA 6

AREA 2 BOUNDARY

10:1 SLOPE

5:1 SLOPE

AREA 1

PROPOSED ECOLOGY BLOCK
RETAINING WALL

Notes:
· Map created by Floyd|Snider, Inc.
· Orthoimage provided by City of Walla Walla and dated 2012.

I:\GIS\Projects\Schwyn-Sudbury\MXD\EDR\Figure 3 Area 2 Conceptual Grading and Drainage Plan.mxd 12/1/2015

Schwyn Environmental Services

0 50 100 200
Scale in Feet
1:1,200

N

Engineering Design Report
Sudbury Road Landfill
Walla Walla, Washington

Area 2 Conceptual Grading and Drainage Plan

Figure 3

PROPOSED HAUL ROAD
(EXISTING HEAVY EQUIPMENT ROAD)

EXISTING CULVERT

NORTH DRAINAGE DITCH

EXISTING CULVERT

TERMINATE HDPE LINER
30' WEST OF EDGE OF AREA 5

CONTINUE CONCRETE CHANNEL
(OMIT HDPE LINER)

3:1 SLOPE

10:1 SLOPE

EXISTING CULVERT

ROADSIDE DRAINAGE DITCH

RUNOFF CONTROL BERM

AREA 5 BOUNDARY

50:1 SLOPE

AREA 7

AREA 6

PROPOSED HAUL ROAD
(EXISTING HEAVY EQUIPMENT ROAD)

RECONSTRUCTED COMPOST
ACCESS ROAD

RUNOFF CONTROL BERM

ROADSIDE DRAINAGE DITCH

NEW CULVERT

CONCRETE RUBBLE PILE

Notes:
· Map created by Floyd|Snider, Inc.
· Orthoimage provided by City of Walla Walla and dated 2012.

I:\GIS\Projects\Schywn-Sudbury\MXD\EDR\Figure 4 Area 5 Conceptual Grading and Drainage Plan.mxd 11/30/2015

Schwyn Environmental Services

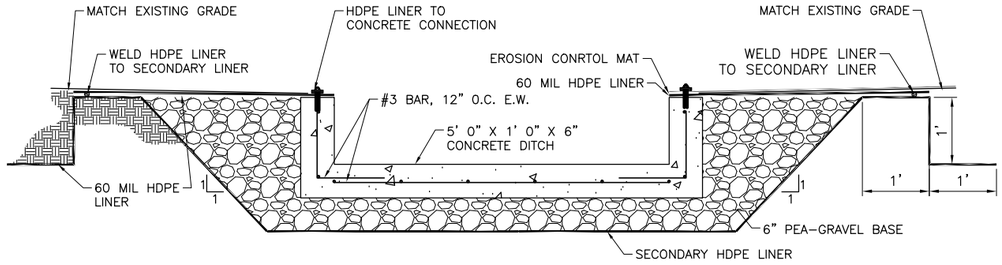
0 75 150 300
Scale in Feet
1:1,800

N

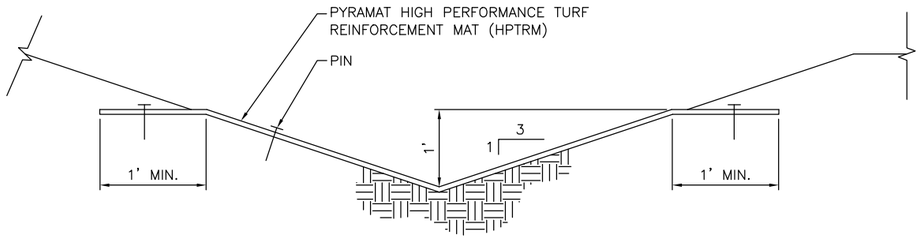
Engineering Design Report
Sudbury Road Landfill
Walla Walla, Washington

Area 5 Conceptual Grading and Drainage Plan

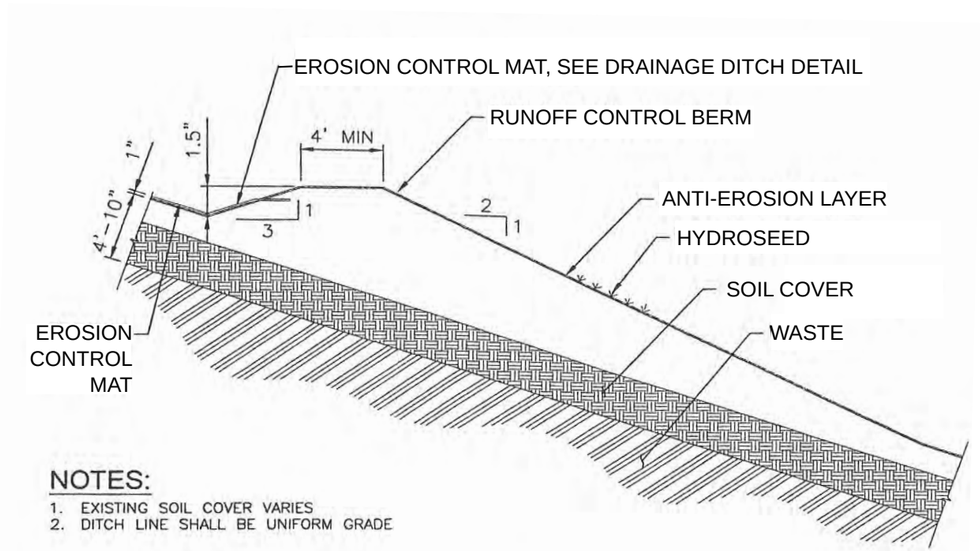
Figure 4



NORTH DRAINAGE DITCH DETAIL



EROSION CONTROL BERM DRAINAGE DITCH DETAIL



RUNOFF CONTROL BERM DETAIL

I:\GIS\Projects\Schywn-Sudbury\SVG\EDR\Figure 3 Drainage Details.svg 9/16/2015

Schwyn Environmental Services

Notes:
· Design elements provided by J-U-B Engineers, Inc.
· Map created by Floyd|Snider, Inc.

Sudbury Road Landfill
Walla Walla, Washington

DRAINAGE DETAILS

Figure
5

Compliance Monitoring Plan
for
Sudbury Road Landfill Cleanup Action
Walla Walla, Washington

January 6, 2016

Prepared for:

City of Walla Walla

Prepared by:

Schwyn Environmental Services
4621 South Custer
Spokane, WA 99223
(509) 448-3187

TABLE OF CONTENTS

TABLES

FIGURES

APPENDIX

LIST OF ABBREVIATIONS AND ACRONYMS

CH_4	Methane
City	City of Walla Walla, Washington
CO_2	Carbon dioxide
COC	Chain of custody
DQO	Data Quality Objective
Ecology	Washington State Department of Ecology
gal/ft^3	Gallons per cubic foot
HASP	Health and Safety Plan
LFG	Landfill gas
MDL	Method detection limit
MRL	Method reporting level
MS/MSD	Matrix spike/matrix spike duplicate
MSW	Municipal solid waste
MTCA	Washington State Model Toxics Control Act
PARCC	Precision, accuracy, representativeness, completeness, and comparability
O_2	Oxygen
PQL	Practical quantitation limit
QA	Quality assurance
QC	Quality control
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative percent difference
SAP	Sampling and Analysis Plan
Site	Sudbury Road Landfill
Schwyn	Schwyn Environmental Services, LLC
µg/L	Micrograms per liter
USEPA	U.S. Environmental Protection Agency
VOA	Volatile organic analysis
VOC	Volatile organic compound
WAC	Washington Administrative Code

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1.0 INTRODUCTION

This Compliance Monitoring Plan (CMP) describes the procedures that will be performed during the City of Walla Walla, Washington (City) Sudbury Road Landfill (Site) Cleanup Action. The cleanup action is being conducted pursuant to Consent Decree 15-2-00536-8 (Decree) and the Model Toxics Control Act (MTCA) regulations (Chapter 173-340 WAC) to implement the remedies specified in the Cleanup Action Plan (CAP: Ecology 2015). The Compliance Monitoring Plan was prepared consistent with the requirements of WAC 173-340-410.

1.1 PURPOSE AND OBJECTIVES

This CMP, and accompanying Sampling and Analysis Plan (SAP), were prepared to fulfill Task 2 of the Scope of Work presented in Exhibit C of the Decree. The CMP describes the monitoring that will be performed during the construction, and operations and maintenance of the cleanup action. The purpose of the compliance monitoring is to ensure that the remedy is effective and provides long-term protection of human health and the environment.

The SAP, along with the accompanying Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) describes the field and laboratory procedures that will be used during the compliance monitoring period. The purpose of the SAP is to confirm that the cleanup action is working to reduce tetrachloroethene (PCE) and vinyl chloride concentrations in groundwater at the conditional point of compliance. PCE and vinyl chloride are the indictor hazardous substances identified at the Site. The objective of the QAPP is to maximize accuracy, reproducibility, and comparability of data between sampling events. The SAP was prepared consistent with the requirements of WAC 173-340-820.

1.2 SITE DESCRIPTION

The Sudbury Road Landfill (Site) is generally located at 414 Landfill Road (formerly Sudbury Road), Walla Walla, Washington 99362, about 4 miles west of the city of Walla Walla and 0.25 mile north of Highway 12 (Figure 1). The landfill is currently operating in accordance with the standards of Chapter 173-351 WAC, Criteria for Municipal Solid Waste Landfills (Ecology 1993) and a Municipal Solid Waste Landfill (MSWLF) Permit issued by the Walla Walla County Health Department (WWCHD). The landfill and facilities cover approximately 125 acres. The designated Site area described in the Decree is composed of seven active and former disposal areas (Areas 1 through 7) covering an area of 94.44 acres (HDJ 2015). The landfill is located within the western portion of an 828.86-acre City-owned parcel of land that is zoned and used for various waste management purposes (Figure 2). The landfill is located in rural southeastern Washington and entirely surrounded by large expanses of rolling hills used for dry-land wheat farming.

The Site is designated by Ecology as Facility No. 4446540.

1.3 PLAN ORGANIZATION

This CMP is organized into the following sections:

- Section 1 provides an introduction;
- Section 2 describes the compliance monitoring program;
- Section 3 presents the Sampling and Analysis procedures;
- Section 4 presents the Quality Assurance (QA) procedures;
- Section 5 identifies the Health and Safety requirements; and
- Section 6 describes the Reporting submittals.

2.0 COMPLIANCE MONITORING PLAN

Compliance monitoring will be conducted in accordance with WAC 173-340-410 to ensure that the remedy is effective and provides long-term protection of human health and the environment. Compliance monitoring will include:

- Groundwater sampling and analysis;
- Field monitoring of landfill gas (LFG);
- Gas collection and control system (GCCS) inspection;
- Landfill cover inspection; and
- Stormwater system inspection.

Compliance monitoring of these items will be conducted as described in the sections below for a minimum period of 5 years after completing the construction of the remedy and for at least 2 years after conditions have stabilized or improved and cleanup levels are achieved in groundwater. When the confirmational monitoring program is completed, groundwater monitoring, field monitoring of LFG, and landfill cover and stormwater system inspections will revert to the requirements of the MSWLF Permit.

2.1 GROUNDWATER MONITORING

Groundwater is the contaminated media at the Site. PCE and vinyl chloride were the only chemicals with concentrations that exceeded their respective MTCA screening levels and are the indicator hazardous substances at the Site. Groundwater monitoring will be conducted to confirm that the cleanup action is working to reduce PCE and vinyl chloride concentrations in groundwater at the conditional point of compliance. The goals of the compliance groundwater monitoring program will be achieved when conditions have stabilized or improved and the PCE and vinyl chloride concentrations in the groundwater samples no longer exceed the cleanup levels of 5.0 micrograms per liter (µg/L) for PCE and 0.29 µg/L for vinyl chloride.

The compliance groundwater monitoring program will include protection, performance, and confirmational monitoring phases. Protection monitoring is designed to protect human health and the environment during the construction, operation, and maintenance phases of the cleanup action. Performance monitoring confirms the cleanup action is meeting cleanup and/or performance standards. Confirmational monitoring confirms the long-term effectiveness of the cleanup action once cleanup standards have been achieved or other performance standards have been attained. During this remedial action the monitoring frequency, analytical, and reporting requirements of the protection, performance, and confirmational monitoring for groundwater will be the same. Details of the SAP for groundwater are described in Section 3.0.

2.2 LANDFILL GAS MONITORING

Protection and performance LFG monitoring will be conducted during the remedial action. Performance of the LFG control systems will be based on not exceeding the methane lower explosive limit at the Site boundary and diminishing VOC concentrations in the groundwater monitoring wells located at the conditional point of compliance. The LFG operating system will be evaluated and optimized to control the LFG if the methane level is observed consistently above 2% by volume in the gas monitoring probes located at the Site boundary. The LFG monitoring locations, frequency, and procedures are described in the SAP described in Section 3.0.

2.3 LANDFILL GAS EXTRACTION AND CONTROL SYSTEM INSPECTION

GCCS operation, monitoring, and adjustment will be required on a one month cycle for the first year to ensure that the LFG control system is operating effectively. Inspection of the GCCS will then be conducted during quarterly monitoring events. At a minimum, the following GCCS conditions will be observed and documented annually:

- Appearance and condition of the GCCS;
- Condition of each extraction wellhead/control point including any settlement around the well, or air leaks;
- Alignment of aboveground horizontal LFG collection piping will be inspected for low spots that can collect condensate and reduce vacuum from reaching individual extraction wells; and
- Sump pumps will be inspected and the condensate sump pump cycle counters will be recorded.

Other equipment calibration, maintenance and repairs will be implemented in accordance with the manufacturer's recommendations or on an as-needed basis. An inspection log will be prepared for each monitoring event and included in an annual summary report. The inspections will likely be combined with the inspections already being conducted per the Post-Closure Plan for Area 6.

2.4 LANDFILL COVER INSPECTION

Annual landfill cover inspection procedures will be conducted to preserve the intended function of the soil cover over Areas 1, 2, and 5 during the compliance monitoring period. During the annual inspections the following cover conditions will be observed and documented:

- Appearance and condition of the vegetation;
- Vegetation stress or death due to LFG;
- Deposition of eroded soil at the toe of steep slopes;
- Soil erosion;
- Rills or cracks in the cover;
- Changes in the surface slope and settlement of waste;
- Intrusion by humans or animals;
- Holes of any kind that allow surface runoff to enter the municipal solid waste directly;
- Wildlife trails created on the cover; and
- Damage by vehicles or maintenance machines.

Maintenance and repairs will be conducted on an as-needed basis to sustain the integrity of the soil cover systems. The cover system inspection finding and a description of any maintenance or repairs completed during the year will be included in the Annual Compliance Monitoring Report as described in Section 6.0.

2.5 STORMWATER CONTROL SYSTEMS INSPECTION

Inspection of stormwater controls will be conducted on an annual schedule. Inspections will document disturbances that result in erosion, settlement, ponded stormwater, and blockage of ditch flow lines. Maintenance will be conducted on an as needed basis to preserve the integrity of the stormwater control systems. The stormwater control system inspection finding and a description of any maintenance or repairs completed during the year will be included in the Annual Compliance Monitoring Report as described in Section 6.0.

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3.0 SAMPLING AND ANALYSIS PLAN

This section describes the groundwater and LFG sampling strategy and procedures (sample location, collection methods, and laboratory analyses) that will be used during the compliance monitoring period for the Site.

3.1 GROUNDWATER SAMPLING PROCEDURES

3.1.1 SAMPLING LOCATIONS

Groundwater samples will be collected for laboratory analysis from the following wells:

- MW-11, MW-12b, MW-14b, MW-15, MW-19, and MW-20.

Monitoring well MW-15 is located downgradient of Area 5 at the western Site boundary and is at the conditional point of compliance. Monitoring well MW-12b is the upgradient background well for the Site. Monitoring wells MW-11 and MW-14 are Site wells located downgradient of Areas 1 and 2. Monitoring wells MW-19 and MW-20 are off-Site downgradient monitoring wells. The groundwater monitoring well locations are shown on Figure 2.

3.1.2 MONITORING FREQUENCY

Compliance groundwater monitoring, including protection, performance, and confirmational monitoring, will be conducted on a quarterly schedule. The monitoring events will coincide with the landfill's ongoing detection/assessment monitoring program schedule for March, June, September, and December each year.

Protection monitoring will begin during the scheduled March 2016 monitoring event. Protection monitoring will continue on a quarterly sequence through the construction period.

Performance monitoring will begin during the regularly scheduled detection/assessment monitoring event immediately after the construction is completed. Performance monitoring will continue on a quarterly frequency until conditions have stabilized or improved and the PCE and vinyl chloride concentrations in groundwater meet or drop below the Site cleanup levels.

Confirmational monitoring will be performed on a quarterly frequency for a minimum period of 5 years after completing the remedy construction and for a minimum 2-year period after conditions have stabilized or improved and the cleanup levels for PCE and vinyl chloride in groundwater are achieved. Confirmational monitoring and the cleanup action compliance monitoring program will terminate after conditions have stabilized or improved and when the concentrations of PCE and vinyl chloride in groundwater are equal to or less than the cleanup levels (5 µg/L and 0.29 µg/L, respectively) during eight consecutive monitoring events at the conditional point of compliance, and the City has received written

notification from Ecology that the remedial action compliance groundwater monitoring program may be ended.

3.1.3 GROUNDWATER SAMPLE COLLECTION METHODS

Groundwater samples will be collected from the monitoring wells using the following procedures:

- Before sampling, depth-to-water will be measured to the nearest 0.01 feet and recorded on the sample collection form. From this, the water column height in the well will be calculated.
- Specific conductivity, pH, and temperature meters will be calibrated according to manufacturer's specifications at the beginning of each sample day. Calibration data will be recorded in a log maintained for each instrument. The meters will be calibrated with solutions buffered closest to known field parameters.
- Before sampling, the well will be purged using a dedicated sampling pump. The well will be purged at a rate that does not allow formation water to vigorously cascade down the sides of the well screen. Purging will continue until at least three casing volumes of water have been removed, the specific conductance and temperature has stabilized within 10 percent of the proceeding value, or until the well is dry. The purge volume will be calculated based on the following formula:

  1 well volume (gallons) = $\pi r^2 h$ x 7.48 gal/ft^3,
  where π = 3.14, r = inside radius of well casing in feet, h = height of water column from the bottom of the well, in feet, gal/ft^3 = gallons per cubic foot.

  - Purge data will be recorded on the sample collection form, including purge volume, time of beginning and termination of purging, and observations regarding color, turbidity, or other factors that may be important in evaluation of sample quality.
  - Purge water from all wells except MW-15 will be discharged to the ground surface provided the discharge to ground conforms with applicable laws. Purge water from monitoring well MW-15 (and others if necessary) will be contained in a 55-gallon drum and evaporated, or will be disposed of in the landfill's leachate evaporation pond, as long as concentrations of contaminants require this type of management.
- Groundwater sampling will begin immediately following purging or, if the well purges dry, as soon as enough water is available in the well for sampling. Sample data will be recorded on the sample collection form, including sample number and time collected, the observed physical characteristics of the sample (e.g., color, turbidity, etc.), field parameters (pH, specific conductance, and temperature), and other data that may be important in the evaluation of sample quality.
- On low-yielding wells, pH, temperature, and specific conductance will be measured at the beginning and end of sampling.
- Groundwater samples will be collected for analysis using a dedicated groundwater sampling pump. Clean gloves will be worn when collecting each sample.
- The sample water will be discharged slowly and carefully into appropriate sample containers to minimize aeration. Volatile organic analyses (VOA) containers will be completely filled so that no head space remains. VOA sample containers will be checked for air bubbles by turning the bottle upside down and tapping it lightly to make air bubbles move to the bottom of the sample bottle. If air bubbles are observed in any of the VOA containers, the container

will be topped off (once only) or a new container used. The samples will be chilled immediately after collection.

- Duplicate samples will be collected by alternately discharging the groundwater into duplicate sample bottles. Duplicate samples will be labeled with a separate sample number and the number will be noted on the sample collection form. Duplicate samples will receive a designation unrelated to the primary sample and traceable to the sample location only through sample collection forms and log notation.

All sampling will be conducted in accordance with the appropriate provisions of the project HASP provided in Appendix A1.

3.1.4 SAMPLE TRANSPORTATION AND HANDLING

The transportation and handling of the groundwater samples will be accomplished in a manner that protects the integrity of the sample and also prevents release of volatile constituents from the samples. Samples will be refrigerated or kept in coolers chilled to 4 degrees centigrade until shipment. Sample delivery to the analytical laboratory will be in chilled coolers at 4 degrees centigrade via next day service. One trip blank will be included in each cooler. All samples will be logged on a chain-of-custody (COC) form that will accompany each shipment of samples to the laboratory.

3.1.5 SAMPLE CUSTODY AND DOCUMENTATION

The primary objective of sample custody is to create an accurate, written record that can be used to trace the possession and handling of samples so that the equality and integrity of each sample is maintained from collection until completion of all required analyses. Adequate sample custody will be achieved by means of approved field and analytical documentation. Such documentation includes the COC record that is initially completed by the sampler and is, thereafter, signed by those individuals who sequentially accept custody of the sample. A sample is in custody if at least one of the following is true:

- It is in someone's physical possession.
- It is in someone's view.
- It is secured in a locked container or otherwise sealed so that tampering will be evident.
- It is kept in a secured area, restricted to authorized personnel only.

Sample control and COC in the field and during transportation to the laboratory will be conducted in general conformance with the procedures described below:

- As few persons as possible will handle samples.
- Sample bottles will be obtained new or pre-cleaned from the laboratory performing the analyses.
- The sampler will be personally responsible for the completion of the COC record and the care and custody of samples collected until the samples are transferred to another person or dispatched properly under COC rules.

- The coolers in which the samples are shipped will be accompanied by the COC record identifying their contents. The original COC record and the laboratory copy will accompany the shipment (sealed inside the shipping container). The other copy will be retained by the responsible party.
- Coolers will be sealed with strapping tape for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information will be entered in the "remarks" section of the COC record and traffic report.

When samples are transferred, the individuals relinquishing and receiving the samples will sign the COC form and record the date and time of transfer. The sample collector will sign the form in the first signature space. Each person taking custody will observe whether the shipping container is correctly sealed and in the same condition as noted by the previous custodian. Any deviations in the procedure will be noted on the appropriate section of the COC record.

All documentation and other project records will be safeguarded to prevent loss, damage, or alteration. If an error is made on a document, the necessary corrections will be made by drawing a single line through the error, and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated and, if necessary, a footnote explaining the correction will be included. Errors will be corrected by the person who made the entry, whenever possible.

3.1.6 CHEMICAL ANALYSES

Laboratory analyses of groundwater samples will be performed by an Ecology-accredited laboratory in accordance with Chapter 173-50 WAC (Ecology 2002). The groundwater samples will be analyzed for VOCs, specifically PCE and vinyl chloride, using USEPA Method 8260. Vinyl chloride will also be will be analyzed by USEPA Method 8260 SIM to reach an MRL of 0.02 µg/L.

3.2 LANDFILL GAS MONITORING PROCEDURES

3.2.1 GAS MONITORING FREQUENCY AND LOCATIONS

3.2.1.1 Protection Monitoring

Protection monitoring will be conducted during the cleanup action construction period to monitor for potential gas migration at the Site boundaries. Protection monitoring will be conducted on a monthly schedule from the start of construction through the LFG extraction and control system start-up. During the protection monitoring period, LFG field measurements will be collected from perimeter gas monitoring wells GW-7S, GW-7D, GW-8, GW-9, GW-10, and GW-12. The LFG monitoring probe locations are shown on Figure 2.

3.2.1.2 Performance Monitoring

Performance monitoring of LFG will occur from system start-up through the duration of the active compliance groundwater monitoring period on a quarterly schedule. The quarterly monitoring

events will coincide with the compliance groundwater monitoring program schedule (March, June, September, and December).

During the performance monitoring period, LFG field measurements will be collected from:

- Perimeter gas monitoring probes GW-7S, GW-7D, GW-8, GW-9, GW-10, and GW-12, to monitor for potential gas migration at the Site boundaries; and
- Site gas monitoring probes GW-5, GW-6, and GW-11 to assess the operational effectiveness of the LFG extraction system.

When the groundwater confirmational monitoring program is completed the field monitoring of LFG will revert to the requirements of the MSWLF Permit.

3.2.2 MONITORING PROCEDURES

The following parameters will be monitored at each gas probe:

- Methane (CH_4);
- Carbon Dioxide (CO_2); and
- Oxygen (O_2).

CH_4, CO_2, and O_2 percentages, and gas pressure will be measured using a portable LFG meter connected to the well head with silicon tubing. The LFG meter will be calibrated according to manufacturer instructions each day prior to the gas monitoring activities. To ensure that representative measurements are collected, the gas probes will be purged until the CH_4, CO_2, and O_2 percentages have stabilized. Purge times will be calculated for each probe based on construction details and pumping rate of the meter used.

Gas pressure will be measured at the well head prior to the purging of each probe. CH_4, CO_2, and O_2 percentages will be monitored every probe volume purged. It will be assumed that the parameters have stabilized when consecutive measurements vary by less than 10%. The final recorded measurements will include the stabilized CH_4, CO_2, and O_2 percentages.

During each monitoring event the barometric pressures will be obtained from local atmospheric sources. The barometric pressures will be recorded and it will be noted whether the pressure during the monitoring event was falling, stable, or rising.

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4.0 QUALITY ASSURANCE PROJECT PLAN

This QAPP establishes quality control (QC) procedures and QA criteria to meet the Data Quality Objectives (DQOs) set forth for the compliance groundwater sampling program. This QAPP was developed in accordance with the Ecology *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* (Ecology 2004).

4.1 LABORATORY DATA QUALITY OBJECTIVES

The DQOs for the groundwater monitoring field activities described in Section 3 are to obtain the type and quantity of data in a manner that are of sufficient quality to meet project objectives, as well as to maximize accuracy, reproducibility, and comparability of data between sampling events. The quality of the field sampling methods and laboratory data will be assessed using the principle data quality indicators of precision, accuracy, representativeness, completeness, and comparability (PARCC) as defined in Ecology and USEPA guidance (Ecology 2004, USEPA 1998). Data quality assurance criteria are described below and presented in Table 1.

The quality of analytical data generated is assessed by the frequency and type of internal QC checks developed for analysis of VOCs. Laboratory results will be evaluated by reviewing results for analyses of method blanks, matrix spikes, duplicate samples, laboratory control samples, calibrations, performance evaluation samples, and interference checks as specified by the specific analytical methods.

4.1.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples for organic analysis and through laboratory duplicate samples for inorganic analyses.

Analytical precision measurements will be carried out on project-specific samples at a minimum frequency of one per laboratory analysis group of approximately 20 samples, as practical. Laboratory precision will be evaluated against quantitative relative percent difference (RPD) performance criteria, presented in Table 1.

Field precision during groundwater sampling will be evaluated by the collection of field duplicates in groundwater at a minimum frequency of one per laboratory analysis group or 1 duplicate in 20 samples (5%). There are no performance criteria for field precision, as it is an inherent function of the methods and media sampled. Therefore, the data will not be qualified based solely on field duplicate precision.

Precision measurements can be affected by the nearness of a chemical concentration to the method detection limit, where the percent error (expressed as RPD) increases. Therefore, precision criteria will be used to evaluate data only when analyte concentrations are greater than five times the laboratory quantitation limit. The equations used to express precision are as follows:

$$RPD = \frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2)/2}$$

Where:

RPD = relative percent difference

C_1 = larger of the two observed values

C_2 = smaller of the two observed values

4.1.2 ACCURACY

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Field accuracy is controlled by adherence to sample collection procedures outlined in earlier sections of this document.

Analytical accuracy may be assessed by analyzing "spiked" samples with known standards (surrogates, laboratory control samples, and/or matrix spike) and measuring the percent recovery. Accuracy measurements on matrix spike samples will be carried out at a minimum frequency of 1 in 20 samples per matrix analyzed. Because MS/MSDs measure the effects of potential matrix interferences of a specific matrix, the laboratory will perform MS/MSDs only on samples from this investigation and not from other projects. Surrogate recoveries will be determined for every sample analyzed for organics.

Laboratory accuracy will be evaluated against quantitative laboratory control sample, matrix spike, and surrogate spike recovery using limits from Table 2 for each applicable analyte. Accuracy can be expressed as a percentage of the true or reference value, or as a percent recovery in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is as follow:

$$\%R = \frac{(S - U) \times 100\%}{Csa}$$

Where:

%R = percent recovery

S = measured concentration in the spiked aliquot

U = measured concentration in the unspiked aliquot

C_{sa} = actual concentration of spike added

4.1.3 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Care will be taken in the design of the sampling program to ensure sample locations are selected properly, sufficient numbers of samples are collected to accurately reflect conditions at the location(s), and samples are representative of the sampling location(s). A sufficient volume of sample will be collected at each sampling location to minimize bias or errors.

4.1.4 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another, either older or younger, set of data or data generated by another laboratory. In order to insure results are comparable, samples will be analyzed using standard USEPA methods and protocols as described in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA 2007). Calibration and reference standards will be traceable to certified standards and standard data reporting formats will be employed. Data will also be reviewed to verify that precision and accuracy criteria have been achieved and, if not, that data have been appropriately qualified.

4.1.5 COMPLETENESS

Completeness is a measure of the amount of data that is determined to be valid in proportion to the amount of data collected. Completeness will be calculated as follows:

$$C = \frac{Na \times 100}{N}$$

Where:

C = completeness

Na = number of acceptable data points

N = total number of data points

The data quality objective for completeness for all components of this project is 95%. Data that have been qualified as estimated because the quality control criteria were not met will be considered valid for the purpose of assessing completeness. Data that have been qualified as rejected will not be considered valid for the purpose of assessing completeness.

4.2 LABORATORY ANALYSIS AND TESTING

The groundwater samples will be analyzed for VOCs, specifically PCE and vinyl chloride, using USEPA Method 8260. Wells that show no detectable levels of vinyl chloride at the standard method reporting level (MRL) of 0.5 µg/L will be analyzed by USEPA Method 8260 SIM to reach an MRL of 0.02 µg/L. Analytical methods and requirements are presented in Tables 2 and 3. Table 3 includes

sample size requirements, container type, preservation method, and holding times for the groundwater analytes. Table 2 includes analytical methods, method detection limits (MDLs), and reporting limits (also referred to as Practical Quantitation Limits [PQLs]). Standard Ecology and USEPA sample preparation, cleanup, and analytical methods will be used for all chemical analyses. The laboratory internal QAPP and standard operating procedures will provide data quality procedures at a level sufficient to meet the analytical DQOs, discussed above in Section 3.0.

4.2.1 DETECTION LIMITS

The selected analytical method(s) for VOC analysis results in standard, normally accepted, MDLs and PQLs which were selected in order to meet conservative MTCA Method B Cleanup Levels for PCE and vinyl chloride. Wells that show no detectable levels of vinyl chloride at the standard method reporting level (MRL) of 0.5 µg/L will be analyzed by USEPA Method 8260 SIM to reach an MRL of 0.02 µg/L.

Table 2 presents the target reporting limits and the project data quality assurance criteria. These reporting limits are goals only, insofar as instances may arise where high sample concentrations or matrix interferences preclude achieving the desired reporting limit and associated QC criteria. In such instances, the laboratory will report the reason for any deviation from these reporting limits.

4.3 QUALITY CONTROL SAMPLING

Sampling procedures for this investigation are described in detail in Section 3.0 of this document. Field and laboratory quality control procedures for the sampling are described in detail below.

4.3.1 FIELD QUALITY CONTROL SAMPLES

One blind field duplicate groundwater sample will be collected and analyzed during each groundwater sampling event. Duplicate groundwater samples provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity and matrix effects. Although validation guidelines have not been established by USEPA for field quality control samples, the analysis of these samples is useful in identifying possible problems resulting from sample collection or sample processing in the field. All field quality control samples will be documented in the field logbook and verified by the QA Manager, or designee.

To measure if any cross contamination has occurred, trip blanks will be included in each cooler with samples being analyzed for VOCs to ensure the sample containers do not contribute to any detected analyte concentrations and to identify any artifacts of improper sample handling, storage, or shipping.

4.3.2 LABORATORY QUALITY CONTROL PROCEDURES

4.3.2.1 Laboratory Quality Control Criteria

Results of the QC samples from each sample delivery group will be reviewed by the analyst immediately after a sample group has been analyzed. The QC sample results will then be evaluated to determine whether control limits have been exceeded. If control limits are exceeded in the sample group, the Project Manager will be contacted immediately, and corrective actions (e.g., method modifications followed by reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples.

All primary chemical standards and standard solutions used in this project will be traceable to documented, reliable, commercial sources. Standards will be validated to determine their accuracy by comparison with an independent standard. Any impurities identified in the standard will be documented.

The following sections summarize the procedures that will be used to assess data quality throughout sample analysis.

4.3.2.2 Initial and Continuing Calibration

Multipoint initial calibration will be performed on each instrument at the start of the project, after each major interruption to the analytical instrument, and when any ongoing calibration does not meet control criteria. Ongoing calibration will be performed daily for organic analyses and with every sample batch for conventional parameters (when applicable) to track instrument performance.

Instrument blanks or continuing calibration blanks provide information on the stability of the baseline established. Continuing calibration blanks will be analyzed immediately prior to continuing calibration verification at a frequency of one continuing calibration blank for every 10 samples analyzed at the instrument for inorganic analyses and every 12 hours for organic analyses. If the ongoing calibration is out of control, the analysis must come to a halt until the source of the control failure is eliminated or reduced to meet control specifications. All project samples analyzed while instrument calibration was out of control will be reanalyzed.

4.3.2.3 Laboratory Duplicates

Analytical duplicates provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity and matrix effects. Analytical duplicates are subsamples of the original sample that are prepared and analyzed as a separate sample. A minimum of 1 duplicate will be analyzed per sample group or for every 20 samples, whichever is more frequent.

4.3.2.4 Matrix Spikes and Matrix Spike Duplicates

Analysis of MS samples provides information on the extraction efficiency of the method on the sample matrix. By performing MSD analyses, information on the precision of the method is also provided

for organic analyses. A minimum of 1 MS/MSD will be analyzed for every sample delivery group of 20 samples.

4.3.2.5 Laboratory Control Samples

A laboratory control sample is a method blank sample carried throughout the same process as the samples to be analyzed, with a known amount of standard added. The blank spike compound recovery assesses analytical accuracy in the absence of any sample heterogeneity or matrix effects

4.3.2.6 Surrogate Spikes

All project samples analyzed for organic compounds will be spiked with appropriate surrogate compounds as defined in the analytical methods. Surrogate recoveries will be reported by the laboratories; however, no sample result will be corrected for recovery using these values.

4.3.2.7 Method Blanks

Method blanks are analyzed to assess possible laboratory contamination at all stages of sample preparation and analysis. A minimum of 1 method blank will be analyzed for every extraction batch or for every 20 samples (10 samples for conventional parameters), whichever is more frequent.

4.4 DATA REDUCTION, VALIDATION AND MANAGEMENT

Initial data reduction, evaluation, and reporting at the laboratory will be carried out as described in the appropriate analytical protocols and the laboratory's QA Manual. QC data resulting from methods and procedures described in this document will also be reported.

4.4.1 DATA REDUCTION AND LABORATORY REPORTING

The laboratory will be responsible for internal checks on data reporting and will correct errors identified during the QA review. Close contact will be maintained with the laboratories to resolve any QC problems in a timely manner. The analytical laboratories will be required, where applicable, to report the following:

- **Project/Case Narrative.** This summary, in the form of a cover letter, will discuss problems, if any, encountered during any aspect of analysis. This summary should discuss, but not be limited to, QC, sample transport/shipment, sample storage, and analytical difficulties. Any problems encountered (actual or perceived) and their resolutions will be documented in as much detail as necessary.
- **Sample Identification.** Records will be produced that clearly match all blind duplicate QA samples with laboratory sample identification.
- **Chain-of-Custody Records.** Legible copies of the custody forms will be provided as part of the data package. This documentation will include the time of receipt and condition of each sample received by the laboratory. Additional internal tracking of sample custody by the laboratory will also be documented.

- **Sample Results.** The data package will summarize the results for each sample analyzed. The summary will include the following information when applicable:
  - Field sample identification code and the corresponding laboratory identification code:
    - Sample matrix
    - Date of sample extraction
    - Date and time of analysis
    - Weight and/or volume used for analysis
    - Final dilution volumes or concentration factor for the sample
    - Percent moisture in solid samples
    - Identification of the instrument used for analysis
    - Method reporting and quantitation limits
  - Analytical results reported with reporting units identified
  - All data qualifiers and their definitions
  - Electronic data deliverables
- **Quality Assurance/Quality Control Summaries.** This section will contain the results of all QA/QC procedures. Each QA/QC sample analysis will be documented with the same information required for the sample results (refer to above). No recovery or blank corrections will be made by the laboratory. The required summaries are listed below; additional information may be requested.
- **Method Blank Analysis.** The method blank analyses associated with each sample and the concentration of all compounds of interest identified in these blanks will be reported.
- **Surrogate Spike Recovery.** All surrogate spike recovery data for organic compounds will be reported. The name and concentration of all compounds added, percent recoveries, and range of recoveries will be listed.
- **Matrix Spike Recovery.** All matrix spike recovery data for metals and organic compounds will be reported. The name and concentration of all compounds added, percent recoveries, and range of recoveries will be listed. The RPD for all duplicate analyses will be reported.
- **Matrix Duplicate.** The RPD for all matrix duplicate analyses will be reported.
- **Blind Field Duplicates.** Blind field duplicates will be reported in the same format as any other sample. RPDs will be calculated for duplicate samples and evaluated as part of the data quality review.

4.4.2 DATA VALIDATION

Laboratory reports will be reviewed for internal consistency, transmittal errors, laboratory protocols, and for adherence to the data quality objectives as specified in this QAPP. A Level 1/Tier 1 Compliance Screening data validation will be performed on analytical data and will include the following:

- Verification that the required analytical methods have been utilized.
- Evaluation of package completeness.
- Verification that sample numbers and analyses match those requested on the COC Record.
- Review of method-specified preservation and sample holding times.

- Verification that the required detection limits and reporting limits have been achieved.
- Verification that the field duplicates, matrix spikes/matrix spike duplicates, and laboratory control samples were analyzed at the proper frequency.
- Verification of analytical precision and accuracy via replicate analysis and analyte recovery values.
- Verification that the surrogate compound analyses have been performed and meet QC criteria.
- Verification that the laboratory method blanks are free of contaminants.

Data validation will be based on the QC criteria as recommended in the methods identified in this QAPP and in the National Functional Guidelines for Inorganic and Organic Data Review (USEPA 2004 and 2008).

Data usability, conformance with the DQOs, and any deviations that may have affected the quality of the data, as well as the basis for application of qualifiers will be included in the final reporting of the data. Any required corrective actions based on the evaluation of the analytical data will be determined by the laboratory Project Manager in consultation with the Schwyn Data Validator, and may include qualification of the data or rejection of the data.

4.4.3 DATA MANAGEMENT

All data will be entered into Ecology's Environmental Information Management (EIM) database used to store and query environmental chemistry results within 60 days of receiving test results. . Field data will not be entered into the database. Analytical laboratory data will be received in an electronic data deliverable format suitable for importation into the database. Both laboratory data qualifiers and external data validation qualifiers are stored in the database. The database is managed and stored in on-site and off-site servers and is subject to electronic backup.

5.0 HEALTH AND SAFETY PLAN

A HASP for implementation of field activities described in the Engineering Design Report and this Compliance Monitoring Plan is provided in Appendix A1. The provisions and procedures outlined in the HASP apply to all personnel on-site that are conducting work associated with the remedial action. Contractors, subcontractors, other oversight personnel, and all other persons involved with the work activities described herein are required to comply with the HASP and develop and comply with their own HASP that is equal to, or more encompassing.

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6.0 REPORTING

The cleanup action compliance monitoring program data results will be incorporated into the landfill's detection/assessment monitoring quarterly and annual reports. Data reports will be prepared on a quarterly basis after each monitoring event under the oversight of a Washington State licensed hydrogeologist. An annual report will be prepared to summarize changes throughout the year. Laboratory analytical data will be received in an electronic data deliverable format suitable for direct importation into Ecology's EIM system. All analytical data will be entered into EIM system within 60 days of receiving the laboratory analytical reports.

Each quarterly monitoring report will include:

- Summary tables of the LFG measurements with comparison to the methane LEL;
- PCE and vinyl chloride laboratory analytical data reports and data summary tables for the sampling period;
- Comparison of the PCE and vinyl chloride concentrations to the Site cleanup levels.
- Static water level readings in each compliance monitoring well;
- Potentiometric surface elevation map depicting groundwater flow direction;
- Groundwater flow rate calculations; and
- Other information provided in the landfill's detection/assessment monitoring program report.

The annual monitoring report will include a summary of:

- PCE and vinyl chloride analytical results for the year with comparison to the Site cleanup levels;
- LFG monitoring results for the year with comparison to the methane LEL;
- Notification of any exceedances of the cleanup levels or LFG compliance levels;
- Documentation of the LFG extraction and control system, landfill cover, and stormwater system inspections; ; and
- Other information provided in the landfill's annual detection/assessment monitoring program report.

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7.0 REFERENCES

HDJ Design Group. 2015. *Landfill Area Legal Description.* Sudbury Road Landfill Legal description and Sheet 1 of 1 surveyed and prepared for Consent Decree 15-2-00536-8 filed with the Walla Walla Superior Court. March 30.

Washington State Department of Ecology (Ecology).. 2004. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies.* Publication No. 04-03-030. Washington State Department of Ecology. July.

———. 2002. *Chapter 173-50 WAC, Accreditation of Environmental Laboratories.* State of Washington Department of Ecology. 1 October.

U.S. Environmental Protection Agency (USEPA). 2008. *USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review*. EPA-540/R-99/008. October.

———. 2007. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*. EPA Publication SW-846. Revision 6. February.

———. 2004. *USEPA National Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. OSWER 9240.1-45, EPA 540-R-04-004. Office of Superfund Remediation and Technology Innovation (OSRTI). Washington, D.C. October.

———. 1998. *Guidance on Quality Assurance Project Plans*. EPA QA/G-5. United States Environmental Protection Agency, Office of Research and Development. EPA/600/R-98/018. February.

———. 1993. *Washington Administrative Code*. Chapter 173-351, Criteria for Municipal Solid Waste Landfills. October.

TABLE 1
DATA QUALITY ASSURANCE CRITERIA
City of Walla Walla Sudbury Road Landfill

Parameter	Matrix	Units	Reporting Limit/PQL[1]	Precision	Accuracy	Completeness	Reference
Groundwater Samples							
Volatile Organic Compounds[2]	Water	µg/L	0.05 - 20	±20%	±50%	95%	USEPA Method 8260C
Tetrachloroethene	Water	µg/L	0.5	±20%	±50%	95%	USEPA Method 8260C
Vinyl chloride	Water	µg/L	0.02	±20%	±50%	95%	USEPA Method 8260C SIM

Notes:
1) All reporting limits shown are method Practical Quantitation Limits (PQLs) from ALS Environmental, Kelso WA.
USEPA = United States Environmental Protection Agency

TABLE 2
ANALYTICAL METHODS, DETECTION AND REPORTING LIMITS
City of Walla Walla Sudbury Road Landfill

Parameter	Analytical Method	Detection Limit[1]	Reporting Limit (PQL)[1]
Groundwater Samples			
Volatile Organic Compounds[2]	USEPA Method 8260C	0.025 - 2.5 µg/L	0.5 – 20 µg/L
Tetrachloroethene	USEPA Method 8260C	0.025 µg/L	0.5 µg/L
Vinyl chloride	USEPA Method 8260C SIM	0.013 µg/L	0.02 µg/L

Notes:
1) All reporting limits shown are method Practical Quantitation Limits (PQLs) from ALS Environmental.
USEPA = United States Environmental Protection Agency
PQL = Practical Quantitation Limit

TABLE 3
ANALYTICAL REQUIREMENTS
City of Walla Walla Sudbury Road Landfill

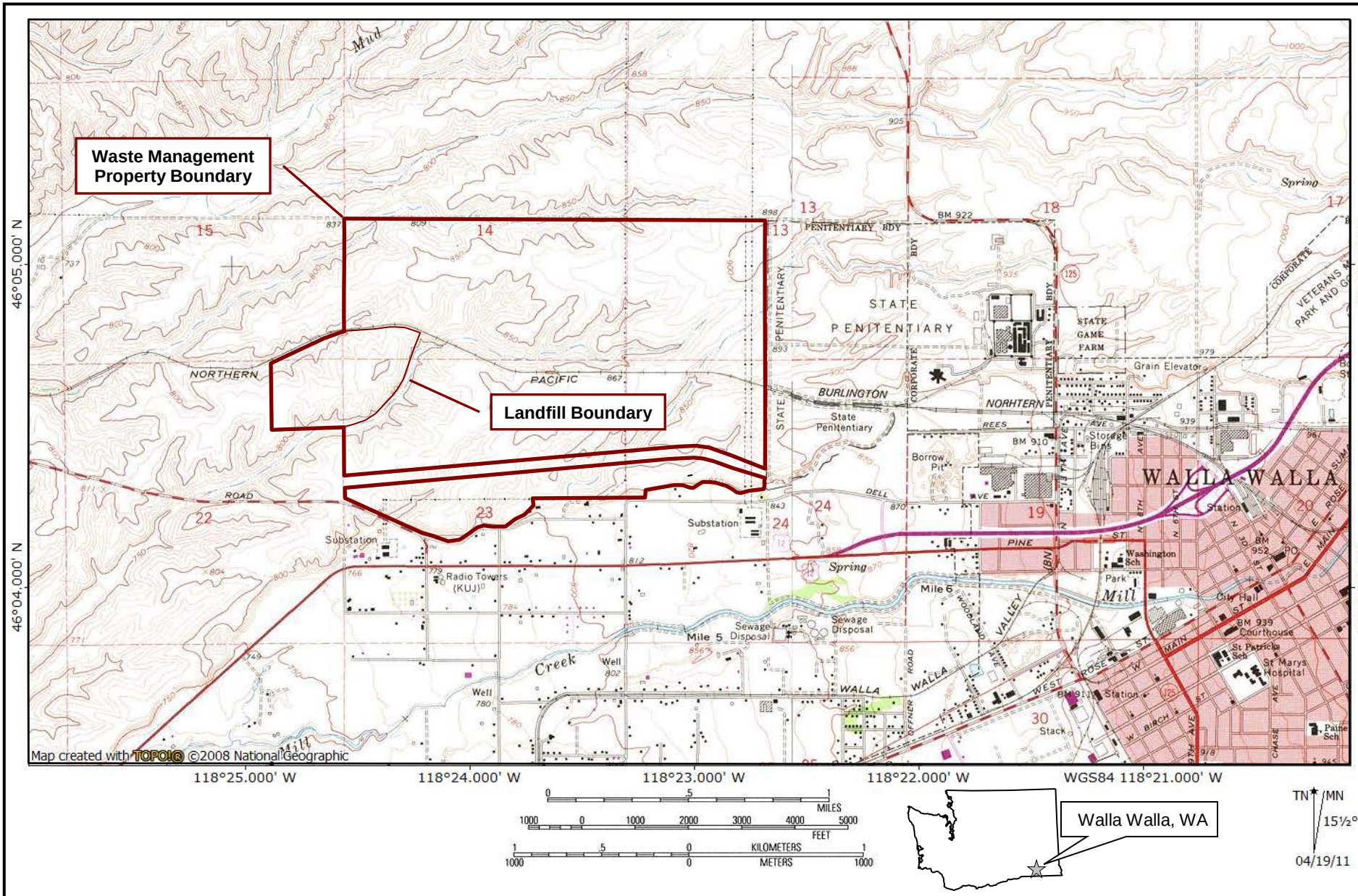
Analyses	Method	Bottle Type	Preservative	Holding Time
Groundwater Samples				
Volatile Organic Compounds[1]	USEPA 8260B Low-Level	(3) 40 mL VOA vials	HCl, cool to 6˚C	14 days to analyze

Notes:

1) No head space in sample container.

USEPA = United States Environmental Protection Agency

HCl = Hydrochloric Acid



Schwyn Environmental Services

Remedial Investigation Work Plan Sudbury Road Landfill Walla Walla, Washington	**Site Location**	Figure 1

Notes:
· Landfill gas extraction system design details provided by Herrara.
· Map created by Floyd|Snider, Inc.
· Orthoimage provided by City of Walla Walla and dated 2012.

LEACHATE EVAPORATION POND
GW-8
MW-12b
AREA 7
NORTH DRAINAGE DITCH
GW-5
GW-7D
GW-7S
MW-19
GW-6
MW-20
MW-15
AREA 5
AREA 4a (Asbestos Area)
MW-16
GW-12
Well #2
AREA 6
GW-9
COMPOST AREA (Green)
AREA 1
GW-11
AREA 4 (Asbestos Area)
AREA 2
GW-10
MW-11
MW-14
Landfill Gas Blower and Flare
AREA 3 (Medical Waste Area)
COMPOST LAGOON
SCALE HOUSE & OFFICE
12

Legend

Existing Features
- Landfill Gas Monitoring Well
- Compliance Wells
- Water Well (non-potable)
- Drainage Pipe
- Creek
- Spring
- Intermittent Creek
- Street
- Highway
- Landfill Areas
- Landfill Boundary
- City Property Boundary
- Compost Area
- Compost Lagoon
- North Drainage Ditch
- Sedimentation Pond

Schwyn Environmental Services

0 200 400 800
Scale in Feet
1:4,810

N

Sudbury Road Landfill
Walla Walla, Washington

Site Plan and Compliance Monitoring Well Locations

Figure 2

I:\GIS\Projects\Schywn-Sudbury\MXD\SAP\Figure 2 Site Plan.mxd 10/1/2015

APPENDIX A1

Sudbury Road Landfill Cleanup Action
Health and Safety Plan

Schwyn Environmental Services

Health and Safety Plan
for
Sudbury Road Landfill Cleanup Action
Walla Walla, Washington

Prepared
January 2016

Prepared for:

City of Walla Walla

Prepared by:

Schwyn Environmental Services
4621 South Custer
Spokane, WA 99223
(509) 448-3187

Table of Contents

1.0 Plan Objectives and Applicability

This Health and Safety Plan (HASP) was developed to comply with the standards prescribed by the Occupational Safety and Health Act (OSHA) and the Washington Industrial Safety and Health Act (WISHA). The purpose of this HASP is to establish protection standards and mandatory safe practices and procedures during the City of Walla Walla, Washington, (City) Sudbury Road Landfill (Site) Remedial Action activities. The components of the Sudbury Road Landfill Remedial Action (RA) include the construction of soil covers for Areas 2 and 5; Area 5 and north drainage ditch stormwater controls; Area 5 run-on controls; landfill gas (LFG) extraction well system installation at Areas 1, 2, and 5, and connection to the existing landfill gas system; compliance groundwater and landfill gas monitoring, and operation and maintenance of the constructed remedial systems. This HASP assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may occur during field work activities. This plan consists of site descriptions, a summary of work activities, an identification and evaluation of chemical and physical hazards, monitoring procedures, personnel responsibilities, a description of site zones, decontamination and disposal practices, emergency procedures, and administrative requirements.

Persons conducting RA field activities are required to read this HASP and indicate that they understand its contents by signing a copy of this plan. The provisions and procedures outlined by this HASP apply to all personnel on-site that are conducting work associated with the RA. Contractors, subcontractors, other oversight personnel, and all other persons involved with the field work activities described herein are required to comply with this HASP or develop their own HASP that is more comprehensive. If a subcontractor of this project chooses to adopt this HASP, the subcontractor shall acknowledge this with the signature of a designated representative on a form accepting the plan. The signed form must be provided prior to that subcontractor's commencing work activities at the site. The subcontractor must make an independent determination of the applicability of its HASP to their work and must comply with all applicable statutes, federal, state and local regulations and codes. Schwyn does not warrant that this HASP will be sufficient for the subcontractor's work. If a subcontractor chooses to develop its own HASP, the subcontractor will provide the Health and Safety Officer a copy for review at least 5 days prior to commencement of work activities at the site. The subcontractor will insure their HASP will be in compliance with this HASP, and all appropriate federal, state and local regulations.

A Health and Safety Officer (HSO) has field responsibility for ensuring that the provisions outlined herein adequately protect worker health and safety and that the procedures outlined by this HASP are properly implemented. Contractors, subcontractors, other oversight personnel, and all other persons involved in RA activities shall designate a HSO for the duration of the work. In this capacity, the HSO will conduct regular site inspections to ensure that this HASP remains current with potentially changing site conditions. The HSO has the authority to make health and safety decisions that may not be specifically outlined in this HASP, should site conditions warrant such actions. In the event that the HSO leaves the Site while work is

in progress, an alternate Site Safety Officer (SSO) will be designated. Personnel responsibilities are further described in Section 4.0.

All site personnel shall review and be familiar with this HASP and any work specific Contractor and subcontractor HASPs. A copy of the HASP will be on-site at all times.

2.0 Emergency Contacts and Information

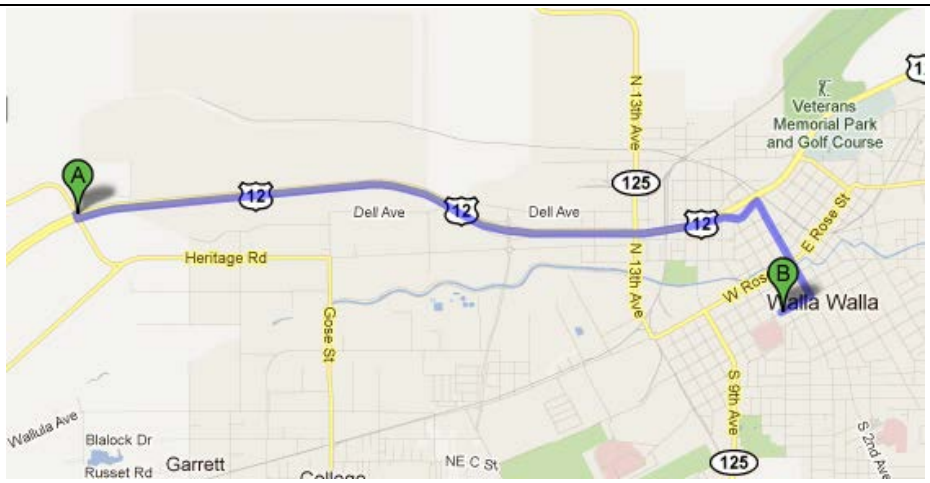
2.1 DIAL 911

In the event of any emergency, dial 911 to reach fire, police, and first aid.

2.2 HOSPITAL AND POISON CONTROL

Nearest Hospital Location and Telephone: Refer to Figure 1 below for map and directions to the hospital.	St. Mary's Hospital 401 West Poplar Street Walla Walla, WA 99362 (509) 525-3320 or (509) 522-5900
Washington Poison Control Center:	(800) 222-1222

Figure 1
Hospital Directions



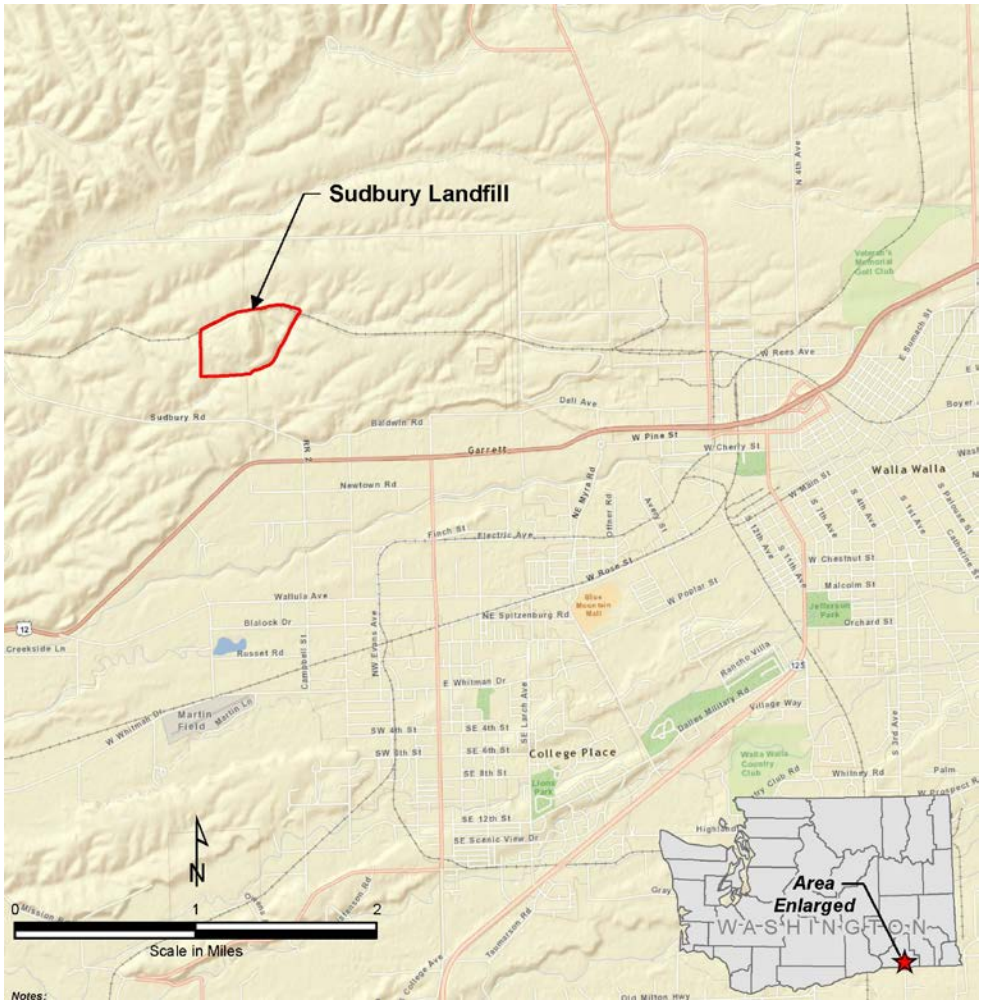
Leave Site Heading LEFT/SOUTHEAST on Sudbury Road
Turn LEFT/EAST onto US-12
Exit US-12 at 2nd Avenue, turn RIGHT/SOUTH onto 2nd Avenue
Turn into Hospital Emergency Room Entrance at 401 West Poplar Street

2.3 PROVIDE INFORMATION TO EMERGENCY PERSONNEL

All project personnel should be prepared to give the following information:

Information to Give to Emergency Personnel	
Site Location: Refer to Figure 2 below for directions and map to the Site.	Sudbury Road Landfill Site 414 Landfill Road Walla Walla, WA 99362
Number that You are Calling from:	Look on the phone you are calling from.
Type of Accident or Type(s) of Injuries:	Describe accident and/or incident and numbers of personnel needing assistance.

Figure 2
Sudbury Road Landfill Site



2.4 EMERGENCY CONTACTS

After contacting emergency response crews as necessary, contact the PM/HSO to report the emergency. Contact other emergency contacts listed below as necessary.

Emergency Contacts:

Contact	Off-site Phone Number	On-site Phone Number
Craig Schwyn, PM and HSO	(509) 448-3187	(509) 499-6583
Landfill Supervisor, Damon Taam		(509)-524-4572
Frank Nicholson, Project Engineer	(509) 200-9766	(509)-524-4510

3.0 Background Information

3.1 SITE BACKGROUND

The Sudbury Road Landfill is generally located at 414 Landfill Road (formerly Sudbury Road), Walla Walla, Washington 99362, about 4 miles west of the city of Walla Walla and 0.25 mile north of Highway 12 (Figure 1). The landfill is composed of seven active and former disposal areas (Areas 1 through 7). Areas 1, 2, 5, and 6 are closed municipal solid waste (MSW) disposal cells. Areas 3 and 4 are closed medical and asbestos waste disposal cells, respectively. Area 7 is an active MSW disposal cell. The landfill itself covers approximately 125 acres, and is located within the western portion of an 828.86-acre City-owned parcel of land that is zoned and used for various waste management purposes (Figure 2).

As part of their solid waste handling permit requirements, the City has monitored groundwater on a quarterly schedule since July 1978. In July 2001, the City installed monitoring well MW-15, a downgradient well adjacent to Area 5. Tests showed the presence of volatile organic compounds (VOCs) in groundwater including trichloroethene (TCE) , trichloroethene (PCE) , trichlorofluoromethane (Freon 11), dichlorodifluoromethane (Freon 12), vinyl chloride, chloroethane, 1,1-dichloroethane, and cis-1,2-dichloroethane, and other constituents including calcium, sodium, bicarbonate/alkalinity, chloride, and total dissolved solids. A remedial investigation and feasibility study were conducted in 2011 through 2014, and a cleanup action was prescribed by Ecology in 2015. Construction activities are scheduled for 2016.

The selected cleanup action for the Site consists of improved capping of two solid waste cells, capture and destruction of landfill gas (LFG), and controls on stormwater to prevent leachate generation. It also includes provisions for long-term monitoring and institutional controls. The components of the selected cleanup action for the Site consist of:

- Landfill cap improvement using soil cover over Areas 2 and 5.
- Stormwater controls:
  - Cast-in-place concrete for the north drainage ditch;
  - Erosion control berm for Area 5 runoff; and
  - Diversion of run-on from the southwest side of Area 5.
- Active LFG extraction and destruction in Areas 1, 2, and 5.
- Monitoring and long-term maintenance of:
  - Groundwater and groundwater monitoring systems;
  - LFG and LFG monitoring systems;
  - Landfill cap; and
  - Stormwater controls.
- Institutional controls.

3.2 SCOPE OF WORK

The scope of work for the remedial action will be/is described in detail in the Engineering Design Report. Construction is expected to occur in 2016. Compliance monitoring will be conducted for a minimum period of 5 years after completing the construction of the remedy and for at least 2 years after achieving cleanup levels.

4.0 Primary Responsibilities and Requirements

4.1 HEALTH AND SAFETY OFFICER

Contractors, subcontractors, other oversight personnel, and all other persons involved in RA activities shall designate a HSO for the duration of the work. In this capacity, the HSO will conduct regular site inspections to ensure that this HASP remains current with potentially changing site conditions. The HSO will ensure that all personnel on-site have received the required training, are familiar with the HASP, and understand the procedures to follow should an accident and/or incident occur on-site. The HSO will advise project personnel on all potential health and safety issues of the remedial action activities to be conducted at the Site. The HSO will specify required exposure monitoring to assess site health and safety conditions, modify the Site's HASP based on field assessment of health and safety accidents and/or incidents, and recommend corrective action if needed. If the HSO observes unsafe working conditions by any personnel, the HSO will suspend all work until the hazard has been addressed.

4.2 SITE SAFETY OFFICER

The SSO will be a person dedicated to assist the HSO during field work activities and occupy the role of the HSO should the HSO be off-site. The SSO will ensure that all personnel have appropriate personal protective equipment (PPE) on-site and that PPE is properly used. The SSO will assist the HSO in field observation of personnel safety. If a health or safety hazard is observed, the SSO shall suspend all work activity. The SSO will conduct on-site safety meetings before work commences. All health and safety equipment will be calibrated daily and records kept in the field logbook. The SSO may perform exposure monitoring if needed and will ensure that equipment is properly maintained.

4.3 TRAINING REQUIREMENTS

All project personnel that perform come in contact with LFG, leachate, or contaminated groundwater must comply with applicable regulations specified in the Hazardous Waste Operations (HAZWOP) Chapter 296-843 of the Washington Administrative Code (WAC), administered by the Washington State Department of Labor and Industries (L&I), and fulfill the medical surveillance program requirements. Project personnel will be 40-hour HAZWOP trained and maintain their training with an annual 8-hour refresher. Personnel with limited tasks and minimal exposure potential will be required to have 24-hour training and a site hazard briefing. Personnel with defined tasks that do not include potential contact with disturbed site soils, waste, or groundwater, or exposures to LFG, are not required to have any level of hazardous waste training beyond a site emergency briefing and hazard orientation by the HSO.

In addition to the 40-hour course and 8-hour refreshers, the HSO will have completed an 8-hour HAZWOP Supervisor training or equivalent as required by WAC 296-843-20015. At least one person on-site during field work will have current cardiopulmonary resuscitation (CPR)/First Aid certification. All field personnel with the potential of exposure to contaminants will have a minimum of 3 days of hazardous materials field

experience under the direction of a skilled supervisor. Documentation of all required training will be maintained in a three-ring binder, or similar, on-site and kept either in the HSO vehicle or landfill office.

Additional site-specific training that covers on-site hazards, PPE requirements, use and limitations, decontamination procedures, and emergency response information as outlined in this HASP will be given by the HSO before on-site work activities begin.

5.0 Hazard Evaluation and Risk Analysis

In general, there are three broad hazard categories that may be encountered during site work: chemical exposure hazards, fire/explosion hazards, and physical hazards. Sections 5.1 through 5.3 discuss the specific hazards that fall within each of these broad categories.

5.1 CHEMICAL EXPOSURE HAZARDS

This section describes potential chemical hazards associated with excavation or borings in or near refuse, LFG systems, and groundwater and LFG monitoring. Based on previous site investigation information, the majority of the chemicals previously detected at this Site are summarized below. Additional volatile organic compounds (VOCs) have been detected in landfill gas at the Site; however, chemicals included below are expected to be representative of hazards posed by exposure to landfill gas while conducting site activities:

- VOCs—tetrachloroethene (PCE), trichloroethene (TCE), vinyl chloride (VC), 1,1-dichloroethane (1,1-DCA), chloroform, chloroethane, cis-1,2-dichloroethene (cis-1,2-DCE), dichlorodifluoromethane (Freon-12), trichlorofluoromethane (Freon-11), and toluene in soil, groundwater, and landfill gas.
- Other potential landfill gases including carbon dioxide, methane, and hydrogen sulfide.

Human health hazards of these chemicals are presented in the table below. This information covers potential toxic effects that might occur if relatively significant acute and/or chronic exposure were to happen. This information does not mean that such effects will occur from the planned site activities. Potential routes of exposure include inhalation, dermal contact, ingestion, and eye contact. The primary exposure route of concern during site work is ingestion of contaminated water or MSW, or inhalation of landfill gas, though such exposure is considered preventable. The types of planned work activities and use of monitoring procedures and protective measures will limit potential exposures at this Site. The use of appropriate PPE and decontamination practices will assist in controlling exposure through pathways to the contaminants listed in the table below.

Chemical Hazard	Permissible Exposure Limits (8-hour TWA/STEL)	Routes of Exposure	Potential Toxic Effects
Tetrachloroethene	25 ppm/38 ppm	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, nose, and throat; nausea; flushed skin; vertigo; dizziness; incoherence; sleepiness; liver damage, cancer
Trichloroethene	50 ppm/200 ppm	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes and skin; headache; vertigo; vision disturbance; fatigue; tremors/jitters; sleepiness; nausea; dermatitis; cardiac arrhythmia; paresthesia; liver injury, cancer
1,2-Dichloroethane	1 ppm/2 ppm	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes; corneal opacity; central nervous system depression; nausea; dermatitis; liver, kidney, cardiovascular system damage, cancer
cis-1,2-dichloroethene	TWA: 200 ppm (790 mg/m^3)	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes and respiratory system; central nervous system depression
Vinyl chloride	1 ppm/5 ppm	Inhalation, skin absorption, ingestion, skin/eye contact	Lassitude; abdominal pain; GI bleeding; enlarged liver; pallor or cyanosis of extremities, cancer
Chloroethane	TWA: 1000 ppm (2600 mg/m^3)	Inhalation, skin absorption, ingestion, skin/eye contact	Inebriation; abdominal cramps; cardiac arrhythmia; cardiac arrest; liver and kidney damage; incoordination

Chemical Hazard	Permissible Exposure Limits (8-hour TWA/STEL)	Routes of Exposure	Potential Toxic Effects
Chloroform	STEL: 2 ppm/9.78 mg/m^3	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes and skin; dizziness; mental dullness; nausea; confusion; headache; lassitude; anesthesia; liver damage, cancer
Toluene	100 ppm/150 ppm	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes; lassitude; euphoria; dizziness; headache; dilated pupils; anxiety; muscle fatigue; liver and kidney damage; confusion; insomnia; dermatitis
Freon-11	TWA: 1000 ppm (5600 mg/m^3)	Inhalation, skin absorption, ingestion, skin/eye contact	Dizziness; tremors; asphyxia; unconsciousness; cardiac arrhythmia; cardiac arrest; Liquid: frostbite
Freon-12	TWA: 1000 ppm (4,950 mg/mg^3)	Inhalation, skin absorption, ingestion, skin/eye contact	Dizziness; tremors; asphyxia; unconsciousness; cardiac arrhythmia; cardiac arrest; Liquid: frostbite
Carbon dioxide (CO_2)	5,000 ppm/30,000 ppm	Inhalation	Asphyxia; nausea; respiratory problems; vasodilation leading to circulatory collapse
Hydrogen Sulfide (H_2S)	10 ppm/15 ppm	Inhalation	Irritation to eyes and respiratory system; apnea; coma; convulsions; eye pain; dizziness; headache; lassitude; GI distress. Most individuals can smell the “rotten egg” smell at concentrations as low as 0.005 ppm.
Methane (CH_4)	Not Established	Inhalation	Defined as an asphysiant

Chemical Hazard	Permissible Exposure Limits (8-hour TWA/STEL)	Routes of Exposure	Potential Toxic Effects
Laboratory Preservatives (HCl, MeOH, Sodium Bisulfate, HNO_3)	Not Applicable	Dermal contact, eye contact	Irritation to skin or eyes.

Abbreviations:

GI	Gastro-intestinal
HCl	Hydrochloric acid
HNO_3	Nitric acid
MeOH	Methanol
mg/m3	Milligrams per cubic meter
PPE	Personal protective equipment
ppm	Parts per million
STEL	Short term exposure limit
TWA	Time-weighted average

5.2 FIRE AND EXPLOSION HAZARDS

Flammable and combustible landfill gases, such as methane, may be encountered during field work. This work includes, but is not limited to, drilling or well decommissioning in a landfill, work around LFG transfer pipelines, flair stations, and sumps, and monitoring wells. Flammable and combustible liquid hazards may occur from fuels and lubricants brought to the property to support heavy equipment. When on-site storage is necessary for fuels and lubricants, such material will be stored in containers approved by the Washington State Department of Transportation (WSDOT) in a location not exposed to strike hazards and provided with secondary containment. A minimum 2-A:20-B fire extinguisher will be located within 25 feet of the storage location and where refueling occurs. Any subcontractors bringing flammable and combustible liquid hazards to the Site are responsible for providing appropriate material for containment and spill response. Transferring of flammable liquids (e.g., gasoline) will occur only after making positive metal to metal connection between the containers, which may be achieved by using a bonding strap. Storage of ignition and combustible materials will be kept away from fueling operations.

Absolutely *no* open flames or spark source is allowed in the work area. This includes no lit cigarettes, lighters, matches, welding torches, or other potential sources of open flames or sparks. A minimum 2-A:20-B fire extinguisher will be located within 25 feet of the work area. If air monitoring thresholds described in Section 6.1 are exceeded, all workers shall leave the area until the flammable/explosive vapors have dissipated prior to continuation of work.

5.3 PHYSICAL HAZARDS

When working in or around any hazardous or potentially hazardous substances or situations, all site personnel should plan all activities before starting any task. Site personnel shall identify health and safety hazards involved with the work planned and

consult with the HSO as to how the task can be performed in the safest manner, and if personnel have any reasons for concern or uncertainty.

All field personnel will adhere to general safety rules including wearing appropriate PPE—hard hats, steel-toed boots, high-visibility vests, safety glasses, gloves, and hearing protection, as appropriate. Eating, drinking, and/or use of tobacco or cosmetics will be restricted in all work areas. Personnel will prevent splashing of liquids containing chemicals and minimize dust emissions.

The following table summarizes a variety of physical hazards that may be encountered on the Site during work activities. For convenience, these hazards have been categorized into several general groupings with recommended preventative measures.

Hazard	**Cause**	**Prevention**
Head strike	Falling and/or sharp objects, bumping hazards.	Hard hats will be worn by all personnel at all times when overhead hazards exist, such as during drilling activities and around large, heavy equipment.
Foot/ankle twist, crush, slip/trip/fall	Sharp objects, dropped objects, uneven and/or slippery surfaces.	Steel-toed boots must be worn at all times on-site while heavy equipment is present. Pay attention to footing on uneven or wet terrain and do not run. Keep work areas organized and free from unmarked trip hazards.
Hand cuts, splinters, and chemical contact	Hands or fingers pinched or crushed, chemical hazards including dermal exposure to laboratory sample preservatives. Cut or splinters from handling sharp/rough objects and tools.	Safety gloves will be worn to protect the hands from dust and chemicals. Leather or cotton outer gloves will be used when handling sharp-edged rough materials or equipment. Refer to preventive measures for mechanical hazards below.
Eye damage from flying materials, or splash hazards	Sharp objects, poor lighting, exposure due to flying debris or splashes.	Safety glasses will be worn at all times on-site. If a pressure washer is used to decontaminate heavy equipment, a face shield will be worn over safety glasses or goggles. Care will be taken during decontamination procedures, soil sampling, and groundwater sampling to avoid splashing, as well as when dropping equipment into decontamination water. Face shields may be worn over safety glasses if splashing is occurring during sampling, decontamination, well testing, or disposal.

Hazard	Cause	Prevention
Electrical hazards	Underground utilities, overhead utilities. Electrical cord hazards, such as well development pumps.	Utility locator service will be used prior to any investigation to locate all underground utilities. Visual inspection of work areas will be conducted prior to starting work. Whenever possible, avoid working under overhead high voltage lines. Make sure that no damage to extension cords occurs. If an extension cord is used, make sure it is the proper size for the load that is being served, properly rated and inspected prior to use for defects. The plug connection on each end should be of good integrity. Insulation must be intact and extend to the plugs at either end of the cord. All portable power tools will be inspected for defects before use and must either be a double-insulated design or grounded with a ground-fault circuit interrupter (GFCI).
Mechanical hazards	Heavy equipment such as drill rigs, service trucks, mowing equipment, saws, drills, etc. Conducting work in road right-of-ways (on the road shoulder).	Ensure the use of competent operators, backup alarms, regular maintenance, daily mechanical checks, and proper guards. Subcontractors will follow this HASP or supply their own HASP. All project personnel will make eye contact with operator and obtain a clear OK before approaching or working within swing radius of heavy equipment, staying clear of swing radius. Obey on-site speed limits.
Traffic hazards	Vehicle traffic and hazards when working near public right-of-ways.	When working near public access areas or on the shoulder of any roadway, orange cones and/or flagging will be placed around the work area. Safety vests will be worn at all times while conducting work. Multiple field staff will work together (buddy system) and spot traffic for each other. Avoid working with your back to traffic whenever possible. **Further detail on traffic hazards is provided in Section 5.3.4.**
Damage to hearing from noise	Machinery creating more than 85 decibels TWA, less than 115 decibels continuous noise, or peak at less than 140 decibels.	Wear earplugs or protective ear covers when a conversational level of speech is difficult to hear at a distance of 3 feet; when in doubt, a sound level meter may be used on-site to document noise exposure.

Hazard	Cause	Prevention
Strains from improper lifting	Injury due to improper lifting techniques, over-reaching/ overextending, lifting overly heavy objects.	Use proper lifting techniques and mechanical devices where appropriate. The proper lifting procedure first involves testing the weight of the load by tipping it. If in doubt, ask for help. Do not attempt to lift a heavy load alone. Take a good stance and plant your feet firmly with legs apart, one foot farther back than the other. Make sure you stand on a level area with no slick spots or loose gravel. Use as much of your hands as possible, not just your fingers. Keep your back straight, almost vertical. Bend at the hips, holding load close to your body. Keep the weight of your body over your feet for good balance. Use large leg muscles to lift. Push up with one foot positioned in the rear as you start to lift. Avoid quick, jerky movements and twisting motions. Turn the forward foot and point it in the direction of the eventual movement. Never try to lift more than you are accustomed to lifting. During the transfer of monitoring well purge water to the disposal area (leachate ponds), mechanical lifting devices (drum tongs or dolly) will be used to move the drums. Lifting hazards may also be minimized by pumping from drums directly to a water truck tank, which will then transport the water to the ponds.
Cold stress	Cold temperatures and related exposure.	Workers will ensure appropriate clothing, stay dry, and take breaks in a heated environment when working in cold temperatures. **Further detail on cold stress is provided in Section 5.3.1.**
Heat exposure	High temperatures exacerbated by PPE, dehydration.	Workers will ensure adequate hydration, shade, and breaks when temperatures are elevated. **Further detail on heat stress is provided in Section 5.3.2.**
Accidents due to inadequate lighting	Improper illumination.	Work will proceed during daylight hours only, or under sufficient artificial light.

Abbreviations:
HASP Hand and Safety Plan
PPE Personal protective equipment
TWA Time-weighted average

5.3.1 Cold Stress

The majority of field work is expected to be completed during warm periods; however, some activities such as groundwater and LFG monitoring may be conducted in winter months and exposure to cold temperatures may occur. Exposure to moderate levels of cold can cause the body's internal temperature to drop to a dangerously low level, causing hypothermia. Symptoms of hypothermia include slow, slurred speech, mental confusion, forgetfulness, memory lapses, lack of coordination, and drowsiness.

To prevent hypothermia, site personnel will stay dry and avoid exposure. Site personnel will have access to a warm, dry area, such as a vehicle, to take breaks from the cold weather and warm up. Site personnel will be encouraged to wear sufficient clothing in layers such that outer clothing is wind- and waterproof and inner layers retain warmth (wool or polypropylene), if applicable. Site personnel will keep hands and feet well protected at all times. The signs and symptoms and treatment for hypothermia are summarized below.

Signs and Symptoms

- Mild hypothermia (body temperature of 98–90° F)
  - Shivering
  - Lack of coordination, stumbling, fumbling hands
  - Slurred speech
  - Memory loss
  - Pale, cold skin
- Moderate hypothermia (body temperature of 90–86° F)
  - Shivering stops
  - Unable to walk or stand
  - Confused and irrational
- Severe hypothermia (body temperature of 86–78° F)
  - Severe muscle stiffness
  - Very sleepy or unconscious
  - Ice cold skin
  - Death

Treatment of Hypothermia—Proper Treatment Depends on the Severity of the Hypothermia

- Mild hypothermia
  - Move to warm area.
  - Stay active.

- Remove wet clothes and replace with dry clothes or blankets and cover the head.
- Drink warm (not hot) sugary drinks.

- Moderate hypothermia
  - All of the above, plus:
    - call 911 for an ambulance.
    - cover all extremities completely.
    - place very warm objects such as hot packs or water bottles on the victim's head, neck, chest, and groin.

- Severe hypothermia
  - Call 911 for an ambulance.
  - Treat the victim very gently.
  - Do not attempt to re-warm—the victim should receive treatment in a hospital.

Frostbite

Frostbite occurs when the skin actually freezes and loses water. In severe cases, amputation of the frostbitten area may be required. While frostbite usually occurs when the temperatures are 30°F or lower, wind chill factors can allow frostbite to occur in above-freezing temperatures. Frostbite typically affects the extremities, particularly the feet and hands. Frostbite symptoms include cold, tingling, stinging, or aching feeling in the frostbitten area followed by numbness and skin discoloration from red to purple, then white or very pale. Should any of these symptoms be observed, wrap the area in soft cloth, do not rub the affected area, and seek medical assistance. Call 911 if the condition is severe.

Protective Clothing

Wearing the right clothing is the most important way to avoid cold stress. The type of fabric also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, on the other hand, retains its insulation even when wet. The following are recommendations for working in cold environments:

- Wear *at least three layers* of clothing.
  - An outer layer to break the wind and allow some ventilation (like Gortex or nylon).
  - A middle layer of down or wool to absorb sweat and provide insulation even when wet.
  - An inner layer of cotton or synthetic weave to allow ventilation.
- Wear a hat—up to 40 percent of body heat can be lost when the head is left exposed.
- Wear insulated boots or other footwear.

- Keep a change of dry clothing available in case work clothes become wet.
- Do not wear tight clothing—loose clothing allows better ventilation.

Work Practices

- Drinking—Drink plenty of liquids, avoiding caffeine and alcohol. It is easy to become dehydrated in cold weather.
- Work Schedule—If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold in heated vehicles.
- Buddy System—Try to work in pairs to keep an eye on each other and watch for signs of cold stress.

5.3.2 Heat Stress

To avoid heat-related illness, current regulations in WAC 296-62-095 through 296-62-09570 will be followed during all outdoor work activities. These regulations apply to any outdoor work environment from May 1 through September 30, annually, when workers are exposed to temperatures greater than 89°F when wearing breathable clothing, greater than 77°F when wearing double-layered woven clothing (such as jackets or coveralls) or greater than 52°F when wearing non-breathing clothing such as chemical resistant suits or tyvek. The HSO will identify and evaluate temperature, humidity, and other environmental factors associated with heat-related illness including, but not limited to, the provision of rest breaks that are adjusted for environmental factors, and encourage frequent consumption of drinking water. Drinking water will be provided and made readily accessible in sufficient quantity to provide at least 1 quart per employee per hour. All personnel will be informed and trained for responding to signs or symptoms of possible heat-related illness and accessing medical aid.

Employees showing signs or demonstrating symptoms of heat-related illness must be relieved from duty and provided with a sufficient means to reduce body temperature, including rest areas or temperature-controlled environments (i.e., air conditioned vehicle). Any employee showing signs or demonstrating symptoms of heat-related illness must be carefully evaluated to determine whether it is appropriate to return to work or if medical attention is necessary.

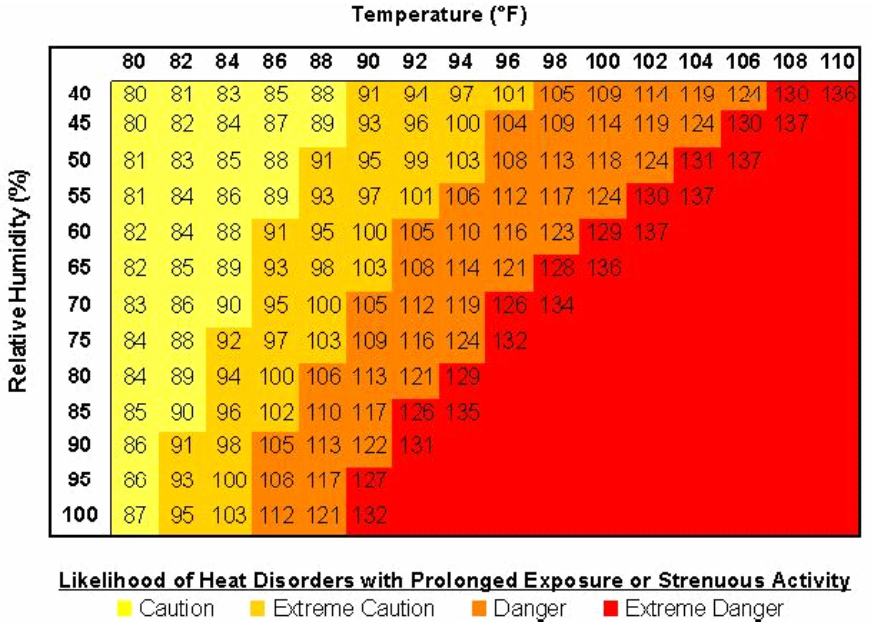
Any incidence of heat-related illness must be immediately reported to the employer directly through the HSO.

The signs, symptoms, and treatment of heat stress include the following:

Condition	**Signs/Symptoms**	**Treatment**
Heat cramps	Painful muscle spasms and heavy sweating.	Increase water intake, rest in shade/cool environment.
Heat syncope	Brief fainting and blurred vision.	Increase water intake, rest in shade/cool environment.

Dehydration	Fatigue, reduced movement, headaches.	Increase water intake, rest in shade/cool environment.
Heat exhaustion	Pale and clammy skin, possible fainting, weakness, fatigue, nausea, dizziness, heaving sweating, blurred vision, body temperature slightly elevated.	Lie down in cool environment, increase water intake, loosen clothing, and call 911 for ambulance transport if symptoms continue once in cool environment.
Heat stroke	Cessation of sweating, skin hot and dry, red face, high body temperature, unconsciousness, collapse, convulsions, confusion or erratic behavior, life threatening condition.	**Medical Emergency! Call 911** for ambulance transport. Move victim to shade and immerse in water.

If site temperatures are forecast to exceed 85°F and physically demanding site work will occur in impermeable clothing, the HSO will promptly consult with a certified industrial hygienist and a radial pulse monitoring method will be implemented to ensure that heat stress is properly managed among the affected workers. The following heat index chart indicates the relative risk of heat stress.



5.3.3 Biohazards

Bees and other insects may be encountered during the field work tasks. Persons with allergies to bees will make the HSO aware of their allergies and will avoid areas where bees are identified. Controls such as repellents, hoods, nettings, masks, or other

personal protection may be used. Report any insect bites or stings to the HSO and seek first aid, if necessary.

Site personnel will maintain a safe distance from any urban wildlife encountered, including stray dogs, raccoons, and rodents, to preclude a bite from a sick or injured animal. Personnel will be gloved and will use tools to lift covers from catch basins and monitoring wells.

5.3.4 Traffic Hazards

While performing work conducted nearby or alongside a roadway, signs, signals, and barricades should be utilized. Because signs, signals, and barricades do not always provide appropriate protection, spotters will be used to ensure traffic is monitored during work activities along active roadways. All workers will wear high visibility reflective neon orange or yellow vests.

6.0 Site Monitoring

The following sections describe site monitoring techniques and equipment that are to be used during site field activities. The HSO, or a designated alternate, is responsible for site control and monitoring activities.

6.1 SITE MONITORING

Air monitoring will be conducted during all intrusive field activities such as drilling, well decommissioning, test pitting, and during gas pipe cutting or connections. The following equipment will be used to monitor air quality in the breathing zone during work activities:

Monitoring Instrument	Calibration Frequency	Parameters of Interest	Sampling Frequency
Photoionization detector (PID)	Daily	VOCs	During activities[(a)]
H_2S meter	As recommended by manufacturer	H_2S	During activities[(a)]
Combined gas/O_2 meter	As recommended by manufacturer	CO_2, CH_4, H_2S, O_2	During activities[(a)]

(a) Activities include but are not limited to drilling and well decommissioning in a landfill, work around LFG control and transfer facilities, sumps, and monitoring wells, where flammable/explosive gas such as methane may be present.

Abbreviations:

CH_4	Methane
CO_2	Carbon dioxide
H_2S	Hydrogen sulfide
O_2	Oxygen
VOC	Volatile organic compound

The following action levels are established to determine the appropriate level of personal protection to be used during field activities:

Instrument	Reading in Breathing Zone	Action	Comments
PID	5 PID units greater than background for 5 minutes	Upgrade to Level C PPE (air purifying respirator with organic vapor cartridge).	Alternatively, employ engineering controls (ventilation) or leave location and return at a later time.
PID	100 PID units greater than background for 5 minutes	Leave location pending further evaluation by HSO or SSO.	

H2S meter	Greater than 10 ppm	Leave location pending further evaluation by HSO or SSO.
Combined Gas/O2 meter	CH_4 greater than 5% by volume	Leave location pending further evaluation by HSO or SSO.

Abbreviations:

H_2S	Hydrogen sulfide
HSO	Health and Safety Officer
O2	Oxygen
PID	Photoionization detector
PPE	Personal protective equipment
SSO	Site Safety Officer

Visual monitoring for dust will be conducted by the HSO to ensure that inhalation of contaminated soil particles does not occur. Water may be used to suppress any dust clouds generated during work activities. The concentrations of VOCs encountered at the Site are lower than the exposure limits developed by OSHA. Since the concentrations of VOCs are low, and all work will be conducted outdoors in an open-air ventilated environment, vapor concentrations are not expected to exceed allowable levels.

The HSO will visually inspect the work site at least daily to identify any new potential hazards. If new potential hazards are identified, immediate measures will be taken to eliminate or reduce the risks associated with these hazards.

7.0 Hazard Analysis by Task

The following section identifies potential hazards associated with each task listed in Section 3.2 of this HASP. Tasks have been grouped according to the types of potential hazard associated with them.

Task	Potential Hazard
Excavation and grading	Exposure to landfill gas (flammable, explosive, and toxic); refuse; loud noise; overhead hazards; head, foot, ankle, hand, and eye hazards; electrical and mechanical hazards; lifting hazards; dust inhalation hazards; potential dermal or eye exposure to site contaminants in refuse, groundwater, landfill gas, and soil; fall hazards; heat and cold exposure hazards; and biological hazards.
Landfill gas systems including: installation of landfill gas wells, landfill gas sampling, decommissioning of landfill gas facilities, landfill gas destruction facility (flare) start-up and operation, gas piping cutting and connection, and other activities associated with the landfill gas extraction and treatment systems	Exposure to landfill gas (flammable, explosive, and toxic); electrical and mechanical hazards; slips, trips or falls, loud noise; lifting hazards; dust inhalation hazards; potential dermal or eye exposure to site contaminants in refuse, groundwater, landfill gas, condensate and soil; fall hazards; heat and cold exposure hazards; and biological hazards.
Surveying	Exposure to landfill gas (flammable, explosive, and toxic); slips, trips or falls, loud noise; electrical and mechanical hazards; lifting hazards; dust inhalation hazards; potential dermal or eye exposure to site contaminants in refuse, groundwater, landfill gas, and soil; fall hazards; heat and cold exposure hazards; and biological hazards.
Groundwater systems including: groundwater purging and sampling, well decommissioning, and transfer of purge water to leachate lagoons	Chemical hazards include potential dermal or eye exposure to site contaminants in groundwater. Physical hazards include slip, trip, or fall hazards; heat and cold exposure hazards; and biological hazards.

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8.0 Personal Protective Equipment

All work involving heavy equipment, drilling, and well installation will proceed in Level D PPE, which shall include hard hat, steel-toed boots, hearing protection, eye protection, gloves, and sturdy cotton outer work clothing or removable cotton outer clothing.

All personnel will be properly trained in the use of PPE. The level of protection will be upgraded by the HSO whenever warranted by conditions present in the work area. The HSO will periodically inspect equipment such as gloves and hard hats for defects.

For all work involving potential exposure to soil, groundwater, or landfill gas, workers will wear safety gloves and Level D PPE.

High visibility vests will be worn during all work activities.

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9.0 Site Control and Communication

9.1 SITE CONTROL

Unauthorized personnel will not be allowed in the work areas. Access to the work areas will be restricted to designated personnel. The purpose of site control is to minimize the public's potential exposure to site hazards.

9.2 COMMUNICATION

All site work will occur in teams and the primary means of communication on-site and with off-site contacts will be via cell phones. An agreed-upon system of alerting via air horns and/or vehicle horns may be used around heavy equipment to signal an emergency if shouting is ineffective.

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10.0 Decontamination

In known or suspected areas of contamination, decontamination procedures will be followed to prevent off-site spread of contaminated media. The HSO will assess the effectiveness of decontamination procedures by visual inspection. Refer to the Compliance Monitoring Plan/Sampling Analysis Plan/Quality Assurance Project Plan for additional details.

Before eating, drinking, and use of tobacco, hands must be thoroughly washed.

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11.0 Emergency Response and Contingency Plan

This section defines the emergency action plan for the Site. It will be rehearsed with all site personnel and reviewed whenever the plan is modified or the HSO believes that site personnel are unclear about the appropriate emergency actions.

A muster point of refuge (that is clear of adjacent hazards and not located downwind of site investigation activities) will be identified by the HSO and communicated to the field team. In an emergency, all site personnel and visitors will evacuate to the muster point for roll call. It is important that each person on-site understand their role in an emergency, and that they remain calm and act efficiently to ensure everyone's safety.

After each emergency is resolved, the entire project team will meet and debrief on the incident—the purpose is not to fix blame, but to improve the planning and response to future emergencies. The debriefing will review the sequence of events, what was done well, and what can be improved. The debriefing will be documented in a written format. Modifications to the emergency plan will be approved by the HSO.

Reasonably foreseeable emergency situations include medical emergencies, accidental release of hazardous materials (such as gasoline or diesel) or hazardous waste, and general emergencies such as vehicle accident, fire, thunderstorm, and earthquake. Expected actions for each potential incident are outlined below.

11.1 MEDICAL EMERGENCIES

In the event of a medical emergency, the following procedures should be used:

- Stop any imminent hazard if you can safely do so.
- Remove ill, injured, or exposed person(s) from immediate danger if moving them will clearly not cause them harm and no hazards exist to the rescuers.
- Evacuate other on-site personnel to a safe place in an upwind or cross-wind direction until it is safe for work to resume.
- If serious injury or a life-threatening condition exists, call **911** for paramedics, fire department, and police.
    - Clearly describe the location, injury, and conditions to the dispatcher. Designate a person to go to the site entrance and direct emergency equipment to the injured person(s). Provide the responders with a copy of this HASP to alert them to chemicals of potential concern.
- Trained personnel may provide first aid/cardiopulmonary resuscitation if it is necessary and safe to do so. Remove contaminated clothing and PPE only if this can be done without endangering the injured person.
- Call the HSO.
- Immediately implement steps to prevent recurrence of the accident.

Refer to Figure 1 in Section 2.2 for a map showing the nearest hospital location with phone number and address.

11.2 ACCIDENTAL RELEASE OF HAZARDOUS MATERIALS OR WASTES

1. Evacuate all on-site personnel to a safe place in an upwind direction until the HSO determines that it is safe for work to resume.
2. Instruct a designated person to contact the PM and confirm a response.
3. Contain the spill, if it is possible and can be done safely.
4. If the release is not stopped, contact 911 to alert the fire department.
5. Contact the Washington State Dept. of Ecology at 509-329-3400 to report the release.
6. Initiate cleanup.
7. The PM will submit a written report to Ecology in the event of a reportable release of hazardous materials or wastes.

11.3 GENERAL EMERGENCIES

In the case of fire, explosion, earthquake, or imminent hazards, work shall be halted and all on-site personnel will be immediately evacuated to a safe place. The local police/fire department shall be notified if the emergency poses a continuing hazard by calling 911.

In the event of a thunderstorm, outdoor work will be discontinued until the threat of lightning has abated.

Contact the fire department by calling 911. During the incipient phase of a fire, the available fire extinguisher(s) may be used by persons trained in putting out fires, if it is safe for them to do so.

11.4 EMERGENCY COMMUNICATIONS

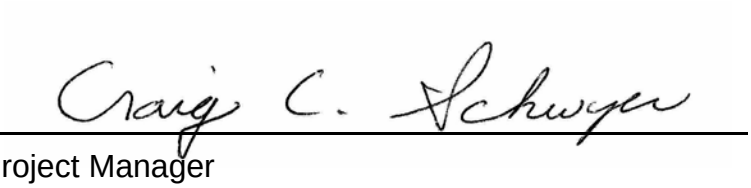
In the case of an emergency, an air horn or car horn will be used as needed to signal the emergency. One long (5-second) blast will be given as the emergency/stop work signal. If the air horn is not working, a vehicle horn and/or overhead waving of arms will be used to signal the emergency. In any emergency, all personnel will evacuate to the designated refuge area and await further instruction.

11.5 EMERGENCY EQUIPMENT

The following minimum emergency equipment will be readily available on-site and functional at all times:

- First Aid Kit—contents approved by the HSO, including two blood borne pathogen barriers.
- Sorbent materials capable of absorbing the volume of liquids/fuels brought to the Site by project personnel or subcontractor.
- Portable fire extinguisher (2-A:10 B/C minimum).

12.0 Approvals



Project Manager	January 4, 2016 Date
Project Health & Safety Officer	Date

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13.0 Signature Page

I have read this Health and Safety Plan and understand its contents. I agree to abide by its provisions and will immediately notify the HSO if site conditions or hazards not specifically designated herein are encountered.

Name (Print)	Signature	Date	Company/Affiliation

APPENDIX B

Sudbury Road Landfill
Draft Environmental Covenant

Schwyn Environmental Services

DRAFT
ENVIRONMENTAL COVENANT

After Recording Return
Original Signed Covenant to: [1] (Footnotes to be removed for final draft)
Marni Solheim
Waste 2 Resources Program
Department of Ecology
4601 N. Monroe St.
Spokane, WA 99205

Environmental Covenant

Grantor: City of Walla Walla [2]
Grantee: State of Washington, Department of Ecology
Brief Legal Description: Portions of the south half of the southwest quarter of Section 14, portions of the southeast quarter of the southeast quarter of Section 15, the northeast quarter of the northeast quarter of Section 22, and portions of the north half of the northwest quarter of Section 23; all in Township 7 North, Range 35 East of the Willamette Meridian, Walla Walla County, Washington.
Tax Parcel Nos.: 350722110001, 350715440004, and portions of 350714310002 and 350723110005.

RECITALS [3]

a. This document is an environmental (restrictive) covenant (hereafter "Covenant") executed pursuant to the Model Toxics Control Act ("MTCA"), chapter 70.105D RCW, Uniform Environmental Covenants Act ("UECA"), chapter 64.70 RCW, and Solid Waste Management – Reduction and Recycling, chapter 70.95 RCW.

b. The property that is the subject of this Covenant consists of the site commonly known as Sudbury Road Landfill, Cleanup Site No. 2485, Facility Site No. 4446540 (the "Property")**.** The Property is legally described and depicted in Exhibit A. Figures 1 and 2 depict the general location and landfill boundary. If there are differences between the depictions and legal description, the legal description shall prevail. [4]

[1] Some counties keep the original covenant, others don't. If the signed original is available, it must be sent to Ecology. If the signed original is not available, send a legible copy to Ecology.
[2] The Grantor of a covenant typically is the fee simple land owner of the property. The Grantor may also include holders of other property interests such as a holder of an easement, right of way, mineral right, lien, or mortgage.
[3] This section is primarily used to describe this document and its purpose. It should not be used for substantive binding provisions.
[4] Note that an environmental covenant applies to a specific Property, not the site (which may comprise several properties or "parcels"). A precise legal description of the Property (or Property interest such as an easement) is essential to know where the covenant applies. If there is any uncertainty, the Grantor must have the Property (or Property interest) surveyed and a legal description prepared by a licensed surveyor. If the contaminated area includes multiple parcels, each parcel must have the covenant recorded on the title. If contamination remains on

c. The Property is the subject of remedial action under MTCA and the post-closure requirements under chapter 70.95 RCW. This Covenant is required because a conditional point of compliance has been established for groundwater and because municipal solid waste will remain on the Property after completion of the remedial action and closure of the landfill. Containment of municipal solid waste is part of the remedial action. This covenant is also required because municipal solid waste is contained on the Property beneath a final cover system that is designed to minimize infiltration and erosion and to prevent exposing waste. In addition, during the post-closure care period, the owner or operator is required, under the terms of its permit from the jurisdictional health department, to maintain and operate leachate control systems, and gas and groundwater monitoring systems on the Property.

d. It is the purpose of this Covenant to restrict certain activities and uses of the Property to protect human health and the environment, and maintain the integrity of remedial actions conducted at the site, and the landfill unit/s. Records describing the extent of residual contamination and remedial actions conducted, and landfill closure and post-closure activities are available through the Washington State Department of Ecology.

e. This Covenant grants the Washington State Department of Ecology, as holder of this Covenant, certain rights specified in this Covenant. The right of the Washington State Department of Ecology as a holder is not an ownership interest under any law or regulation, including without limitation, MTCA, Chapter 70.105D RCW, the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 USC Chapter 103, or Solid Waste Management – Reduction and Recycling, chapter 70.95 RCW.

COVENANT

The City of Walla Walla, as Grantor and owner of the Property, hereby grants to the Washington State Department of Ecology, and its successors and assignees, (hereafter "Ecology") the following covenants. Furthermore, it is the intent of the Grantor that such covenants shall run with the land and be binding on all current and future owners of any portion of, or interest in, the Property.

Section 1. General Restrictions and Requirements.

The following general restrictions and requirements shall apply to the Property:

a. Interference with Remedial Action and the Landfill Unit/s. The Grantor shall not engage in any activity on the Property that may impact or interfere with the remedial action or landfill unit/s and any operation, maintenance, inspection or monitoring of that remedial action or landfill unit/s without prior written approval from Ecology. Such activities shall include those that may:

i. Threaten the integrity of any cover, waste containment, storm water or leachate control, gas collection and/or treatment system, public access control, or environmental monitoring system.

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only part of a larger Property, the restrictions may apply to just the smaller area, but the covenant must still be recorded on the title for all parcels encompassing the contaminated area.

ii. Interfere with the operation and maintenance, monitoring, or other measures necessary to assure the integrity of the landfill unit/s and continued protection of human health and the environment.

iii. Result in release of solid waste constituents or otherwise exacerbate exposures to solid waste constituents.

b. Protection of Human Health and the Environment. The Grantor shall not engage in any activity on the Property that may threaten continued protection of human health or the environment through any activity that results in the release of solid waste constituents or residual contamination without prior written approval from Ecology. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as a part of the remedial action or landfill closure, or that exacerbates or creates a new exposure to residual contamination or municipal solid waste remaining on the Property.

c. Continued Compliance Required. Grantor shall not convey any interest in any portion of the Property without providing for the continued adequate and complete operation, maintenance and monitoring of remedial actions and the landfill unit/s post-closure permit requirements, and continued compliance with this Covenant.

d. Leases. Grantor shall restrict any lease for any portion of the Property to uses and activities consistent with this Covenant and notify all lessees of the restrictions on the use of the Property.

e. Amendment to the Covenant. Grantor must notify and obtain approval from Ecology at least sixty (60) days in advance of any proposed activity or use of the Property that is inconsistent with this Covenant.[5] Before approving any proposal, Ecology must issue a public notice and provide an opportunity for the public to comment on the proposal. If Ecology approves the proposal, the Covenant will be amended to reflect the change.

Section 2. Specific Prohibitions and Requirements.

In addition to the general restrictions in Section 1 of this Covenant, the following additional specific restrictions and requirements shall apply to the Property.

a. The Grantor shall maintain a suitable barrier that restricts unauthorized access to the Property.

b. Any activity on the Property that may disturb the integrity of landfill caps are prohibited without prior written approval from Ecology. Such activities include, but are not limited to, the following: drilling; digging; grading; excavation; installation of underground utilities; removal of the cap; or, application of loads in excess of the cap load bearing capacity; provided, however, that Grantor shall not be required to obtain Ecology's prior written approval for such activities if they constitute routine operations and maintenance tasks.

c. To minimize the potential for mobilization of contaminants that may remain in the soil, municipal solid waste, and groundwater on the Property, no stormwater infiltration facilities shall be constructed on the Property. All stormwater catch basins, ponds, conveyance systems, and

[5] Examples of inconsistent uses are: using the Property for a use not allowed under the covenant (for example, mixed residential and commercial use on a property that is restricted to industrial uses); OR, drilling a water supply well when use of the groundwater for water supply is prohibited by the covenant.

other appurtenances located within the Property shall receive written approval by Ecology and shall be constructed in a way that minimizes infiltration into soil or waste. [6]

d. The residual contamination on the Property includes volatile chemicals that may generate harmful vapors and biodegradable municipal solid wastes that may generate methane, a combustible gas. To minimize the potential for exposure to these vapours, no building or other enclosed structure shall be constructed above Areas 1, 2, 5, 6, and 7 without written approval by Ecology and suitable engineering controls.

e. Groundwater and landfill gas monitoring wells are located on the Property to monitor the performance of the remedial action and landfill unit/s. Grantor shall make reasonable efforts to protect these devices from damage.

f. Drilling of a well on the Property for any potable water supply purpose is strictly prohibited. Drilling of a well for any other non-potable purpose is prohibited without prior written approval from Ecology. Groundwater extracted from the Property for any purpose shall be considered potentially contaminated and any discharge of this water shall be done in accordance with state and federal law. Notwithstanding the foregoing, Grantor may continue to extract and use groundwater from the existing well located on the Property known as "Well #2" for its nonpotable purposes as of the recordation of this environmental covenant and for no other purpose.

Section 3. Access.

a. The Grantor shall maintain reasonable access to all components necessary to construct, operate, inspect, monitor, and maintain the remedial action and landfill unit/s.

b. The Grantor freely and voluntarily grants Ecology and its authorized representatives, upon reasonable notice, the right to enter the Property at reasonable times to evaluate the effectiveness of this Covenant and associated remedial actions and landfill post-closure activities, and enforce compliance with this Covenant and those actions, including the right to take samples, inspect any remedial actions conducted on the Property, inspect any structures or systems on the Property, and to inspect related records. Ecology shall be accompanied by an authorized representative of the Grantor while on the Property unless otherwise agreed to by Grantor. Ecology shall be responsible for the health and safety of its employees and representatives, and shall comply with all applicable health and safety laws and regulations including the health and safety procedures as directed by Grantor.

c. No right of access or use by a third party to any portion of the Property is conveyed by this instrument.

Section 4. Notice Requirements.

[6] NOTE: Most local ordinances require on-site infiltration of runoff. If redevelopment of the Property is anticipated, the cleanup plan should reserve an area for this infiltration to occur without exacerbating leaching of residual soil contamination or enhancing movement of contaminants within the groundwater.

a. Conveyance of Any Interest. The Grantor, when conveying any interest in any part of the Property, including but not limited to title, easement, leases, and security or other interests, must:

i. Notify Ecology at least thirty (30) days in advance of the conveyance. [7]

ii. Include in the conveying document a notice in substantially the following form, as well as a complete copy of this Covenant:

NOTICE: THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL COVENANT GRANTED TO THE WASHINGTON STATE DEPARTMENT OF ECOLOGY ON [DATE] AND RECORDED WITH THE WALLA WALLA COUNTY AUDITOR UNDER RECORDING NUMBER [RECORDING NUMBER]. USES AND ACTIVITIES ON THIS PROPERTY MUST COMPLY WITH THAT COVENANT, A COMPLETE COPY OF WHICH IS ATTACHED TO THIS DOCUMENT.

iii. Unless otherwise agreed to in writing by Ecology, provide Ecology with a complete copy of the executed document within thirty (30) days of the date of execution of such document.

b. Reporting Violations. Should the Grantor become aware of any violation of this Covenant, Grantor shall promptly report such violation to Ecology.

c. Emergencies. For any emergency or significant change in site conditions due to Acts of Nature (for example, flood, fire) resulting in a violation of this Covenant, the Grantor is authorized to respond to such an event in accordance with state and federal law. The Grantor must notify Ecology of the event and response actions planned or taken as soon as practical but no later than within 24 hours of the discovery of the event.

d. Any required written notice, approval, or communication shall be personally delivered or sent by first class mail to the following persons. Any change in this contact information shall be submitted in writing to all parties to this Covenant.

Frank Nicholson City of Walla Walla 55 Moore Street Walla Walla, WA 99362 509-524-4510 fnicholson@wallawallawa.gov	Marni Solheim Washington State Department of Ecology Waste 2 Resources Program 4601 N. Monroe Spokane, WA 99205 509-329-3564 Marni.solheim@ecy.wa.gov

As an alternative to providing written notice and change in contact information by mail, these documents may be provided electronically in an agreed upon format at the time of submittal.

[7] Ecology may waive this notice provision for some units at a Property where the anticipated use is a multi-tenant/owner building where some owners or tenants are unlikely to be exposed to residual contamination. For example: upper story apartments or condominiums, or commercial tenants in a strip mall, with limited rights to use the grounds under and around the building (such as for parking).

If Ecology agrees to such a waiver, the circumstances of the waiver will be detailed in paragraph 4.a.i. In addition to the specific circumstances, this provision must include the following statement: "Waiver of this advance notice to Ecology for these transactions does not constitute waiver of this notice for the entire Property nor a waiver of the requirement in Section 4.a.ii. to include this notice in any document conveying interest in the Property."

Section 5. Modification or Termination.

a. If the conditions at the site requiring a Covenant have changed or no longer exist, then the Grantor may submit a request to Ecology that this Covenant be amended or terminated. Any amendment or termination of this Covenant must follow the procedures in Chapter 64.70 RCW, Chapter 70.105D RCW, Chapter 70.95 RCW, and any rules promulgated under these chapters.

Section 6. Enforcement and Construction.

a. This Covenant is being freely and voluntarily granted by the Grantor.

b. Grantor shall provide Ecology with an original signed Covenant and proof of recording within ten (10) days of execution of this Covenant.

c. Ecology shall be entitled to enforce the terms of this Covenant by resort to specific performance or legal process. All remedies available in this Covenant shall be in addition to any and all remedies at law or in equity, including Chapter 70.105D RCW, Chapter 70.95 RCW, and Chapter 64.70 RCW. Enforcement of the terms of this Covenant shall be at the discretion of Ecology, and any forbearance, delay or omission to exercise its rights under this Covenant in the event of a breach of any term of this Covenant is not a waiver by Ecology of that term or of any subsequent breach of that term, or any other term in this Covenant, or of any rights of Ecology under this Covenant.

d. The Grantor, upon request by Ecology, shall be obligated to pay for Ecology's costs to process a request for any modification or termination of this Covenant and any approval required by this Covenant.

e. This Covenant shall be liberally construed to meet the intent of the Model Toxics Control Act, chapter 70.105D RCW, Solid Waste Management – Reduction and Recycling, chapter 70.95 RCW, and Uniform Environmental Covenants Act, chapter 64.70 RCW.

f. The provisions of this Covenant shall be severable. If any provision in this Covenant or its application to any person or circumstance is held invalid, the remainder of this Covenant or its application to any person or circumstance is not affected and shall continue in full force and effect as though such void provision had not been contained herein.

g. A heading used at the beginning of any section or paragraph or exhibit of this Covenant may be used to aid in the interpretation of that section or paragraph or exhibit but does not override the specific requirements in that section or paragraph.

The undersigned Grantor warrants he/she holds the title to the Property and has authority to execute this Covenant.

EXECUTED this _____ day of _____, 20___.

CITY OF WALLA WALLA

[SIGNATURE]_____
NABIEL SHAWA

CITY MANAGER, CITY OF WALLA WALLA

Dated: _____

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

[SIGNATURE]_____
LAURIE DAVIES
PROGRAM MANAGER, WASTE 2 RESOURCES PROGRAM

Dated: _____

GRANTOR INDIVIDUAL ACKNOWLEDGMENT

STATE OF _____
COUNTY OF _____

On this _____ day of _____, 20__, I certify that _____ personally appeared before me, and acknowledged that **he/she** is the individual described herein and who executed the within and foregoing instrument and signed the same at **his/her** free and voluntary act and deed for the uses and purposes therein mentioned.

_____
Notary Public in and for the State of
Washington, residing at _____.
My appointment expires_____.

GRANTOR CORPORATE ACKNOWLEDGMENT

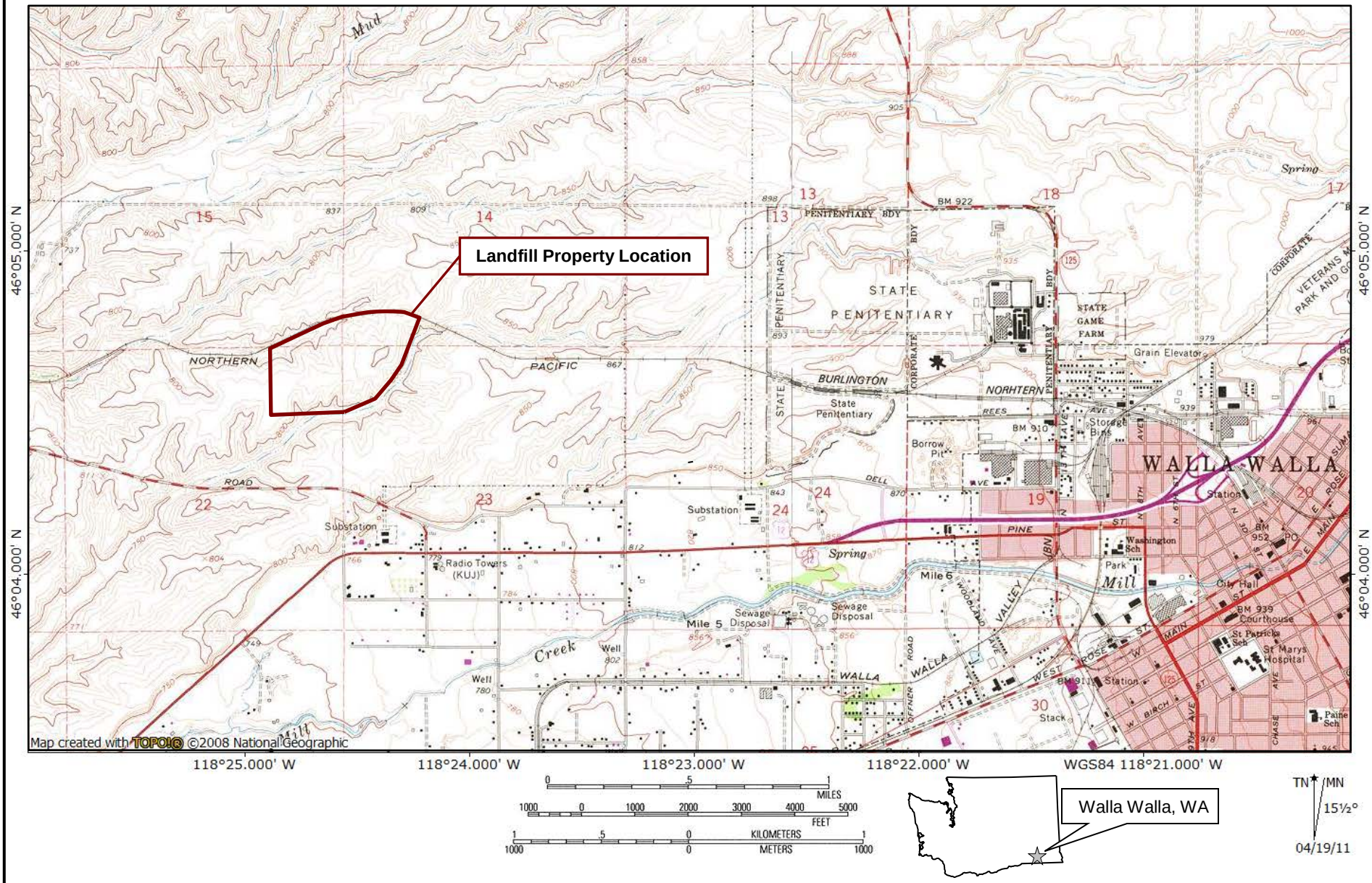
STATE OF _____
COUNTY OF _____

On this _____ day of _____, 20__, I certify that _____ personally appeared before me, acknowledged that **he/she** is the _____ of the municipal corporation that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that **he/she** was authorized to execute said instrument for said corporation.

_____
Notary Public in and for the State of
Washington, residing at _____.
My appointment expires_____.

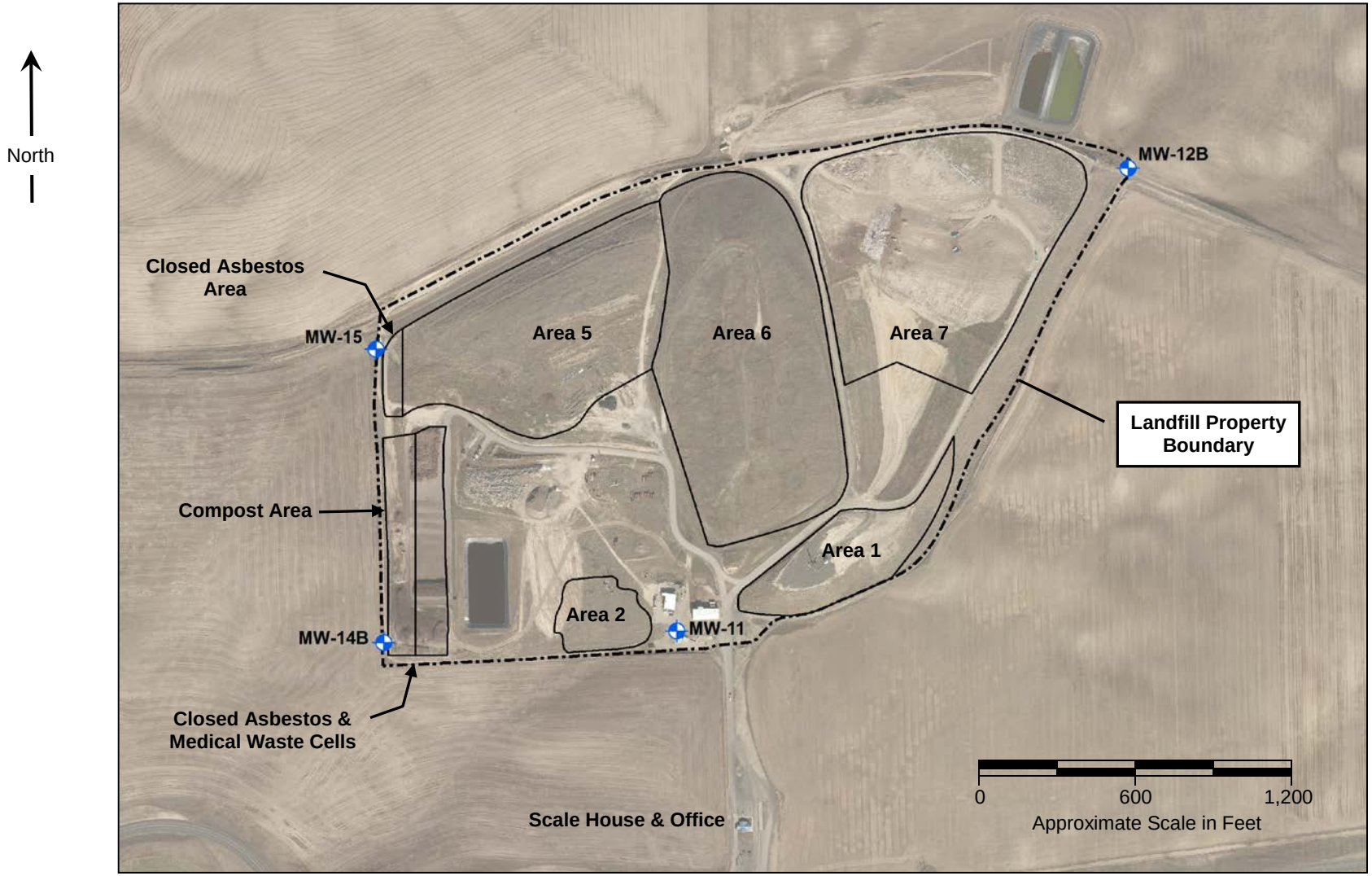
Figures 1 and 2

Exhibit A
Legal Description of Property



Schwyn Environmental Services

Sudbury Road Landfill Walla Walla, Washington	**Landfill Property Location**	Figure 1



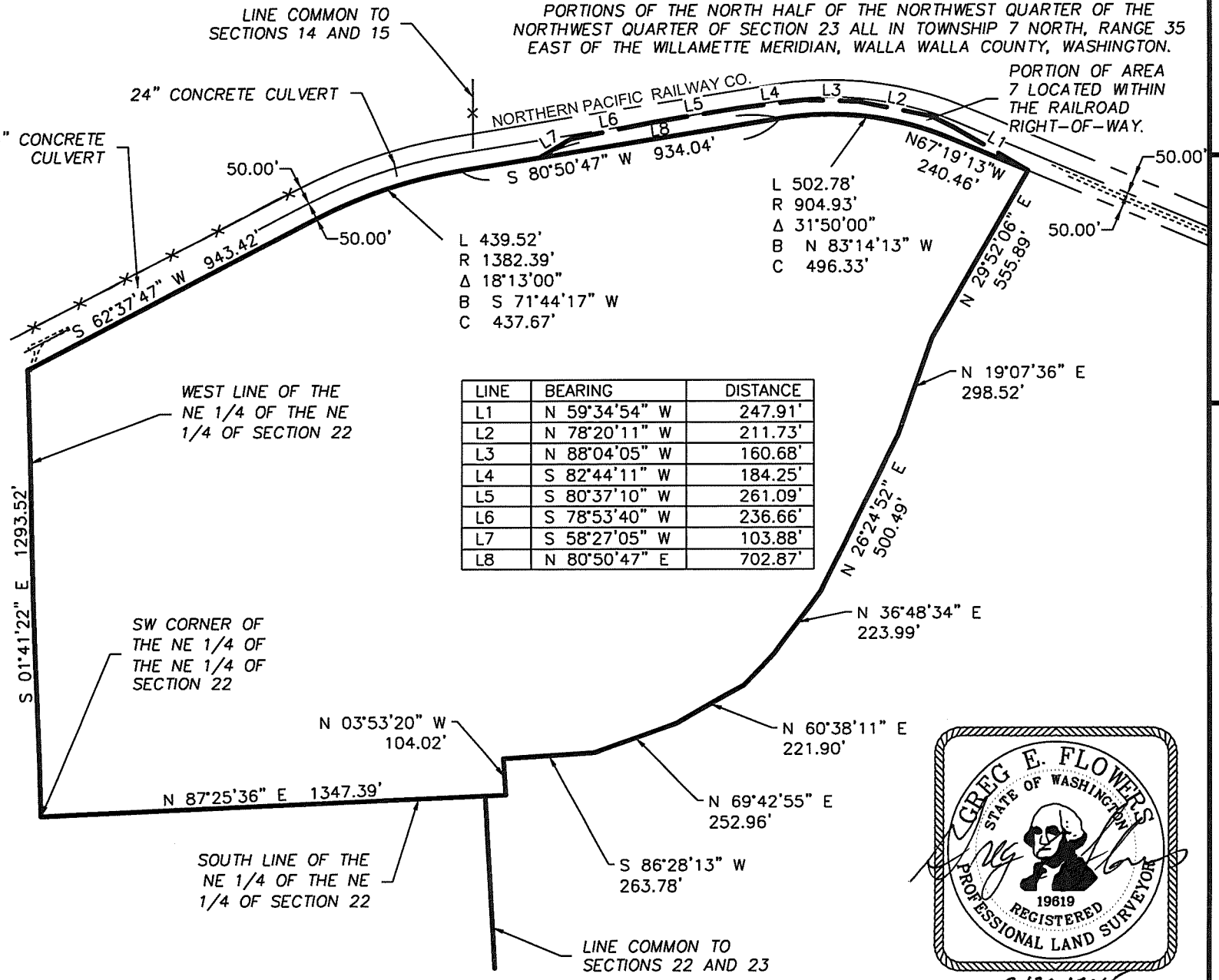
Schwyn Environmental Services

Sudbury Road Landfill Walla Walla, Washington	**Landfill Property**	Figure 2

Exhibit A

SUDBURY LANDFILL

BEING PORTIONS OF THE SOUTH HALF OF THE SOUTHWEST QUARTER OF SECTION 14, PORTIONS OF THE SE QUARTER OF THE SOUTHEAST QUARTER OF SECTION 15, THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 22 AND PORTIONS OF THE NORTH HALF OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 23 ALL IN TOWNSHIP 7 NORTH, RANGE 35 EAST OF THE WILLAMETTE MERIDIAN, WALLA WALLA COUNTY, WASHINGTON.



LINE	BEARING	DISTANCE
L1	N 59°34'54" W	247.91'
L2	N 78°20'11" W	211.73'
L3	N 88°04'05" W	160.68'
L4	S 82°44'11" W	184.25'
L5	S 80°37'10" W	261.09'
L6	S 78°53'40" W	236.66'
L7	S 58°27'05" W	103.88'
L8	N 80°50'47" E	702.87'

GREG E. FLOWERS
STATE OF WASHINGTON
19619
REGISTERED
PROFESSIONAL LAND SURVEYOR

3/30/2015

CLIENT: SCHWYN ENVIRONMENTAL	PROJECT NO.: 3975
SURVEYOR: GREG E. FLOWERS	DATE: 3-30-2015
CALC BY: GEF	DRAWN BY: GEF
SECTION: 23	TOWNSHIP: 7 NORTH
CITY: WALLA WALLA	COUNTY: WALLA WALLA
	SCALE: 1" = 400'
	RANGE: 35 EAST
	SHEET 1 OF 1

HDJ DESIGN GROUP PLLC
engineers | landscape architects | planners | surveyors
5 North Colville Street
Walla Walla, WA 99362
509/956-3026
306/695-3488
509/547-5129 fax
Internet: www.hdjdesigngroup.com

HDJ DESIGN GROUP PLLC

Exhibit A

Landfill Area Legal Description

Portions of the south half of the Southwest Quarter of Section 14, portions of the Southeast Quarter of the Southeast Quarter of Section 15, the Northeast Quarter of the Northeast Quarter of Section 22 and portions of the north half of the Northwest Quarter of Section 23 all in Township 7 North, Range 35 East of the Willamette Meridian, Walla Walla County, Washington being more particularly described as follows:

Beginning at the Southwest corner of the Northeast Quarter of the Northeast Quarter of Section 22, Township 7 North, Range 35 East of the Willamette Meridian, Walla Walla County, State of Washington and running thence N87°25'36"E, along the South line of the Northeast Quarter of the Northeast Quarter of said Section 22 and the easterly prolongation thereof, a distance of 1347.39 feet to a point on the easterly side of the primary access road to the City of Walla Walla Sudbury Landfill; thence N03°53'20"W a distance of 104.02 feet; thence N86°28'13"E a distance of 263.78 feet; thence N69°42'55"E a distance of 252.96 feet; thence N60°38'11"E a distance of 221.90 feet; thence N43°28'18"E a distance of 127.56 feet; thence N36°48'34"E a distance of 223.99 feet; thence N26°24'52"E a distance of 500.49 feet; thence N19°07'36"E a distance of 298.52 feet; thence N29°52'06"E a distance of 555.89 feet to a point on the southerly right-of-way line of the Northern Pacific Railway Company; thence, along said southerly right-of-way line, N67°19'13"W a distance of 240.46 feet; thence with a curve turning to the left with an arc length of 502.78 feet, with a radius of 904.93 feet, with a chord bearing of N83°14'13"W, with a chord length of 496.33 feet; thence S80°50'47"W a distance of 934.04 feet; thence with a curve turning to the left with an arc length of 439.52 feet, with a radius of 1382.39 feet, with a chord bearing of S71°44'17"W, with a chord length of 437.67feet; thence S62°37'47"W a distance of 943.42 feet to the point of intersection of said southerly right-lof-way line with the west line of the Northeast Quarter of the Northeast Quarter of said Section 22; thence S01°41'22"E, along the west line of the Northeast Quarter of the Northeast Quarter of said Section 22, a distance of 1293.52 feet to the point of beginning,

Having an area of 94.44 acres, more or less.

3/30/2015

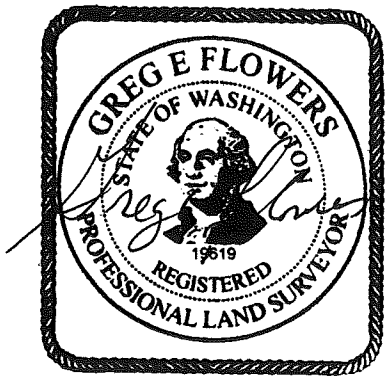
Exhibit A

Description of the portion of Area 7 extending into the Rail Road Right of Way

A portion of the south half of the Southwest Quarter of Section 14, Township 7 North, Range 35 East of the Willamette Meridian, Walla Walla County, Washington being more particularly described as follows:

Commencing at the Southwest corner of the Northeast Quarter of the Northeast Quarter of Section 22, Township 7 North, Range 35 East of the Willamette Meridian, Walla Walla County, State of Washington and running thence N87°25'36"E, along the South line of the Northeast Quarter of the Northeast Quarter of said Section 22 and the easterly prolongation thereof, a distance of 1347.39 feet to a point on the easterly side of the primary access road to the City of Walla Walla Sudbury Landfill; thence N03°53'20"W a distance of 104.02 feet; thence N86°28'13"E a distance of 263.78 feet; thence N69°42'55"E a distance of 252.96 feet; thence N60°38'11"E a distance of 221.90 feet; thence N43°28'18"E a distance of 127.56 feet; thence N36°48'34"E a distance of 223.99 feet; thence N26°24'52"E a distance of 500.49 feet; thence N19°07'36"E a distance of 298.52 feet; thence N29°52'06"E a distance of 555.89 feet to a point on the southerly right-of-way line of the Northern Pacific Railway Company and the True Point of Beginning for this description; thence N59°34'54"W a distance of 247.91 feet; thence N64°29'34"W a distance of 72.93 feet; thence N78°20'11"W a distance of 211.73 feet; thence N88°04'05"W a distance of 160.68 feet; thence S82°44'11"W a distance of 184.25 feet; thence S80°37'10"W a distance of 261.09 feet; thence S78°53'40"W a distance of 236.66 feet; thence S58°27'05"W a distance of 103.88 feet to a point on the southerly right-of-way of said Northern Pacific Railway Company; thence, along said southerly right-of-way, N80°50'47"E a distance of 702.87 feet; thence with a curve turning to the right with an arc length of 502.78 feet, with a radius of 904.93 feet, with a chord bearing of S 83°14'13" E, with a chord length of 496.33feet; thence S67°19'13"E a distance of 240.46 feet to the point of beginning.

Having an area of 53852 square feet, 1.24 acres, more or less.



3/30/2015

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APPENDIX C

Sudbury Road Landfill Cleanup Action
Financial Assurance Calculations

Schwyn Environmental Services

COST BREAKDOWN FOR CLEANUP ACTION FINANCIAL ASSURANCE PLANNING COSTS
Sudbury Road Landfill
Walla Walla, Washington

Item Description	Quantity	Unit	Unit Price	Cost	Comments
2016 Performance Monitoring					
Groundwater Sampling	1	Quarterly	$ 3,550	$ 3,550	3rd party sample collection and travel
Laboratory Analysis	1	Quarterly	$ 602	$ 602	Based on 6 samples plus duplicate at $86/sample per event
LFG Monitoring	2	Monthly	$ 560	$ 1,120	Conducted during LFG system O&M by 3rd party
Quarterly Reporting	1	Quarterly	$ 4,000	$ 4,000	
Annual Reporting	1	Annual	$ 4,000	$ 4,000	
Total per Year				$ 13,272	
2017 Performance Monitoring					
Groundwater Sampling	4	Quarterly	$ 3,550	$ 14,200	3rd party sample collection and travel
Laboratory Analysis	4	Quarterly	$ 602	$ 2,408	Based on 6 samples plus duplicate at $86/sample per event
LFG Monitoring	8	Monthly	$ 560	$ 4,480	Conducted during LFG system O&M by 3rd party
Quarterly Reporting	4	Quarterly	$ 4,000	$ 16,000	
Annual Reporting	1	Annual	$ 4,000	$ 4,000	
Total per Year				$ 41,088	
Longer-Term Annual Performance Monitoring					
Groundwater Sampling	4	Quarterly	$ 3,550	$ 14,200	3rd party sample collection and travel
Laboratory Analysis	4	Quarterly	$ 602	$ 2,408	Based on 6 samples plus duplicate at $86/sample per event
LFG Monitoring	4	Quarterly	$ 560	$ 2,240	Conducted during groundwater sampling event by 3rd party
Quarterly Reporting	4	Quarterly	$ 4,000	$ 16,000	
Annual Reporting	1	Annual	$ 4,000	$ 4,000	
Total per Year				$ 38,848	
Confirmational Monitoring					
Groundwater Sampling	4	Quarterly	$ 3,550	$ 14,200	3rd party sample collection and travel
Laboratory Analysis	4	Quarterly	$ 602	$ 2,408	Based on 6 samples plus duplicate at $86/sample per event
LFG Monitoring	4	Quarterly	$ 560	$ 2,240	Conducted during groundwater sampling event by 3rd party
Quarterly Reporting	4	Quarterly	$ 4,000	$ 16,000	
Annual Reporting	1	Annual	$ 4,000	$ 4,000	
Total per Year				$ 38,848	

COST BREAKDOWN FOR CLEANUP ACTION FINANCIAL ASSURANCE PLANNING COSTS
Sudbury Road Landfill
Walla Walla, Washington

Item Description	Quantity	Unit	Unit Price	Cost	Comments
2016 Operations and Maintenance					
LFG System O&M	2	Event	$ 2,500	$ 5,000	3rd party wellfield and flare fine-tuning, general O&M (two monthly events during first year)
Reporting	1	Annual	$ 500	$ 500	
Total per Year				$ 5,500	
2017 Operations and Maintenance					
LFG System O&M	9	Event	$ 2,500	$ 22,500	3rd party wellfield and flare fine-tuning, general O&M (monthly during first 8 months and quarterly thereafter)
Cover/Stormwater System Inspections	1	Annual	$ 550	$ 550	Conducted during groundwater sampling event by 3rd party
Cover/Stormwater System Maintenance	1	Est.	$ 1,000	$ 1,000	Minor to no maintenance of soil cover and stormwater control systems is expected during the remedial action period
Reporting	1	Annual	$ 2,000	$ 2,000	
Total per Year				$ 26,050	
Longer-Term Operations and Maintenance					
LFG System O&M	4	Quarterly	$ 2,500	$ 10,000	Includes wellfield and flare, general O&M (conducted quarterly by 3rd party)
LFG System Repairs	1	Annual	$ 1,500	$ 1,500	Set aside for minor system repair (no well replacement).
Cover/Stormwater System Inspections	1	Annual	$ 550	$ 550	Conducted during groundwater sampling event by 3rd party
Cover/Stormwater System Maintenance	1	Est.	$ 1,000	$ 1,000	Minor to no maintenance of soil cover and stormwater control systems is expected during the remedial action period
Reporting	1	Annual	$ 2,000	$ 2,000	
Total per Year				$ 15,050	
Off-Site Access Agreements					
Access Agreement	2	Annual	$ 1,000	$ 2,000	

SUMMARY OF CLEANUP ACTION FINANCIAL ASSURANCE PLANNING COSTS
Sudbury Road Landfill
Walla Walla, Washington

Post Construction Description	Year									Task Cost
	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Performance GW/LFG Monitoring	$ 13,272	$ 41,088	$ 38,848	$ 38,848	$ 38,848	$ 38,848	$ 38,848			$ 248,600
Confirmation GW/LFG Monitoring								$ 38,848	$ 38,848	$ 77,696
Cover, SW, MW & LFG System O&M	$ 5,500	$ 26,050	$ 15,050	$ 15,050	$ 15,050	$ 15,050	$ 15,050	$ 15,050	$ 15,050	$ 136,900
Off-Site Lease Agreement		$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 16,000
ANNUAL/TOTAL COST ($2015)	$ 20,788	$ 71,155	$ 57,916	$ 57,917	$ 57,918	$ 57,919	$ 57,920	$ 57,921	$ 57,922	$ 479,196
INFLATED COST @ 3%	$ 22,054	$ 77,753	$ 65,185	$ 67,142	$ 69,157	$ 71,233	$ 73,371	$ 75,574	$ 77,842	**$ 599,311**

Notes:
GW = Groundwater
LFG = Landfill gas
SW = Stormwater
O&M = Operations and maintenance
Costs based on $2015.
Costs inflated at annual 3%.
Financial assurance costs are only associated with the post-construction operation and maintenance (O&M) of the cleanup action, including institutional controls, compliance monitoring, and corrective measures.
Assumes that off-site well land access agreements would be terminated in 2024 immediately after 2 years of confirmational monitoring.
Assumes that Area 6-7 Closure, Post-Closure fund would pay for O&M beginning in 2025: post Area 7 closure.