



HUMAN HEALTH RISK ASSESSMENT (UPDATED 2024)



FORMER BLUE HERON PAPER MILL AERATED STABILIZATION BASIN

1317 Willamette Falls Drive
West Linn, Oregon

Agency Information
ODEQ ECSI No. 5717

Prepared for:

SDG-2, LLC
Attn: RJ Schultz

Issued on:

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This

Human Health Risk Assessment

for:

Former Blue Heron Paper Mill

1317 Willamette Falls Drive
West Linn, Oregon

Has been prepared for the sole benefit and use of our Client:

SDG-2, LLC

Attn: RJ Schultz

and its assignees

Issued

February 3, 2024

by:



EXP. 2/1/2025

Victoria Bennett

102

Victoria Bennett
Principal Environmental Scientist

Lynn D. Green, C.E.G.
Principal Engineering Geologist

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List of Acronyms and Abbreviations

ASB	aerated settling basin	NRI	NRI Global, Inc.
Client	SDG-2, LLC	PAH	polynuclear aromatic hydrocarbons
COC	constituent of concern	PCB	polychlorinated biphenyl
COI	constituent of interest	OAR	Oregon Administrative Rule
COPC	constituent of potential concern	ODEQ	Oregon Department of Environmental Quality
CPEC	Constituent of Ecological Concern	RBCs	risk-based concentrations
DRO	diesel-range organics	RBDM	<i>Risk-Based Decision Making for Remediation of Petroleum-Contaminated Sites</i> , ODEQ September 2003 Guidance Document
E&E	Ecology & Environment, Inc.	RRO	residual(oil)-range organics
E&ES	Easement and Equitable Servitude	SLRBCs	screening-level risk-based concentrations
ENW	EVREN Northwest, Inc.	SOW	scope of work
EPA	Environmental Protection Agency	SVOC	semi volatile organic constituent
ERA	Ecological Risk Assessment	VOC	volatile organic constituent
GRO	gasoline-range organics		
HHRA	Human Health Risk Assessment		
LOF	Locality of Facility		
µg/L	micrograms per Liter		
mg/Kg	milligrams per Kilogram		
NPDES	National Pollutant Discharge Elimination System (		

1.0 Introduction

This updated Human Health Risk Assessment (HHRA) has been prepared by EVREN Northwest, Inc. (ENW) to evaluate hazardous substances impacts at the Former Blue Heron Paper Mill located at 1317 Willamette Falls Drive in West Linn, Oregon (see Figures 1 and 2). This HHRA presents an assessment of human health risk to current and future human receptors by potentially hazardous chemical impacts to soil, sludge, ground water, and surface water at the subject site.

1.1 Background

As described by CDM Smith,¹ the property was developed with an aerated settling basin (ASB) to receive industrial wastewater and storm water from the former Blue Heron Paper Mill (and its predecessors). This paper mill operated from 1972 until early 2011, when the mill was closed. The ASB received wastewater from the mill via a 3-mile pipeline that runs under the Willamette River, continues aboveground, and extends underground onto the subject site from the east side of the property.

Wastewater from the mill's primary treatment clarifier, chemical recovery area, cooling water, and storm water was pumped to the ASB for treatment. Treatment methods included settling of solids and use of microorganisms to facilitate the breakdown of organic matter in wastewater. Treated water discharged through an outfall (Outfall 001) to the river at River Mile 27.8 under a National Pollutant Discharge Elimination System (NPDES) permit. Solids settled as sludge remained in the ASB. It appears that the only discharge of waste sulfite liquor, an historical waste by-product of the chemical pulping processes, to the property was a one-time failed experiment in 1951 when 47,700 gallons of waste sulfite liquor was deposited into an asphalt-lined 50 x 50-foot waste pond in the approximate area of the current ASB boat house. All of this waste sulfite liquor leached into the ground from this pond over an 18-day period. In addition to the sulfite pulping process, it has been reported that chlorine was likely used to bleach pulp at the site during the between the years 1972 and 1983, when magnesium sulfite processing was commonly used. The use of elemental chlorine to bleach pulp and sulfite-based pulping are both associated with the generation of dioxins/furans.

From July 2012 to August 2013, NRI Global, Inc. (NRI) discharged storm water and wastewater to the ASB under an agreement with Clackamas County Service District No. 1/Tri-City Service District that water discharged be "treated Compliant Wastewater meeting all effluent limits and other requirements of the permit." The agreement specifically prohibited discharge of bulk chemicals including oil, coolant, organic solvents, transformer oil, or fuel.

Paper recycling activities were also historically conducted at the mill. Low concentrations of heavy metals may be found in de-inking sludges. Additionally, polychlorinated biphenyls (PCBs) were used in coatings on the back of carbonless paper and could have contributed PCBs to the waste stream.

¹ CDM Smith, *Remedial Investigation and Risk Assessment, Blue Heron Paper Company, Aerated Stabilization Basin Site, 1317 Willamette Falls Drive, West Linn, Oregon 97068*. Dated April 7, 2014.

The ASB has been dredged four times between the years 1978 and 1999, although dredging never resulted in the removal of all sludge. The average amount of sludge left after each dredging event ranged from 4 to 9.3 feet. The thickness of remaining sludge in the ASB is estimated to range from 1.3 to 16.2 feet. Since the mill shut down, the water surface has never dropped low enough to expose the surface of the sludge.

2.0 Site Setting

Description and Location. The subject property is located on the north side of the Willamette River, approximately three miles southwest of the City of West Linn. It is north of Volpp Street and bisected by 4th Street, with a situs address reported as 1317 Willamette Falls Drive, West Linn, Oregon. The subject property is irregular in outline, measures approximately 39.15 acres and is currently developed with an approximately 15-acre aerated settling basin formerly used for industrial wastewater treatment by the Blue Heron Paper Mill. The City of West Linn has currently zoned the area north of 4th Avenue R10 – Single-Family Residential Detached and the area south of 4th Avenue GI – General Industrial. The properties adjacent to the east and south are zoned GI. The properties adjacent to the north and west are zoned R10.

Topography. Topography at the subject property is irregular, but generally slopes to the southeast towards the Willamette River. The highest elevation (around 120 feet above mean sea level) is located at the north edge of the site, along 5th Avenue. See Figure 1.

Geologic Setting. According to previous reporting² the subject property lies within the Willamette Trough or Willamette Lowland, which is an elongated north-south trending depression located between the Cascade Range to the east and the Coast Range to the west. The trough is divided by folded and distorted bedrock and basalt outcrops into several structure basins, including the central Willamette Valley basin, in which the subject property is located. The bedrock and basalt are overlain by unconsolidated basin-fill sediments consisting of recent alluvium near the surface and by deeper sedimentary units originating from older alluvial fans, streams, and lakes. The site is reportedly underlain by fine-grained alluvium consisting primarily of sandy silt and silty sand, with occasional layers of silt, sand, and gravel.

Hydrogeologic Setting. Previous investigations¹ have identified ground water beneath the site to be between approximately 10 and 17 feet below ground surface. Comparison of the elevation of the base of the ASB to ground water elevations measured in onsite monitoring wells suggests some amount of hydraulic communication between water in the ASB and ground water. However, previous reports have indicated that the permeability of the base and sides of the ASB is very low and thus the ASB has little impact on the overall ground water flow at the site. In line with the general topography at the site, ground water flow underneath the property is generally to the southeast, toward the Willamette River.

² CDM Smith, *Phase II Environmental Site Assessment, Blue Heron Paper Company, Aerated Stabilization Basin Site, 1317 Willamette Falls Drive, West Linn, Oregon 97068*. Dated March 26, 2011.

3.0 Cleanup Levels and Other Numeric Criteria

Oregon's environmental cleanup rules (Oregon Administrative Rules [OAR] 340-122) establish the standards and procedures for the protection of current and future public health, safety and welfare, and the environment in the event of a release or threat of a release of a hazardous substance. In the event of a release of a hazardous substance, remedial actions shall be implemented to achieve:

- Acceptable risk levels defined in OAR 340-122-0115, as demonstrated by a residual risk assessment; or
- Numeric cleanup standards developed as part of an approved generic remedy identified or developed by the Department under OAR 340-122-0047, if applicable; or
- For areas where hazardous substances occur naturally (e.g., metals, etc.), the background level of the hazardous substances, if higher than those levels specified above.

Acceptable risk levels may be evaluated through conducting a site-specific risk assessment that calculates exposure point concentrations for specific exposure pathway receptor-scenarios or use generic for hazardous substances under the Oregon Department of Environmental Quality's (ODEQ) Risk-Based Decision Making (RBDM) guideline to streamline the risk assessment process (see below).

The assessment and remediation of hazardous substances in Oregon are conducted according to OAR 340, Division 122, *Hazardous Substance Remedial Action Rules*. The following cleanup standards and numeric criteria may be applied in evaluating site assessment results.

Soil Matrix. Under the Soil Matrix Cleanup Option Rules (OARs 340-122-0320 through 0360) cleanup standards are determined by assigning site-specific values to environmental parameters (e.g., soil type, depth to ground water, etc.). For purposes of risk-based evaluations of soil, Soil Matrix Cleanup Levels are often used for screening purposes, where potentially significant levels of petroleum contamination may be present if concentrations of total petroleum hydrocarbons in soil exceed their respective soil matrix cleanup level or soil matrix level I for conservative screening purposes and may require remedial action. Concentrations of total petroleum hydrocarbons lower than their corresponding Soil Matrix Cleanup Level or Soil Matrix Level I if a cleanup level has not been determined, usually do not require any additional cleanup or risk management.

ODEQ Risk-Based Concentrations. ODEQ has compiled default risk-based screening reference levels (RBDM guidance document) for common exposure-pathway receptor-scenarios that may be utilized in lieu of site-specific risk calculations (OAR 340-122-0115). In particular, the pre-calculated risk-based concentration (RBC) represents the concentration of a constituent of interest (COI) in the impacted medium (e.g., soil, ground water, or air) that potentially represents an unacceptable risk level.

The published RBCs represent a conservative default concentration of a COI in an impacted medium (e.g., soil, ground water, soil gas, or air). When COI concentrations on a site exceed the RBC, unacceptable human health impacts are possible.

- For carcinogens, the regulatory standard is represented by an excess cancer risk of one in one million (1×10^{-6}), and

- For non-carcinogens, this is represented by a Hazard Index of 1.

RBC exceedances typically trigger further investigation and potentially a human health risk assessment. Therefore, RBCs can be applied at sites as generic, conservative cleanup standards and are routinely used by ODEQ to determine if a site requires additional action. Site-specific parameters used in the equations to develop the RBCs are often adjusted to match actual conditions in developing site-specific cleanup levels.

RBCs are generally used to evaluate sampling analytical results as follows:

- ODEQ's lowest RBC for all pathways for residential receptors is used as an initial 'conservative' screening of a constituent. If a constituent's concentration exceeds its screening level risk-based concentration (SLRBC), it requires further evaluation. Otherwise, the constituent is considered unlikely to pose unacceptable risk to any human receptor.
- Because ODEQ Generic RBCs are based on several conservative assumptions (e.g., duration and type of exposure), exceeding an SLRBC does not necessarily indicate that additional investigation or remediation is required. Rather, the exceedance of a SLRBC may indicate that additional investigation and evaluation, including consideration of site-specific information (e.g., current, and future land uses), may be necessary to determine if remediation or other actions are necessary. In many cases, it is not possible to determine whether unacceptable risks to human health and the environment are present, and require further action, until a risk assessment, including evaluation of current and reasonably likely land and water uses, is complete.
- In general, ODEQ considers chemical concentrations less than SLRBCs to be protective of human health.

Should constituents be identified that also exceed their generic, but exposure pathway- and receptor-specific RBCs, then the appropriateness of additional site-specific methods allowed under the RBDM guidance document will be evaluated (e.g., the development of site-specific RBCs, sampling of soil gas and/or vapor, etc.).

Other Numeric Criteria. In addition to the above risk-based cleanup standards, concentrations were also compared to the following numeric criteria to determine if possible enrichment was occurring, and/or determine if there may be offsite soil disposal restrictions.

- **Background Metals.** Analytical data were compared with background concentrations established by ODEQ.^{3,4} ODEQ does not require cleanup for metals concentrations below default background concentrations. Background concentrations are used for screening data for metals in soil as part of the risk assessment.

³ ODEQ, March 2013, Development of Oregon Background Metals Concentrations in Soil: Technical Report, Land Quality Division Cleanup Program.

⁴ ODEQ, October 28, 2002, Default Background Concentrations for metals, Memo from Toxicology Workgroup to DEQ Cleanup, Table 1 – Oregon DEQ Suggested Default Background Concentrations for Inorganic Contaminants in Various Environmental Media.

4.0 Overview of Environmental History

Previous environmental investigations are described in detail in CDM's 2014 Remedial Investigation and Risk Assessment.¹ As reported by CDM, highlights of work completed to date are as follows:

- In 2008, Ecology & Environment, Inc. (E&E) completed a site inspection for the entire Blue Heron Paper Company facility on behalf of the EPA, which included limited sampling on the subject site.
- In April 2008, Maul Foster & Alongi, Inc. completed a Phase I and Phase II ESA for the subject site.
- Sampling and analysis of the ASB sludge was conducted on several occasions in order to gain approval of land application of the sludge prior to dredging.
- Discharge water from the ASB was sampled to comply with the NPDES permit.
- In 2011, Bridgewater Group Inc. conducted an investigation of PCBs in soil.
- CDM completed Phase I and Phase II ESAs for the site in 2012.

In 2014, CDM completed a Remedial Investigation and Risk Assessment for the property. Additional surface soil, ground water, ASB water, and wetland surface water samples were collected and analyzed for constituents of concern. The Risk Assessment was performed under several assumptions, including that no residential receptors would be present on site in the future and that impacted sludge and soil on site would be encapsulated. Therefore, the Risk Assessment did not evaluate risk to future residents or occupational workers at the subject site.

CDM made the following conclusions in their 2014 report:

- The total excess cancer risk to current onsite ASB workers were below ODEQ acceptable limits; however, non-cancer hazard indices for an onsite worker were greater than ODEQ acceptable limits.
- The total excess cancer risk to future construction/excavation workers on site was below ODEQ acceptable limits; however, non-cancer hazard indices for future construction/excavation workers were greater than ODEQ acceptable limits.
- No exposure of current residents to constituents of potential of concern (COPCs) was identified.

In June 2018, ODEQ accepted⁵ CDM's Remedial Investigation and Risk Assessment with the following assumptions:

1. Based on the reports, and communications above, it is clear that the site may be redeveloped for a use other than a park, and therefore may include commercial uses. This is a change from the redevelopment assumptions ODEQ outlined in the letter dated January 14, 2014. Based on the land use zoning at the site (General Industrial), however, the HHRA concludes that there will be no residential development at the site.

⁵ ODEQ. June 18, 2014. Letter from ODEQ regarding Remedial Investigation and Risk Assessment.

2. The site is described as having two single family residences on the property, but based on zoning, the Residential Exposure Pathway is considered incomplete. This exposure pathway is considered complete by ODEQ, both now and in the future, but concludes based on the screening performed in the [Remedial Investigation] RI that only sludge and a minimal volume of surface soil exceed residential [RBCs]. Exposure to these materials following site redevelopment is not anticipated as soil is expected to be relocated to the sludge pond area, and both this soil and sludge capped eliminating the potential for direct contact.
3. As stated by ODEQ in our meeting on January 28, 2014, ODEQ considers the ground water-to-surface water (Willamette River) pathway to be complete. The Final Report has omitted this correction. ODEQ will require ground water monitoring following initial construction (dewatering, sludge management, etc.) to confirm that there is no unacceptable risk to surface water.
4. Slight differences exist within the HHRA and the [Ecological Risk Assessment] ERA on the conclusions regarding the area of surface soil represented by soil sample CS-3. ODEQ concludes that this small volume of soil is *de minimis* and can be managed by placing it in the ASB pond following dewatering activities. The surface soil can then be managed with the ASB sludge based on similar contaminant concentrations.
5. ODEQ approves of the proposed management of the ASB sludge on-site and will require an Easement and Equitable Servitude (E&ES) to prevent its disturbance by future development of the site, and maintenance of the ASB cover to prevent disturbance by burrowing animals (e.g., nutria).
6. The ecological risk assessment concludes that there is potential risk to ecological receptors from exposure to diesel-range organics (DRO) and heavy oil-range organics (RRO) in surface soil based on a lack of screening level value. ODEQ recommends using the Washington State Department of Ecology's MTCA Ecological Indicator Soil Concentration for the Protection of Terrestrial Plants and Animals as a screening value for these chemicals. For DRO, the screening level is 6,000 mg/kg. The concentrations of DRO and ORO detected in soil at the site are below this value, and therefore TPH should not be retained as a [Constituent of Ecological Concern] CPEC at the Site for ecological exposures to soil.

Based on this, and as requested by ODEQ, the purpose of this updated HHRA is to confirm the conclusions regarding media of concern assuming future residential development of the subject site.

5.0 Current Known Extent of Impacts

The known impacts of site contaminants to site media are summarized in this section on the basis of reporting by CDM. Refer to Tables 1 through 3, and Figure 3.

5.1 Soil

Sampling results indicate some impacts of DRO, RRO, and dioxins/furans in surface soil downgradient of the ASB, however, only dioxins/furans in surface soil at one location (sample location CS-3, see Figure 3) exceeds its SLRBC. There was no obvious sign of sediment deposition noted in the area of sample CS-3

and overtopping events from the ASB are rare. Other sources of surface soil impacts may include runoff from the asphaltic concrete road (Volpp Street) and atmospheric deposition of dioxins/furans.

5.2 ASB Sludge

Concentrations of petroleum hydrocarbons were generally detected at concentrations exceeding respective SLRBCs in most samples of sludge previously collected from the ASB. Dioxins/furans and PCBs, while present at much lower concentrations, also typically exceed their respective SLRBCs. Overall, metals concentrations in the ASB sludge are comparable to background soil concentrations.

5.3 Ground Water

Dioxins/furans and PCBs were not detected in ground water, which is consistent with the low overall concentrations of these constituents detected in the sludge and their low mobility in the subsurface. Petroleum hydrocarbons detected at BH-4 are consistent with the petroleum hydrocarbons identified in ASB sludge and ASB water. Similarly, metals concentrations are consistently highest at BH-4, which is located near surface soil sample CS-3, south (downgradient) of the ASB. The low concentrations of metals in the sludge and surface water indicate that the overall higher metals concentrations in ground water are likely related to redox conditions specific to the ground water. These ground water impacts appear to attenuate within a short distance downgradient of the ASB, based on the results from monitoring well BH-5, which is located approximately 100-feet south-southeast, downgradient of BH-4.

5.4 ASB Water

Similar to the ASB sludge results, ASB water appears to be impacted by low concentrations of DRO and RRO and dioxins/furans, with the concentration of DRO and dioxins/furans exceeding their respective SLRBCs. Concentrations of select metals were either detected at concentrations below their respective SLRBCs (total manganese and nickel) or were detected at concentrations below those typical of background concentrations in surface water (total arsenic).

5.5 Wetland Surface Water

Wetland surface water appears to be impacted by dioxins/furans at a concentration exceeding its respective SLRBC. Since dioxins/furans were not detected in ground water or in the ASB sludge, it is very unlikely that ground water or sludge would be a contributor of dioxins/furans to the wetland surface water. Concentrations of select metals were either detected at concentrations below their respective SLRBCs (total manganese and nickel) or were detected at concentrations below those typical of background concentrations in surface water (total arsenic).

6.0 Locality of Facility

The Locality of the Facility (LOF) is defined as any point where a human or an ecological receptor is reasonably likely to encounter facility-related hazardous substances. The LOF considers the likelihood of the contamination migrating over time and may be larger than the facility's property boundaries. The LOF

described in this section incorporates information on the local topography and hydrogeology, as well as known information on facility-related impacts, as they are understood currently.

6.1 Locality of Facility

The LOF for all impacted media is defined as:

- The north margin of the wetland boundary.
- The east subject site boundary.
- The south subject site boundary.
- The west subject site boundary.

The extent of the Locality of Facility is shown on Figure 2.

7.0 Risk Assessment

7.1 Methodology

Where residual impacts exist in media above SLRBCs and background concentrations, the State of Oregon requires that the impacts are evaluated using a risk-based approach, as described in ODEQ's *Risk-Based Decision Making for the Remediation of Contaminated Sites* (RBDM) guidance document, updated October 2017. The RBDM guidance document and its supplemental updates periodically provided by the agency provide pre-calculated risk-based concentrations (RBCs) which were developed as screening levels for suspect sites, based on Oregon's unacceptable additional risk criteria for cancer occurrence and for non-carcinogenic health impacts. The State of Oregon considers acceptable additional risk of cancer from contact with carcinogenic constituents at less than one in one million incidences, or for non-carcinogenic constituents, the constituent threshold concentration at which health impacts would occur.

This section conducts a risk-based assessment for residual impacted media at the site, based on analytical data collected during the site activities performed by others described above.

7.2 Identification of Constituents of Interest

COIs reported in previous assessments performed by others of the subject property are as follows:

- Metals (arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel; sludge and water only)
- Total petroleum hydrocarbons as gasoline-range organics (GRO) and DRO
- Volatile organic constituents (VOCs; soil and water only)
- Polynuclear aromatic hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs; soil and sludge only)
- Hexachlorobenzene (water only)

- Select semi volatile organic constituents (SVOCs; dichlorobenzidine, pentachlorophenol, styrene, 2,3,7,8-TCDD [dioxin] equivalents)

7.3 Identification of Constituents of Potential Concern

An initial screening of COIs was performed by comparing the maximum detected concentration of each COI to SLRBCs. If the concentration of a detected constituent exceeds the listed screening level, then the constituent is considered a COPC in that medium and is retained for further evaluation. Note that in accord with ODEQ guidance, a “non-detect” will be considered acceptable proof that the contaminant is not present, as long as commonly achievable analytical method detection limits are met by ODEQ-approved analytical methods.

7.3.1.1 Surface Soil

Onsite surface soil sample analytical results from previous investigations were screened in Table 1 (following Tables tab after text). Based on this initial screening, the following COPCs in surface soil were identified:

- 2,3,7,8-TCDD [dioxin] equivalents

7.3.1.2 Subsurface Soil

Subsurface soil sample analytical results from previous investigations were screened in Table 1 (following Tables tab after text). Based on this initial screening, no COPCs were identified in subsurface soil. Thus, subsurface soil can be ruled out as a media of concern at this time.

7.3.1.3 ASB Sludge

Onsite ASB sludge sample analytical results from previous investigations were screened in Table 2 (following Tables tab after text). Based on this initial screening, the following COPCs in ASB sludge were identified:

- | | |
|-------------------------------------|-------|
| • PCBs | • GRO |
| • 2,3,7,8-TCDD [dioxin] equivalents | • DRO |

7.3.1.4 Ground Water

Ground water sample analytical results were screened in Table 3 (following Tables tab after text). Based on this initial screening, the following COPCs in ground water were identified:

- | | |
|-----------|-------------|
| • Arsenic | • Manganese |
| • DRO | |

7.3.1.5 ASB Water

ASB water sample analytical results were screened in Table 3 (following Tables tab after text). Based on this initial screening, the following COPCs in ASB water were identified:

- | | |
|-------------------------------------|-------|
| • 2,3,7,8-TCDD (dioxin) equivalents | • DRO |
|-------------------------------------|-------|

7.3.1.6 Wetland Surface Water

Wetland surface water sample analytical results were screened in Table 3 (following Tables tab after text). Based on this initial screening, the following COPC in wetland surface water were identified:

- 2,3,7,8-TCDD (dioxin) equivalents

7.4 Conceptual Site Model

A conceptual site exposure model is developed to evaluate potential pathways of exposure. An exposure pathway is the course a chemical takes from a source to an exposed population. Exposure pathways include four elements: (1) the source of contamination; (2) the means by which a chemical will be released, retained, or travel in a given medium (e.g., air or ground water); (3) a point of potential contact with a receptor; and (4) the means by which contact will occur (e.g., inhalation, ingestion). If any of these elements are missing, the pathway is considered incomplete. The conceptual site model is presented in Figure 4; behind Figures tab following text.

7.4.1.1 Media of Concern

Media of Concern are conservatively identified as any media in which COIs have been detected during previous sampling investigations. Based on current sample data, the preliminary media of concern include:

- Surface soils (<3 feet depth)
- Subsurface soils (>3 feet depth)
- ASB Sludge
- Ground Water
- ASB Water
- Wetlands Surface Water

While COIs were detected in subsurface soils, no COPCs were identified as all detections were below ODEQ SLRBCs and/or applicable background concentrations. Therefore, subsurface soil was eliminated as a media of concern.

7.4.1.2 Land and Water Use Evaluation

Current and Likely Future Beneficial Use of Water

A previous beneficial water use determination performed by CDM¹ indicated ground water on site is not currently utilized and is not likely to be utilized in the future. Specifically:

- Ground water is not used at the site, either for potable water supply or irrigation purposes.
- Water supply for the site is provided by the City of West Linn.
- No records of drinking water wells on site have been identified.
- A search of the Oregon Water Resources Department online Well Log Query identified the closest potable water wells are over one-half mile away, across the Tualatin River.

Therefore, ground water risk pathways are insignificant, and ground water ingestion is eliminated as a media of concern from a human health perspective.

Land Use. The subject property is located on the north side of the Willamette River, approximately three miles southwest of the City of West Linn. Areas on site north of 4th Avenue are used residentially. The subject property and adjoining properties are zoned GI (General Industrial) and R10 (Residential) by the City of West Linn.

Residential redevelopment of the site is planned. Therefore, based on current zoning and planned development, both residential and occupational uses will be evaluated.

7.4.1.3 Site Receptor Populations

The area on site south of 4th Avenue is currently zoned GI (General Industrial) and the area north of 4th Avenue is currently zoned R10 (Residential) by the City of West Linn. A couple residences are currently present in the northern area. Additionally, future development plans for the site include possible residential uses. Furthermore, the ASB on site is currently being maintained and monitored. Because of this, current occupational workers and both future residents and occupational workers will be considered in the conceptual site model.

Additionally, it is reasonable to anticipate that construction and/or trench work (planned or unplanned) may occur in the future. Therefore, construction and trench workers must be considered in the conceptual site model.

7.4.1.4 Pathway Analysis

Table 7-1 summarizes each of the exposure pathways for each receptor in each medium.

Table 7-1. Summary of Pathway Analysis for Human Receptors

Potentially Exposed Population	Exposure Route, Medium and Exposure Point	Pathway Considered	Reason for Selection or Exclusion
Surface Soils			
Future Residents and Current and Future Occupational Workers	Direct ingestion, inhalation, and dermal contact with soil	YES	COPCs are present in surface soil.
	Inhalation of volatiles in interior and/or exterior air	YES	COPCs in surface soil are volatile.
	Leaching of contaminants from soil into ground water followed by ingestion	NO	There is no likely current or future beneficial use of shallow ground water within the LOF.
Construction Workers	Direct ingestion, inhalation, and dermal contact with soil	YES	COPCs are present in surface soil
Excavation Workers	Direct ingestion, inhalation of dusts and volatiles and dermal contact with soil	YES	COPCs are present in surface soil.
ASB Sludge			
Future Residents and Current and Future Occupational Workers	Direct ingestion, inhalation, and dermal contact with soil	YES	COPCs are present in ASB sludge.
	Inhalation of volatiles in interior and/or exterior air	YES	COPCs in ASB sludge are volatile.
	Leaching of contaminants from soil into ground water followed by ingestion	NO	There is no likely current or future beneficial use of shallow ground water within the LOF.
Construction Workers	Direct ingestion, inhalation, and dermal contact with soil	YES	COPCs are present in ASB sludge.

Potentially Exposed Population	Exposure Route, Medium and Exposure Point	Pathway Considered	Reason for Selection or Exclusion
Excavation Workers	Direct ingestion, inhalation of dusts and volatiles and dermal contact with soil	YES	COPCs are present in ASB sludge.
Ground Water			
Current and Future Residents and Occupational Workers	Ingestion & Inhalation from Tapwater	NO	The shallow ground water is not used for domestic use.
	Direct contact with chemicals in ground water	NO	The shallow ground-water table is deep, therefore limiting direct contact.
	Volatile inhalation	YES	COPCs in ground water may volatilize and migrate upward into indoor or outdoor air.
Construction Workers	Direct contact with chemicals in ground water	YES	Construction workers may come into direct contact with shallow ground water
Excavation Workers		YES	Excavation workers may come into direct contact with shallow ground water
ASB Water			
Current and Future Occupational Workers	Ingestion & Inhalation from Tapwater	NO	The ASB water is not used for domestic purposes.
	Direct contact with chemicals in ASB water	YES	Current or future residents or occupational workers could come into contact with ASB water.
	Volatile inhalation	YES	COPCs in ASB water may volatilize and migrate upward into indoor or outdoor air.
Construction Workers	Direct contact with chemicals in ASB water	YES	Construction workers may come into direct contact with ASB water
Excavation Workers		YES	Excavation workers may come into direct contact with ASB water
Wetland Surface Water			
Current and Future Occupational Workers	Ingestion & Inhalation from Tapwater	NO	The wetland surface water is not used for domestic use.
	Direct contact with chemicals in wetland surface water	YES	Current or future residents or occupational workers could come into contact with wetland surface water.
	Volatile inhalation	YES	COPCs in wetland surface water may volatilize and migrate upward into indoor or outdoor air.
Construction Workers	Direct contact with chemicals in wetland surface water	YES	Construction workers may come into direct contact with wetland surface water
Excavation Workers		YES	Excavation workers may come into direct contact with wetland surface water

Figure 4 presents a Human Health Conceptual Site Model, based on this exposure summary.

7.5 Further Evaluation of COPCs

Each COI was further evaluated by comparing the highest detected concentration. In accord with ODEQ guidance, a “nondetect” will be considered acceptable proof that the contaminant is not present, as long as commonly achievable analytical method detection limits are met by ODEQ-approved analytical methods.

7.5.1.1 Surface Soil

Since 2,3,7,8-TCDD [dioxin] equivalents were identified by the initial screening as COPCs in surface soil, the COPCs are further evaluated by comparing RBCs for complete exposure pathways for applicable receptors to determine if they are constituents of concern (COCs) at the site (Table 4). Based on this further evaluation, the following was identified:

- The maximum 2,3,7,8-TCDD [dioxin] equivalents concentration exceeds its applicable resident and occupational worker RBCs for the *Soil Ingestion, Dermal Contact, and Inhalation* exposure pathway.

7.5.1.2 ASB Sludge

Since PCBs, 2,3,7,8-TCDD (dioxin) equivalents, GRO and DRO were identified by the initial screening as COPCs in ASB sludge, the COPCs are further evaluated by comparing RBCs for complete exposure pathways for applicable receptors to determine if they are constituents of concern (COCs) at the site (Table 5). It should be noted that ASB sludge was evaluated as a surface soil, since it has the potential to be readily accessible to receptors on site. Based on this further evaluation, the following was identified:

- The maximum PCBs and 2,3,7,8-TCDD (dioxin) equivalents concentrations exceed their respective applicable resident RBCs for the *Soil Ingestion, Dermal Contact, and Inhalation* exposure pathway.
- The maximum GRO concentration exceeds its applicable resident RBC for the *Vapor Intrusion into a Building* exposure pathway.
- The maximum DRO concentration exceeds its applicable residential, occupation and construction worker RBCs for the *Soil Ingestion, Dermal Contact, and Inhalation* exposure pathway.

7.5.1.3 Ground Water

COPCs in ground water are further evaluated by comparing RBCs for complete exposure pathways for applicable receptors to determine if they are COCs at the site (Table 6). Based on this further evaluation, the following was identified:

- None of the COPCs in ground water exceeded their respective complete exposure pathway RBCs.

7.5.1.4 ASB Water

Since DRO and 2,3,7,8-TCDD (dioxin) equivalents were identified by the initial screening as COPCs in ASB water, these COPCs are further evaluated by comparing RBCs for complete exposure pathways for applicable receptors to determine if they are COCs at the site (Table 7). Based on this further evaluation, the following was identified:

- The maximum 2,3,7,8-TCDD (dioxin) equivalents and DRO concentrations in ASB water exceed their applicable residential RBCs for the *Ingestion, Inhalation, and Direct Contact with Chemicals* exposure pathway. Additionally, the maximum 2,3,7,8-TCDD (dioxin) equivalents concentration in ASB water exceeds its applicable occupational RBC for the *Ingestion, Inhalation, and Direct Contact with Chemicals* exposure pathway. It is important to note that this exposure pathway was only used as a surrogate for potential direct exposure to a future resident and/or an occupational worker and assumes use of the ASB water as a drinking water source, which it is not. Therefore,

further evaluation assuming recreational exposure as a more applicable exposure pathway is necessary (see Section 7.5.1.5).

7.5.1.5 ASB Water – Recreational Use

To further evaluate possible recreational exposure, based on communications with ODEQ, the following modifications were made to the generic exposure factors used to calculate ODEQ generic RBCs:

- A key parameter is exposure frequency, someone visiting the park every day during the summer, for a total of 90 days/year.
- For early-life exposure, 0-2 years were excluded from the risk calculations and 14 years was used for a child and 12 years as an adult, for a total of 26 years (the standard residential assumption).

Comparing the maximum concentrations of DRO and 2,3,7,8-TCDD (dioxin) equivalents to recreational *Ingestion, Inhalation, and Direct Contact* RBCs, which were calculated based on the modifications to the exposure factors outlined above, there is no unacceptable risk in exposure of ASB water to a future recreational user to these COPCs. Therefore, no COCs were identified in ASB water.

7.5.1.6 Wetland Surface Water

Since naphthalene, total arsenic, total lead, benzo[a]pyrene, GRO, and DRO were identified by the initial screening as COPCs in reconnaissance ground water, the COPCs are further evaluated by comparing RBCs for complete exposure pathways for applicable receptors to determine if they are COCs at the site (Table 5). Based on this further evaluation, the following was identified:

- The maximum 2,3,7,8-TCDD (dioxin) equivalents concentration exceeds its applicable resident and occupational RBCs for the *Direct Contact with Chemicals in Wetland Surface Water* exposure pathway. It is important to note that this exposure pathway was only used as a surrogate for potential direct exposure to a future resident and/or an occupational worker and assumes use of the wetland surface water as a drinking water source, which it is not. Therefore, further evaluation assuming recreational exposure as a more applicable exposure pathway is necessary (see Section 7.5.1.5).

7.5.1.7 Wetland Surface Water – Recreational Use

To further evaluate possible recreational exposure, based on communications with ODEQ, modifications were made to the generic exposure factors used to calculate ODEQ generic RBCs (see Section 7.5.1.5). Comparing the maximum concentration of 2,3,7,8-TCDD (dioxin) equivalents in wetland surface water to a recreational *Ingestion, Inhalation, and Direct Contact* RBC, there is no unacceptable risk in exposure of wetland surface water to a future recreational user to this COPC. Therefore, no COCs were identified in wetland surface water.

7.6 Hot Spot

Determination of Hot Spot Based on Concentration. ODEQ's cleanup rules require the remedial investigation to evaluate hot spots of contamination for media of concern [Oregon Administrative Rule (OAR) 340-122-080(7)]. The calculation of "highly concentrated" hot spot levels for human exposures is based on a 100-fold multiplier of the acceptable risk levels for carcinogens and a 10-fold multiplier of the

acceptable risk level for non-carcinogens, or where COCs are reasonably likely to migrate such that a hot spot would be created in another medium, or COCs are not reliably able to be contained.

Surface Soils

2,3,7,8-TCDD (dioxin) equivalents was the only COC identified in surface soil.

- The maximum concentration of 2,3,7,8-TCDD (dioxin) equivalents detected in surface soil was 0.0000905 mg/Kg. The lowest applicable RBC for 2,3,7,8-TCDD (dioxin) equivalents in surface soil is 0.00000474411 mg/Kg. Since 2,3,7,8-TCDD (dioxin) equivalents are currently classified as a carcinogen, the calculated hotspot concentration for 2,3,7,8-TCDD (dioxin) equivalents is 0.000474411 mg/Kg. Based on this, 2,3,7,8-TCDD (dioxin) equivalents concentrations in surface soil do not present a possible hot spot on the subject site.

ASB Sludge

PCBs, 2,3,7,8-TCDD (dioxin) equivalents, GRO and DRO were the only COCs identified in ASB sludge.

- The maximum concentration of total PCBs detected in ASB sludge was 0.48 mg/Kg. The lowest applicable RBC for total PCBs in ASB sludge is 0.23 mg/Kg. Since total PCBs are currently classified as a carcinogen, the calculated hotspot concentration for total PCBs is 23 mg/Kg. Based on this, total PCBs concentrations in ASB sludge do not present a possible hot spot on the subject site.
- The maximum concentration of 2,3,7,8-TCDD (dioxin) equivalents detected in ASB sludge was 9.05E-05 mg/Kg. The lowest applicable RBC for 2,3,7,8-TCDD (dioxin) equivalents in ASB sludge is 4.7E-06 mg/Kg. Since 2,3,7,8-TCDD (dioxin) equivalents are currently classified as a carcinogen, the calculated hotspot concentration for 2,3,7,8-TCDD (dioxin) equivalents is 4.7E-4 mg/Kg. Based on this, 2,3,7,8-TCDD (dioxin) equivalents concentrations in ASB sludge do not present a possible hot spot on the subject site.
- The maximum concentration of GRO detected in ASB sludge was 320 mg/Kg. The lowest applicable RBC for GRO in ASB sludge is 94 mg/Kg. Since GRO is not classified as a carcinogen, the calculated hotspot concentration for GRO is 940 mg/Kg. Based on this, GRO concentrations in ASB sludge do not present a possible hot spot on the subject site.
- The maximum concentration of DRO detected in ASB sludge was 18,000 mg/Kg. The lowest applicable RBC for DRO in ASB sludge is 1100 mg/Kg. Since DRO is not classified as a carcinogen, the calculated hotspot concentration for DRO is 11,000 mg/Kg. Based on this, DRO concentrations in ASB sludge present a possible hot spot on the subject site.

Ground Water

There were no COCs identified in ground water.

ASB Water

There were no COCs identified in ASB water.

Wetland Surface Water

There were no COCs identified in wetland surface water.

Determination of Hot Spot Based on Mobility. Mobility refers to the transport or migration of hazardous substances from their present location. Typical routes of migration include:

- Advection

- Volatilization
- Chemical degradation

The assessment of “highly mobile” hot spots is required only in instances when it is reasonably likely that significant migration routes exist at a site.

- Windblown distribution is not likely as most impacts are related to surface water or sludge that is underwater at all times.
 - The only hot spot determined to be possible at the site was related to DRO in ASB sludge. As ASB sludge is currently underwater and contained within the ASB, it is not likely to migrate.
- Erosion of surface soil during storm events, if any, would be minimal, given the localized nature of surface soil impacts. Additionally, surface soil impacts appear likely to be the result of runoff from the asphaltic concrete road and atmospheric deposition of dioxins/furans rather than site specific sources.
- The property has not received wastewater for years and no significant leaching of COPCs to ground water has been demonstrated. It is unlikely that without additional sources of impacts, leaching of current concentrations of COPCs in sludge to ground water would be cause for additional concern.
- The beneficial water use determination confirms there is no domestic uses of water within a reasonable search distance from the site and that capture zone from municipal wells likely down-gradient from the subject site likely capture water from a deeper water-bearing unit.

7.7 Uncertainty Analysis

An uncertainty analysis is a discussion of uncertainties in the risk estimates and their impacts in terms of underestimating or overestimating calculated potential risks. There are inherent uncertainties in the risk characterization process. These uncertainties are associated with:

- The validity of adding risks or hazard quotients for multiple chemicals.
- The validity of adding risks or hazard quotients across pathways.
- Lack of reliable toxicological data.
- The validity of the critical underlying assumption in the dose-response model for carcinogens (linearized multistage model) that there is no threshold for carcinogenesis.
- The probability of adverse effects in a human population that is highly variable genetically and in age, activity level and lifestyle.

Uncertainty Based on Data Gaps. A sampling program was developed to target areas of likely impact, based on historical site uses. Therefore, soil samples were not collected from all areas of the subject site. However, since this justified sampling program targeted areas where impacts were likely present, the statistical distribution of detected constituents would be biased high, if detected. It is not practical to sample all areas of the site, given the inaccessibility of many of these areas due to the presence of site structures. Therefore, the uncertainty in contaminant distribution would not likely change the findings of this assessment.

RRO was detected above SLRBCs in several samples taken from ASB sludge, ground water, and ASB water. RRO, unless mineral oil, is not evaluated during risk assessments and instead, samples with high detections of RRO are typically analyzed for PAH concentrations, which are then used in the risk assessment process. Not all of the samples in which RRO was detected were run for PAHs. However, PAHs, if present in ground water, are unlikely to present additional risk, as ground water is not in use as a drinking water resource. PAHs, if present in ASB sludge are unlikely to present additional risk given the exposure pathway with the lowest RBC values, *Soil Ingestion, Dermal Contact, and Inhalation*, is already a pathway of concern. The same is true of ASB water. Therefore, the uncertainty in possible PAHs in impacted media would not likely change the findings of this assessment.

8.0 Conclusions

ENW makes the following conclusions:

- Previous investigations have identified COPCs in surface soil, ASB sludge, ground water, ASB water, and wetland surface water (Tables 1, 2 and 3).
- While the subject property is currently zoned for industrial use, current redevelopment plans are considering development with residential use. Based on this reasonably likely future use, site receptors should include: Residents, Occupational Workers, Construction Workers, and Excavation Workers (Section 7.4.3).
- Initial screening identified the following COPCs in the following media:
 - Surface soil
 - 2,3,7,8-TCDD (dioxins) equivalents (Section 7.3.1 and Table 1).
 - ASB sludge
 - Total PCBs, 2,3,7,8-TCDD (dioxins) equivalents, GRO, and DRO (Section 7.3.3 and Table 2).
 - Ground water
 - Arsenic, copper, lead, manganese, nickel, benzo[a]pyrene, dibenz[a,h]anthracene, and DRO (see Section 7.3.4 and Table 3).
 - ASB water
 - 2,3,7,8-TCDD (dioxin) equivalents and DRO (see Section 7.3.4 and Table 3).
 - Wetland surface water
 - 2,3,7,8-TCDD (dioxin) equivalents (see Section 7.3.4 and Table 3).
- This risk assessment identified the following COCs:
 - Surface Soil:
 - 2,3,7,8-TCDD (dioxin) equivalents, specifically for Current and Future Residents and Occupational Workers for the *Soil Ingestion, Dermal Contact, and Inhalation* pathway.

- ASB sludge
 - PCBs and 2,3,7,8-TCDD (dioxin) equivalents, specifically for Current and Future Residents for the *Soil Ingestion, Dermal Contact, and Inhalation* pathway.
 - GRO, specifically for Current and Future Residents for the *Vapor Intrusion into Buildings* pathway.
 - DRO, specifically for Current and Future Residents, Occupational Workers, and Construction Workers for the *Soil Ingestion, Dermal Contact, and Inhalation* pathway.
- An evaluation of Exposure Pathways has identified the following exposure pathways of concern:
 - Surface Soil:
 - *Soil Ingestion, Dermal Contact, and Inhalation* for Current and Future Residents and Occupational Workers.
 - ASB Sludge:
 - *Soil Ingestion, Dermal Contact, and Inhalation* for Current and Future Residents, Occupational Workers, and Construction Workers.
 - *Vapor Intrusion into Buildings* for Current and Future Residents.

9.0 Discussion

Potential human health risk is driven by the potential for direct contact with impacted surface soil, ASB sludge and/or ASB water. Under the future scenario where the ASB sludge is drained, dewatered, encapsulated onsite, and impacted surface soil is consolidated within this cap, there would be no potential for exposure to surface soil, ASB sludge or ASB water. Draining the water from the ASB will no longer provide aquatic habitat, the source material would be removed, and would mitigate further migration or ecological exposure.

10.0 Recommendations

As previously described, as part of site redevelopment, it is assumed that the ASB will be decommissioned by draining the water, dewatering the ASB sludge, encapsulating the ASB sludge (possibly with some amendments so can be used as structural fill), along with impacted surface soil, and providing a soil cap. Assuming the dried sludge may generate methane and to mitigate possible vapor intrusion issues associated with GRO, a passive venting system will also be incorporated into the cap. These actions will eliminate exposures via surface soil, ASB surface water, and ASB sludge and will eliminate or substantially reduce contaminants in groundwater as a result of changing redox conditions. As required by ODEQ, the effects of these actions on ground water would be confirmed by future ground water monitoring, for a minimum of four consecutive quarters.

ODEQ previously approved of the proposed management of the ASB sludge on-site⁵ and stated that an E&ES will be required to prevent its disturbance by future site development and maintenance of the ASB cover to prevent disturbance by burrowing animals.

Based on this, ENW recommends preparation of a focused feasibility study, focused on ASB decommissioning, surface soil consolidation, soil and ASB sludge capping/encapsulation, and vapor ventilation.

11.0 Limitations

The conclusions of this report are based on information supplied by others as well as interpretations by qualified parties. The focus of this Assessment does not extend to the presence of the following conditions unless they were the express concerns of contacted personnel, report and literature authors or the work scope:

1. Naturally occurring toxic or hazardous substances in subsurface soils, geology and water,
2. Toxicity of substances common in current habitable environments, such as stored chemicals, products, building materials and consumables,
3. Contaminants or contaminant concentrations that are not a concern now but may be under future regulatory standards,
4. Unpredictable events that may occur after ENW's site visit, such as illegal dumping or accidental spillage.

There is no practice that is thorough enough to absolutely identify the presence of all hazardous substances that may be present at a given site. ENW's investigation has been focused only on the potential for contamination that was specifically identified in the scope of work (SOW). Therefore, if contamination other than that specifically mentioned is present and not identified as part of a limited SOW, ENW's environmental investigation shall not be construed as a guaranteed absence of such materials.

We have performed our services for this project in accordance with our agreement and understanding with the client. This document and the information contained herein have been prepared solely for the use of the client and his representatives.

ENW performed this study under a limited scope of services per our agreement. It is possible, despite the use of reasonable care and interpretation, that ENW may have failed to identify regulation violations related to the presence of hazardous substances other than those specifically mentioned at the closure site. ENW assume no responsibility for conditions that we did not specifically evaluate or conditions that were not generally recognized as environmentally unacceptable at the time this report was prepared.

Table 1 - Summary of Analytical Data, Soil

Location ID		B1		B2A	B2B	B3	B4	CS-1	CS-2	CS-3
Sample ID		B1-8	B1-12	B2A-2	B2B-2	B3-13	B4-21	CS-1	CS-2	CS-3
Date Sampled		2/2/2012	2/2/2012	2/2/2012	2/2/2012	2/2/2012	2/2/2012	3/27/2013	3/27/2013	3/27/2013
Depth Sampled (feet)		8	12	2	2	13	21	Surface	Surface	Surface
Sampled By		CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM
Constituent of Interest		Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)
Volatile Organic Constituents										
Acrylonitrile	c, v	---	---	---	---	---	<0.0051 (ND)	---	---	---
Benzene	c, v	---	---	---	---	---	0.0016	---	---	---
Bromodichloromethane	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Bromoform	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Bromomethane	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Carbon tetrachloride	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Chlorobenzene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Chlorodibromomethane (dibromochloromethane)	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Chloroethane (ethyl chloride)	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Chloroform	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Chloromethane	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
1,2-Dichlorobenzene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
1,4-Dichlorobenzene	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
1,1-Dichloroethane	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
1,1-Dichloroethene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
cis-1,2-Dichloroethene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
trans-1,2-Dichloroethene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Dichloromethane	c, v	---	---	---	---	---	0.0033	---	---	---
EDB (1,2-dibromoethane)	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
EDC (1,2-dichloroethane)	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Ethylbenzene	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Naphthalene	c, v	---	---	---	---	---	<0.0051 (ND)	---	---	---
iso-Propylbenzene (cumene)	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Tetrachloroethene (PCE)	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Toluene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	nc, v	---	---	---	---	---	<0.002 (ND)	---	---	---
1,1,1-Trichloroethane	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
1,1,2-Trichloroethane	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Trichloroethene	NA, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Trichlorofluoromethane (Freon 11)	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
1,2,4-Trimethylbenzene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
1,3,5-Trimethylbenzene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Vinyl chloride	c, v	---	---	---	---	---	<0.001 (ND)	---	---	---
Xylenes	nc, v	---	---	---	---	---	<0.002 (ND)	---	---	---
Semivolatile Organic Constituents										
Polychlorinated biphenyls (Total PCBs)	c, v	---	---	---	---	---	---	<0.032 (ND)	<0.033 (ND)	<0.033 (ND)
Styrene	nc, v	---	---	---	---	---	<0.001 (ND)	---	---	---
2,3,7,8-TCDD (dioxin) equivalents	c, v	5.30E-07	2.60E-07	---	---	---	---	3.88E-06	3.36E-06	2.95E-05
Total Petroleum Hydrocarbons										
Generic Gasoline (GRO)	nc, v	---	---	<20 (NP)	<20 (NP)	<20 (NP)	---	---	---	---
Generic Diesel / Heating Oil (DRO)	nc, v	---	---	<50 (NP)	<50 (NP)	<50 (NP)	---	35	35	390
Generic Mineral Insulating Oil (RRO)	nc, nv	---	---	<100 (NP)	<100 (NP)	<100 (NP)	---	180	230	1200

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

Shaded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for soil (screening level assumes residential use, from ODEQ RBCs dated May 2018).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

Note, B(a)P equivalents is calculated using Toxicity Equivalent Factors for all carcinogenic PAHs, per ODEQ guidance.

Table 1 - Summary of Analytical Data, Soil

Location ID		Maximum Soil Concentration (remaining soil)	Soil Matrix Cleanup Level	ODEQs Screening-Level Risk-Based Concentrations SLRBCs ¹ (Soil)	Background Concentrations (Regional Default)	Clean Fill Screening Levels or Background Concentrations (as applicable)	Exceeds ODEQs Screening-Level SLRBCs (Soil) and/or Soil Matrix Cleanup Level
Sample ID							
Date Sampled							
Depth Sampled (feet)							
Sampled By							
Constituent of Interest		Note	mg/Kg (ppm)				TRUE OR Y FALSE OR N
Volatile Organic Constituents							
Acrylonitrile	c, v	<0.0051 (ND)	NE	0.00036	---	0.00036	(Y)
Benzene	c, v	0.0016	NE	0.023	---	0.023	N
Bromodichloromethane	c, v	<0.001 (ND)	NE	0.002	---	0.002	N
Bromoform	c, v	<0.001 (ND)	NE	0.046	---	0.046	N
Bromomethane	nc, v	<0.001 (ND)	NE	0.083	---	0.083	N
Carbon tetrachloride	c, v	<0.001 (ND)	NE	0.013	---	0.013	N
Chlorobenzene	nc, v	<0.001 (ND)	NE	5.8	---	2.4	N
Chlorodibromomethane (dibromochloromethane)	c, v	<0.001 (ND)	NE	0.0024	---	0.0024	N
Chloroethane (ethyl chloride)	nc, v	<0.001 (ND)	NE	310	---	310	N
Chloroform	c, v	<0.001 (ND)	NE	0.0034	---	0.0034	N
Chloromethane	nc, v	<0.001 (ND)	NE	2.2	---	2.2	N
1,2-Dichlorobenzene	nc, v	<0.001 (ND)	NE	36	---	0.92	N
1,4-Dichlorobenzene	c, v	<0.001 (ND)	NE	0.057	---	0.057	N
1,1-Dichloroethane	c, v	<0.001 (ND)	NE	0.044	---	0.044	N
1,1-Dichloroethene	nc, v	<0.001 (ND)	NE	6.7	---	6.7	N
cis-1,2-Dichloroethene	nc, v	<0.001 (ND)	NE	0.63	---	0.63	N
trans-1,2-Dichloroethene	nc, v	<0.001 (ND)	NE	7.0	---	7	N
Dichloromethane	c, v	0.0033	NE	0.14	---	0.14	N
EDB (1,2-dibromoethane)	c, v	<0.001 (ND)	NE	0.00012	---	0.00012	(Y)
EDC (1,2-dichloroethane)	c, v	<0.001 (ND)	NE	0.0028	---	0.0028	N
Ethylbenzene	c, v	<0.001 (ND)	NE	0.22	---	0.22	N
Naphthalene	c, v	<0.0051 (ND)	NE	0.077	---	0.077	N
iso-Propylbenzene (cumene)	nc, v	<0.001 (ND)	NE	96	---	96	N
Tetrachloroethene (PCE)	c, v	<0.001 (ND)	NE	0.46	---	0.18	N
Toluene	nc, v	<0.001 (ND)	NE	83	---	23	N
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	nc, v	<0.002 (ND)	NE	8100	---	1600	N
1,1,1-Trichloroethane	nc, v	<0.001 (ND)	NE	190	---	190	N
1,1,2-Trichloroethane	c, v	<0.001 (ND)	NE	0.0063	---	0.0063	N
Trichloroethene	NA, v	<0.001 (ND)	NE	0.013	---	0.013	N
Trichlorofluoromethane (Freon 11)	nc, v	<0.001 (ND)	NE	61	---	52	N
1,2,4-Trimethylbenzene	nc, v	<0.001 (ND)	NE	10	---	10	N
1,3,5-Trimethylbenzene	nc, v	<0.001 (ND)	NE	11	---	11	N
Vinyl chloride	c, v	<0.001 (ND)	NE	0.00057	---	0.00057	(Y)
Xylenes	nc, v	<0.002 (ND)	NE	23	---	1.4	N
Semivolatile Organic Constituents							
Polychlorinated biphenyls (Total PCBs)	c, v	<0.033 (ND)	NE	0.23	---	0.23	N
Styrene	nc, v	<0.001 (ND)	NE	170	---	1.2	N
2,3,7,8-TCDD (dioxin) equivalents	c, v	0.0000295	NE	4.74E-06	---	2.90E-07	Y
Total Petroleum Hydrocarbons							
Generic Gasoline (GRO)	nc, v	<20 (NP)	80	31	---	520	N
Generic Diesel / Heating Oil (DRO)	nc, v	390	500	1100	---	90	N
Generic Mineral Insulating Oil (RRO)	nc, nv	1200		2800	---	140,000	N

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

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NE = not established.

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— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

Shaded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for soil (screening level assumes residential use, from ODEQ RBCs dated May 2018).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

Note, B(a)P equivalents is calculated using Toxicity Equivalent Factors for all carcinogenic PAHs, per ODEQ guidance.

Table 2 - Summary of Analytical Data, ASB Sludge

Location ID		P6C0526-02	PQC0371-02	D11		A10			C8		F11		
Sample ID		P6C0526-02	PQC0371-03	D11-6	D11-0-4	A10-6	A10-0-4	A10-4-8	C8-1	C8-0-4	F11-4	F11-0-4	F11-4-8
Date Sampled		3/13/2006	3/8/2007	2/6/2012	2/6/2012	2/6/2012	2/6/2012	2/6/2012	2/6/2012	2/6/2012	2/6/2012	2/6/2012	2/6/2012
Depth Sampled (feet)		--	--	6	0-4	6	0-4	4-8	1	0-4	4	0-4	8-Apr
Sampled By		MF	MF	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM
Constituent of Interest		Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)
Metals													
Arsenic		c, nv	---	---	---	---	---	---	---	---	---	---	---
Cadmium		nc, nv	---	---	---	---	---	---	---	---	---	---	---
Chromium (III)		nc, nv	---	---	---	---	---	---	---	---	---	---	---
Copper		nc, nv	---	---	---	---	---	---	---	---	---	---	---
Lead		NA, nv	---	---	---	---	---	---	---	---	---	---	---
Mercury		nc, nv	---	---	---	---	---	---	---	---	---	---	---
Nickel		c, nv	---	---	---	---	---	---	---	---	---	---	---
Semivolatile Organic Constituents													
Polychlorinated biphenyls (Total PCBs)		c, v	---	---	---	0.41	---	0.48	0.39	---	0.48	---	0.294
2,3,7,8-TCDD (dioxin) equivalents		c, v	<0.0000005 (ND)	<0 (ND)	---	2.19E-05	---	1.96E-05	1.13E-05	---	4.28E-05	---	5.95E-06
Total Petroleum Hydrocarbons													
Generic Gasoline (GRO)		nc, v	---	---	<42 (NP)	---	---	---	---	---	<36 (NP)	---	---
Generic Diesel / Heating Oil (DRO)		nc, v	---	---	<100 (NP)	---	2200	---	---	1900	---	<90 (NP)	---
Generic Mineral Insulating Oil (RRO)		nc, nv	---	---	<210 (NP)	---	3400	---	---	2800	---	<180 (NP)	---

Notes:

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NE = not established.

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— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

Purple shaded and bolded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for soil (screening level assumes residential use, from ODEQ RBCs dated May 2018).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

J = The result is below method reporting limits. The value reported is an estimate.

Note, B(a)P equivalents is calcuculated using Toxicity Equivalent Factors for all carcinogenic PAHs, per ODEQ guidance.

Table 2 - Summary of Analytical Data, ASB Sludge

Location ID		E2		A10C8E2F11	A10C8F11	F5		F7			C5		
Sample ID		E2-1.5	E2-0-4.5	A10C8E2F11-0-4	A10C8F11-4-8	F5-2	F5-0-4	F7-0.5	F7-0-4	F7-4-8	C5-1	C5-7	C5-0-4
Date Sampled		2/6/2012	2/6/2012	2/6/2012	2/6/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012
Depth Sampled (feet)		1.5	0-4.5	0-4	4-8	2	0-4	0.5	0-4	4-8	1	7	0-4
Sampled By		CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM
Constituent of Interest	Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)
Metals													
Arsenic	c, nv	---	---	<10 (ND)	<50 (ND)	---	---	---	---	---	---	---	---
Cadmium	nc, nv	---	---	<0.6 (ND)	<2 (ND)	---	---	---	---	---	---	---	---
Chromium (III)	nc, nv	---	---	20	6	---	---	---	---	---	---	---	---
Copper	nc, nv	---	---	90.3	69	---	---	---	---	---	---	---	---
Lead	NA, nv	---	---	8	<20 (ND)	---	---	---	---	---	---	---	---
Mercury	nc, nv	---	---	0.08	0.09	---	---	---	---	---	---	---	---
Nickel	c, nv	---	---	12	<10 (ND)	---	---	---	---	---	---	---	---
Semivolatile Organic Constituents													
Polychlorinated biphenyls (Total PCBs)	c, v	---	0.141	---	---	---	0.14	---	0.41	0.37	---	---	0.47
2,3,7,8-TCDD (dioxin) equivalents	c, v	---	1.37E-05	---	---	---	3.08E-05	---	9.05E-05	1.85E-05	---	---	6.85E-05
Total Petroleum Hydrocarbons													
Generic Gasoline (GRO)	nc, v	<20 (NP)	---	---	---	63	---	310 J	---	---	320 J	---	---
Generic Diesel / Heating Oil (DRO)	nc, v	670	---	---	---	6700	---	18000	---	---	7400	1800	---
Generic Mineral Insulating Oil (RRO)	nc, nv	910	---	---	---	11000	---	32000	---	---	12000	2700	---

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

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— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

Purple shaded and bolded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for soil (screening level assumes residential use, from ODEQ RBCs dated May 2018).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

J = The result is below method reporting limits. The value reported is an estimate.

Note, B(a)P equivalents is calcuculated using Toxicity Equivalent Factors for all carcinogenic PAHs, per ODEQ guidance.

Table 2 - Summary of Analytical Data, ASB Sludge

Location ID		E2C5F5F7	C5F5F7	Maximum Sludge Concentration (remaining soil)	Soil Matrix Cleanup Level	ODEQs Screening-Level Risk-Based Concentrations SLRBCs ¹ (Soil)	Background Concentrations (Regional Default)	Clean Fill Screening Levels or Background Concentrations (as applicable)	Exceeds ODEQs Screening-Level SLRBCs (Soil) and/or Soil Matrix Cleanup Level	
Sample ID		E2C5F5F7-0-4	C5F5F7-4-8							
Date Sampled		2/7/2012	2/7/2012							
Depth Sampled (feet)		0-4	4-8							
Sampled By		CDM	CDM							
Sampled By		CDM	CDM				Blue Mountains			
Constituent of Interest		Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)					TRUE OR Y FALSE OR N
Metals										
Arsenic	c, nv	<10 (ND)	<20 (ND)	<50 (ND)	NE	0.43	14	14	(Y)	
Cadmium	nc, nv	<0.5 (ND)	<0.8 (ND)	<2 (ND)	NE	78	0.69	0.69	N	
Chromium (III)	nc, nv	32	16	32	NE	120000	190	190	N	
Copper	nc, nv	95.4	112	112	NE	3100	120	120	N	
Lead	NA, nv	15	8	20	NE	30	21	21	N	
Mercury	nc, nv	0.06	0.08	0.09	NE	23	1.4	1.4	N	
Nickel	c, nv	21	7	21	NE	1500	92	92	N	
Semivolatile Organic Constituents										
Polychlorinated biphenyls (Total PCBs)	c, v	---	---	0.48	NE	0.23	---	0.23	Y	
2,3,7,8-TCDD (dioxin) equivalents	c, v	---	---	0.0000905	NE	4.74E-06	---	2.90E-07	Y	
Total Petroleum Hydrocarbons										
Generic Gasoline (GRO)	nc, v	---	---	320 J	80	31	---	520	Y	
Generic Diesel / Heating Oil (DRO)	nc, v	---	---	18000	500	1100	---	90	Y	
Generic Mineral Insulating Oil (RRO)	nc, nv	---	---	32000		2800	---	140,000	(mineral oil)	

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

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nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

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RRO = residual-range organics.

Purple shaded and bolded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for soil (screening level assumes residential use, from ODEQ RBCs dated May 2018).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

J = The result is below method reporting limits. The value reported is an estimate.

Note, B(a)P equivalents is calculated using Toxicity Equivalent Factors for all carcinogenic PAHs, per ODEQ guidance.

Table 3 - Summary of Analytical Data, Ground Water and Surface Water

Location ID		B1 (Reconnaissance)	B2 (Reconnaissance)	B3 (Reconnaissance)	B4 (Reconnaissance)	B5 (Reconnaissance)	B6 (Reconnaissance)	B1 (Reconnaissance)	B4 (Reconnaissance)
Sample ID		B-1-W-032708	B-2-W-032708	B-3-W-032708	B-4-W-032708	B-5-W-032708	B-6-W-032708	B1-W	B4-W
Date Sampled		3/27/08	3/27/08	3/27/08	3/27/08	3/27/08	3/27/08	2/2/12	2/2/12
Sampled By		MF	MF	MF	MF	MF	MF	CDM	CDM
Total or Dissolved Metals		Total	Total	Total	Total	Total	Total	Dissolved	Unreported
Constituent of Interest		Note	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)
Volatile Organic Constituents									
Acrylonitrile	c, v	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	---	<1 (ND)
Benzene	c, v	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	---	<0.2 (ND)
Bromodichloromethane	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Bromoform	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Bromomethane	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<1 (ND)
Carbon tetrachloride	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Chlorobenzene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Chlorodibromomethane (dibromochloromethane)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Chloroethane (ethyl chloride)	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Chloroform	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Chloromethane	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.5 (ND)
1,2-Dichlorobenzene	nc, v	<1.04 (ND)	<1.01 (ND)	<1.02 (ND)	<0.998 (ND)	<1.03 (ND)	<1 (ND)	---	<0.2 (ND)
1,4-Dichlorobenzene	c, v	<1.04 (ND)	<1.01 (ND)	<1.02 (ND)	<0.998 (ND)	<1.03 (ND)	<1 (ND)	---	<0.2 (ND)
1,1-Dichloroethane	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
1,1-Dichloroethene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
cis-1,2-Dichloroethene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
trans-1,2-Dichloroethene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Dichloromethane	c, v	<20 (ND)	<20 (ND)	<20 (ND)	<20 (ND)	<20 (ND)	<20 (ND)	---	<1 (ND)
EDB (1,2-dibromoethane)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
EDC (1,2-dichloroethane)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Ethylbenzene	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
MTBE (methyl t-butyl ether)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	---
Naphthalene	c, v	0.06	0.07	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	<0.5 (ND)
iso-Propylbenzene (cumene)	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Tetrachloroethene (PCE)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Toluene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	nc, v	---	---	---	---	---	---	---	<0.2 (ND)
1,1,1-Trichloroethane	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
1,1,2-Trichloroethane	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Trichloroethene	NA, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Trichlorofluoromethane (Freon 11)	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
2,4,6-Trichlorophenol	c, nv	<5.21 (ND)	<5.07 (ND)	<5.08 (ND)	<4.99 (ND)	<5.13 (ND)	<5.02 (ND)	---	---
1,2,4-Trimethylbenzene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
1,3,5-Trimethylbenzene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Vinyl chloride	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.2 (ND)
Xylenes	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	---	<0.6 (ND)
Pesticides									
Hexachlorobenzene	c, v	<1.04 (ND)	<1.01 (ND)	<1.02 (ND)	<0.998 (ND)	<1.03 (ND)	<1 (ND)	---	---
Metals									
Arsenic	c, nv	50	30	169	18	35	75.1	1.4	---
Cadmium	nc, nv	3.4	1.56	6.42	1.14	<0.6 (ND)	2.1	<0.1 (ND)	---
Chromium (III)	nc, nv	668	232	799	39.2	65.4	287	<0.5 (ND)	---
Copper	nc, nv	685	267	1250	83	55.4	321	<0.5 (ND)	---
Lead	NA, nv	55.7	<12 (ND)	135	<12 (ND)	<12 (ND)	319	<0.1 (ND)	---
Manganese	nc, nv	---	---	---	---	---	---	6600	---
Mercury	nc, nv	0.564	0.309	1.11	0.119	0.114	0.358	<0.1 (ND)	---
Nickel	c, nv	571	264	1110	167	65.8	386	13	---
Semivolatile Organic Constituents									
3,3-Dichlorobenzidine	c, nv	<5.21 (ND)	<5.07 (ND)	<5.08 (ND)	<4.99 (ND)	<5.13 (ND)	<5.02 (ND)	---	---
Pentachlorophenol	c, nv	<5.21 (ND)	<5.07 (ND)	<5.08 (ND)	<4.99 (ND)	<5.13 (ND)	<5.02 (ND)	---	---
Polychlorinated biphenyls (Total PCBs)	c, v	---	---	---	---	---	---	---	---
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	nc, v	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Anthracene	nc, v	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Benz[a]anthracene	c, v	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Benzo[a]pyrene (BaP equivalents)	c, nv	<0.05 (ND)	0.06	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Benzo[b]fluoranthene	c, nv	<0.05 (ND)	0.06	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Benzo[k]fluoranthene	c, nv	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Chrysene	c, nv	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Dibenz[a,h]anthracene	c, nv	0.06	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Fluoranthene	nc, nv	<0.05 (ND)	0.06	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Fluorene	nc, v	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Indeno[1,2,3-cd]pyrene	c, nv	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Pyrene	nc, v	<0.05 (ND)	0.06	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---
Styrene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<0.2 (ND)
2,3,7,8-TCDD (dioxin) equivalents	c, v	---	---	---	---	---	---	---	---
Total Petroleum Hydrocarbons									
Generic Gasoline (GRO)	nc, v	---	---	---	---	---	---	---	<250 (NP)
Generic Diesel / Heating Oil (DRO)	nc, v	---	---	---	---	---	---	---	<100 (ND)
Generic Mineral Insulating Oil (RRO)	nc, nv	---	---	---	---	---	---	---	<200 (ND)

Notes:
ug/L = micrograms per Liter or parts per billion (ppb).
<# (ND) = not detected at or above the laboratory method reporting limit shown.
NE = not established.
NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

¹ Lowest Risk-Based Concentration for ground water (screening level assumes residential use, from ODEQ RBCs dated May 2018).

— = not analyzed or not applicable.
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
RRO = residual-range organics.
BKG = constituent exceeded its SLRBC; however, was not detected above default background concentrations in soil
Bolded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for ground water (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

Table 3 - Summary of Analytical Data, Ground Water and Surface Water

Location ID		GW1 (Reconnaissance)	GW3 (Reconnaissance)	GW4 (Reconnaissance)	BH-1 (Monitoring Well)		BH-2 (Monitoring Well)			
Sample ID		GW1	GW3	GW4	BH-1	BH-1	BH-2	BH-2	BH-2 Dup	BH-2 Dup
Date Sampled		2/2/12	2/2/12	2/2/12	3/26/13	3/26/13	3/26/13	3/26/13	3/26/23	3/26/23
Sampled By		CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM
Total or Dissolved Metals		Dissolved	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Constituent of Interest		Note	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)
Volatile Organic Constituents										
Acrylonitrile	c, v	---	---	---	---	---	---	---	---	---
Benzene	c, v	---	---	---	---	---	---	---	---	---
Bromodichloromethane	c, v	---	---	---	---	---	---	---	---	---
Bromoform	c, v	---	---	---	---	---	---	---	---	---
Bromomethane	nc, v	---	---	---	---	---	---	---	---	---
Carbon tetrachloride	c, v	---	---	---	---	---	---	---	---	---
Chlorobenzene	nc, v	---	---	---	---	---	---	---	---	---
Chlorodibromomethane (dibromochloromethane)	c, v	---	---	---	---	---	---	---	---	---
Chloroethane (ethyl chloride)	nc, v	---	---	---	---	---	---	---	---	---
Chloroform	c, v	---	---	---	---	---	---	---	---	---
Chloromethane	nc, v	---	---	---	---	---	---	---	---	---
1,2-Dichlorobenzene	nc, v	---	---	---	---	---	---	---	---	---
1,4-Dichlorobenzene	c, v	---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	c, v	---	---	---	---	---	---	---	---	---
1,1-Dichloroethene	nc, v	---	---	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	nc, v	---	---	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	nc, v	---	---	---	---	---	---	---	---	---
Dichloromethane	c, v	---	---	---	---	---	---	---	---	---
EDB (1,2-dibromoethane)	c, v	---	---	---	---	---	---	---	---	---
EDC (1,2-dichloroethane)	c, v	---	---	---	---	---	---	---	---	---
Ethylbenzene	c, v	---	---	---	---	---	---	---	---	---
MTBE (methyl t-butyl ether)	c, v	---	---	---	---	---	---	---	---	---
Naphthalene	c, v	---	---	---	---	---	---	---	---	---
iso-Propylbenzene (cumene)	nc, v	---	---	---	---	---	---	---	---	---
Tetrachloroethene (PCE)	c, v	---	---	---	---	---	---	---	---	---
Toluene	nc, v	---	---	---	---	---	---	---	---	---
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	nc, v	---	---	---	---	---	---	---	---	---
1,1,1-Trichloroethane	nc, v	---	---	---	---	---	---	---	---	---
1,1,2-Trichloroethane	c, v	---	---	---	---	---	---	---	---	---
Trichloroethene	NA, v	---	---	---	---	---	---	---	---	---
Trichlorofluoromethane (Freon 11)	nc, v	---	---	---	---	---	---	---	---	---
2,4,6-Trichlorophenol	c, nv	---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	nc, v	---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	nc, v	---	---	---	---	---	---	---	---	---
Vinyl chloride	c, v	---	---	---	---	---	---	---	---	---
Xylenes	nc, v	---	---	---	---	---	---	---	---	---
Pesticides										
Hexachlorobenzene	c, v	---	---	---	---	---	---	---	---	---
Metals										
Arsenic	c, nv	2.9	1.2	0.6	1.8	1.6	1.2	1.2	1.2	1.1
Cadmium	nc, nv	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	---	---	---	---	---	---
Chromium (III)	nc, nv	<0.5 (ND)	<0.1 (ND)	<0.5 (ND)	---	---	---	---	---	---
Copper	nc, nv	0.8	0.6	<0.5 (ND)	---	---	---	---	---	---
Lead	NA, nv	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	---	---	---	---	---	---
Manganese	nc, nv	9750	2840	422	264	250	397	405	379	408
Mercury	nc, nv	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	---	---	---	---	---	---
Nickel	c, nv	90	94	1.8	<10 (ND)	<10 (ND)	90	90	80	90
Semivolatile Organic Constituents										
3,3-Dichlorobenzidine	c, nv	---	---	---	---	---	---	---	---	---
Pentachlorophenol	c, nv	---	---	---	---	---	---	---	---	---
Polychlorinated biphenyls (Total PCBs)	c, v	---	---	---	---	---	<0.01 (ND)	---	<0.01 (ND)	---
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	nc, v	---	---	---	---	---	---	---	---	---
Anthracene	nc, v	---	---	---	---	---	---	---	---	---
Benz[a]anthracene	c, v	---	---	---	---	---	---	---	---	---
Benzo[a]pyrene (BaP equivalents)	c, nv	---	---	---	---	---	---	---	---	---
Benzo[b]fluoranthene	c, nv	---	---	---	---	---	---	---	---	---
Benzo[k]fluoranthene	c, nv	---	---	---	---	---	---	---	---	---
Chrysene	c, nv	---	---	---	---	---	---	---	---	---
Dibenz[a,h]anthracene	c, nv	---	---	---	---	---	---	---	---	---
Fluoranthene	nc, nv	---	---	---	---	---	---	---	---	---
Fluorene	nc, v	---	---	---	---	---	---	---	---	---
Indeno[1,2,3-cd]pyrene	c, nv	---	---	---	---	---	---	---	---	---
Pyrene	nc, v	---	---	---	---	---	---	---	---	---
Styrene	nc, v	---	---	---	---	---	---	---	---	---
2,3,7,8-TCDD (dioxin) equivalents	c, v	---	---	---	---	---	3.80E-07	---	3.80E-07	---
Total Petroleum Hydrocarbons										
Generic Gasoline (GRO)	nc, v	---	---	---	---	---	---	---	---	---
Generic Diesel / Heating Oil (DRO)	nc, v	---	---	---	---	---	<100 (ND)	---	<100 (ND)	---
Generic Mineral Insulating Oil (RRO)	nc, nv	---	---	---	---	---	<200 (ND)	---	<200 (ND)	---

Notes:
ug/L = micrograms per Liter or parts per billion (ppb).
<# (ND) = not detected at or above the laboratory method reporting limit shown.
NE = not established.
NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

¹ Lowest Risk-Based Concentration for ground water (screening level assumes residential use, from ODEQ RBCs dated May 2018).

— = not analyzed or not applicable.
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
RRO = residual-range organics.
BKG = constituent exceeded its SLRBC; however, was not detected above default background concentrations in soil
Bolded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for ground water (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

Table 3 - Summary of Analytical Data, Ground Water and Surface Water

Location ID		BH-3 (Monitoring Well)		BH-4 (Monitoring Well)		BH-5 (Monitoring Well)		ASB-1	Wetlands-1	Wetlands-2	Wetlands-3
Sample ID		BH-3	BH-3	BH-4	BH-4	BH-5	BH-5	ASB-1	W-1	W-2	W-3
Date Sampled		3/26/13	3/26/13	3/26/13	3/26/13	3/26/13	3/26/13	3/25/13	3/25/13	3/25/13	3/25/13
Sampled By		CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM	CDM
Total or Dissolved Metals		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Total	Total	Total
Constituent of Interest		Note	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)
Volatile Organic Constituents											
Acrylonitrile	C, V		---	---	---	---	---	---	---	---	---
Benzene	C, V		---	---	---	---	---	---	---	---	---
Bromodichloromethane	C, V		---	---	---	---	---	---	---	---	---
Bromoform	C, V		---	---	---	---	---	---	---	---	---
Bromomethane	nc, V		---	---	---	---	---	---	---	---	---
Carbon tetrachloride	C, V		---	---	---	---	---	---	---	---	---
Chlorobenzene	nc, V		---	---	---	---	---	---	---	---	---
Chlorodibromomethane (dibromochloromethane)	C, V		---	---	---	---	---	---	---	---	---
Chloroethane (ethyl chloride)	nc, V		---	---	---	---	---	---	---	---	---
Chloroform	C, V		---	---	---	---	---	---	---	---	---
Chloromethane	nc, V		---	---	---	---	---	---	---	---	---
1,2-Dichlorobenzene	nc, V		---	---	---	---	---	---	---	---	---
1,4-Dichlorobenzene	C, V		---	---	---	---	---	---	---	---	---
1,1-Dichloroethane	C, V		---	---	---	---	---	---	---	---	---
1,1-Dichloroethene	nc, V		---	---	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	nc, V		---	---	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	nc, V		---	---	---	---	---	---	---	---	---
Dichloromethane	C, V		---	---	---	---	---	---	---	---	---
EDB (1,2-dibromoethane)	C, V		---	---	---	---	---	---	---	---	---
EDC (1,2-dichloroethane)	C, V		---	---	---	---	---	---	---	---	---
Ethylbenzene	C, V		---	---	---	---	---	---	---	---	---
MTBE (methyl t-butyl ether)	C, V		---	---	---	---	---	---	---	---	---
Naphthalene	C, V		---	---	---	---	---	---	---	---	---
iso-Propylbenzene (cumene)	nc, V		---	---	---	---	---	---	---	---	---
Tetrachloroethene (PCE)	C, V		---	---	---	---	---	---	---	---	---
Toluene	nc, V		---	---	---	---	---	---	---	---	---
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	nc, V		---	---	---	---	---	---	---	---	---
1,1,1-Trichloroethane	nc, V		---	---	---	---	---	---	---	---	---
1,1,2-Trichloroethane	C, V		---	---	---	---	---	---	---	---	---
Trichloroethene	NA, V		---	---	---	---	---	---	---	---	---
Trichlorofluoromethane (Freon 11)	nc, V		---	---	---	---	---	---	---	---	---
2,4,6-Trichlorophenol	C, nv		---	---	---	---	---	---	---	---	---
1,2,4-Trimethylbenzene	nc, V		---	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	nc, V		---	---	---	---	---	---	---	---	---
Vinyl chloride	C, V		---	---	---	---	---	---	---	---	---
Xylenes	nc, V		---	---	---	---	---	---	---	---	---
Pesticides											
Hexachlorobenzene	C, V		---	---	---	---	---	---	---	---	---
Metals											
Arsenic	C, nv		1.5	1.2	16	15.8	0.5	0.6	0.7	0.6	0.8
Cadmium	nc, nv		---	---	---	---	---	---	---	---	---
Chromium (III)	nc, nv		---	---	---	---	---	---	---	---	---
Copper	nc, nv		---	---	---	---	---	---	---	---	---
Lead	NA, nv		---	---	---	---	---	---	---	---	---
Manganese	nc, nv		1160	1110	5200	5320	1020	820	65	129	41
Mercury	nc, nv		---	---	---	---	---	---	---	---	---
Nickel	C, nv		20	10	160	160	40	60	20	<10 (ND)	<10 (ND)
Semivolatile Organic Constituents											
3,3-Dichlorobenzidine	C, nv		---	---	---	---	---	---	---	---	---
Pentachlorophenol	C, nv		---	---	---	---	---	---	---	---	---
Polychlorinated biphenyls (Total PCBs)	C, V		<0.01 (ND)	---	<0.01 (ND)	---	---	---	<0.01 (ND)	<0.01 (ND)	---
Polycyclic Aromatic Hydrocarbons											
Acenaphthene	nc, V		---	---	---	---	---	---	---	---	---
Anthracene	nc, V		---	---	---	---	---	---	---	---	---
Benz[a]anthracene	C, V		---	---	---	---	---	---	---	---	---
Benzo[a]pyrene (BaP equivalents)	C, nv		---	---	---	---	---	---	---	---	---
Benzo[b]fluoranthene	C, nv		---	---	---	---	---	---	---	---	---
Benzo[k]fluoranthene	C, nv		---	---	---	---	---	---	---	---	---
Chrysene	C, nv		---	---	---	---	---	---	---	---	---
Dibenz[a,h]anthracene	C, nv		---	---	---	---	---	---	---	---	---
Fluoranthene	nc, nv		---	---	---	---	---	---	---	---	---
Fluorene	nc, V		---	---	---	---	---	---	---	---	---
Indeno[1,2,3-cd]pyrene	C, nv		---	---	---	---	---	---	---	---	---
Pyrene	nc, V		---	---	---	---	---	---	---	---	---
Styrene	nc, V		---	---	---	---	---	---	---	---	---
2,3,7,8-TCDD (dioxin) equivalents	C, V		3.80E-07	---	3.80E-07	---	---	---	6.15E-06	2.21E-06	---
Total Petroleum Hydrocarbons											
Generic Gasoline (GRO)	nc, V		---	---	---	---	---	---	---	---	---
Generic Diesel / Heating Oil (DRO)	nc, V		<120 (ND)	---	650	---	---	---	320	<100 (ND)	---
Generic Mineral Insulating Oil (RRO)	nc, nv		<240 (ND)	---	1100	---	---	---	390	<200 (ND)	---

Notes:
ug/L = micrograms per Liter or parts per billion (ppb).
<# (ND) = not detected at or above the laboratory method reporting limit shown.
NE = not established.
NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

¹ Lowest Risk-Based Concentration for ground water (screening level assumes residential use, from ODEQ RBCs dated May 2018).

— = not analyzed or not applicable.
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
RRO = residual-range organics.
BKG = constituent exceeded its SLRBC; however, was not detected above default background concentrations in soil
Bolded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for ground water (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

Table 3 - Summary of Analytical Data, Ground Water and Surface Water

Location ID		Maximum Ground Water Concentration (for metals, only dissolved data data was used)	Maximum ABS Water Concentration	Maximum Surface Water Concentration	ODEQs Screening-level Risk-Based Concentrations (SLRBCs) ¹	Background Concentrations (metals)	COPC (Ground Water)	COPC (ABS Water)	COPC (Surface Water)
Sample ID									
Date Sampled									
Sampled By									
Total or Dissolved Metals							TRUE OR Y FALSE OR N		
Constituent of Interest		Note	µg/L (ppb)						
Volatile Organic Constituents									
Acrylonitrile	c, v	<5 (ND)	---	---	0.052	NE	(Y)	---	---
Benzene	c, v	<0.2 (ND)	---	---	0.46	NE	N	---	---
Bromodichloromethane	c, v	<1 (ND)	---	---	0.13	NE	(Y)	---	---
Bromoform	c, v	<1 (ND)	---	---	3.3	NE	N	---	---
Bromomethane	nc, v	<1 (ND)	---	---	7.5	NE	N	---	---
Carbon tetrachloride	c, v	<1 (ND)	---	---	0.46	NE	(Y)	---	---
Chlorobenzene	nc, v	<1 (ND)	---	---	77	NE	N	---	---
Chlorodibromomethane (dibromochloromethane)	c, v	<1 (ND)	---	---	0.17	NE	(Y)	---	---
Chloroethane (ethyl chloride)	nc, v	<1 (ND)	---	---	21000	NE	N	---	---
Chloroform	c, v	<1 (ND)	---	---	0.22	NE	(Y)	---	---
Chloromethane	nc, v	<1 (ND)	---	---	190	NE	N	---	---
1,2-Dichlorobenzene	nc, v	<1.04 (ND)	---	---	300	NE	N	---	---
1,4-Dichlorobenzene	c, v	<1.04 (ND)	---	---	0.48	NE	(Y)	---	---
1,1-Dichloroethane	c, v	<1 (ND)	---	---	2.8	NE	N	---	---
1,1-Dichloroethene	nc, v	<1 (ND)	---	---	280	NE	N	---	---
cis-1,2-Dichloroethene	nc, v	<1 (ND)	---	---	36	NE	N	---	---
trans-1,2-Dichloroethene	nc, v	<1 (ND)	---	---	360	NE	N	---	---
Dichloromethane	c, v	<20 (ND)	---	---	11	NE	(Y)	---	---
EDB (1,2-dibromoethane)	c, v	<1 (ND)	---	---	0.0075	NE	(Y)	---	---
EDC (1,2-dichloroethane)	c, v	<1 (ND)	---	---	0.17	NE	(Y)	---	---
Ethylbenzene	c, v	<1 (ND)	---	---	1.5	NE	N	---	---
MTBE (methyl t-butyl ether)	c, v	<1 (ND)	---	---	14	NE	N	---	---
Naphthalene	c, v	0.5	---	---	0.17	NE	(Y)	---	---
iso-Propylbenzene (cumene)	nc, v	<1 (ND)	---	---	440	NE	N	---	---
Tetrachloroethene (PCE)	c, v	<1 (ND)	---	---	12	NE	N	---	---
Toluene	nc, v	<1 (ND)	---	---	1100	NE	N	---	---
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	nc, v	<0.2 (ND)	---	---	55000	NE	N	---	---
1,1,1-Trichloroethane	nc, v	<1 (ND)	---	---	8000	NE	N	---	---
1,1,2-Trichloroethane	c, v	<1 (ND)	---	---	0.28	NE	(Y)	---	---
Trichloroethene	NA, v	<1 (ND)	---	---	0.49	NE	(Y)	---	---
Trichlorofluoromethane (Freon 11)	nc, v	<1 (ND)	---	---	1100	NE	N	---	---
2,4,6-Trichlorophenol	c, nv	<5.21 (ND)	---	---	4.4	NE	(Y)	---	---
1,2,4-Trimethylbenzene	nc, v	<1 (ND)	---	---	54	NE	N	---	---
1,3,5-Trimethylbenzene	nc, v	<1 (ND)	---	---	59	NE	N	---	---
Vinyl chloride	c, v	<1 (ND)	---	---	0.027	NE	(Y)	---	---
Xylenes	nc, v	<1 (ND)	---	---	190	NE	N	---	---
Pesticides									
Hexachlorobenzene	c, v	<1.04 (ND)	---	---	0.0098	NE	(Y)	---	---
Metals									
Arsenic	c, nv	15.8	0.7	0.8	0.052	2	Y	BKG	BKG
Cadmium	nc, nv	<0.1 (ND)	---	---	20	1	N	---	---
Chromium (III)	nc, nv	<0.5 (ND)	---	---	30000	1	N	---	---
Copper	nc, nv	0.8	---	---	800	9	N	---	---
Lead	NA, nv	<0.1 (ND)	---	---	15	13.3	N	---	---
Manganese	nc, nv	9750	65	179	480	NE	Y	N	N
Mercury	nc, nv	<0.1 (ND)	---	---	6	0.1	N	---	---
Nickel	c, nv	160	20	10	400	5.5	N	N	N
Semivolatile Organic Constituents									
3,3-Dichlorobenzidine	c, nv	<5.21 (ND)	---	---	0.17	NE	(Y)	---	---
Pentachlorophenol	c, nv	<5.21 (ND)	---	---	0.044	NE	(Y)	---	---
Polychlorinated biphenyls (Total PCBs)	c, v	<0.01 (ND)	<0.01 (ND)	<0.01 (ND)	0.006	NE	(Y)	(Y)	(Y)
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	nc, v	<0.05 (ND)	---	---	510	NE	N	---	---
Anthracene	nc, v	<0.05 (ND)	---	---	>S	NE	N	---	---
Benz[a]anthracene	c, v	<0.05 (ND)	---	---	0.03	NE	(Y)	---	---
Benzo[a]pyrene (BaP equivalents)	c, nv	0.06	---	---	0.025	NE	(Y)	---	---
Benzo[b]fluoranthene	c, nv	0.06	---	---	0.25	NE	N	---	---
Benzo[k]fluoranthene	c, nv	<0.05 (ND)	---	---	2.5	NE	N	---	---
Chrysene	c, nv	<0.05 (ND)	---	---	25	NE	N	---	---
Dibenz[a,h]anthracene	c, nv	0.06	---	---	0.025	NE	(Y)	---	---
Fluoranthene	nc, nv	0.06	---	---	800	NE	N	---	---
Fluorene	nc, v	<0.05 (ND)	---	---	280	NE	N	---	---
Indeno[1,2,3-cd]pyrene	c, nv	<0.05 (ND)	---	---	0.25	NE	N	---	---
Pyrene	nc, v	0.06	---	---	110	NE	N	---	---
Styrene	nc, v	<1 (ND)	---	---	1200	NE	---	---	---
2,3,7,8-TCDD (dioxin) equivalents	c, v	<3.8E-07 (ND)	6.15E-06	2.21E-06	9.12E-08	NE	(Y)	Y	Y
Total Petroleum Hydrocarbons									
Generic Gasoline (GRO)	nc, v	<250 (NP)	---	---	110	NE	(Y)	---	---
Generic Diesel / Heating Oil (DRO)	nc, v	650	320	<100 (ND)	100	NE	Y	Y	N
Generic Mineral Insulating Oil (RRO)	nc, nv	1100	390	<200 (ND)	300	NE	(mineral oil)	(mineral oil)	N

Notes:
ug/L = micrograms per Liter or parts per billion (ppb).
<# (ND) = not detected at or above the laboratory method reporting limit shown.
NE = not established.
NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

¹ Lowest Risk-Based Concentration for ground water (screening level assumes residential use, from ODEQ RBCs dated May 2018).

— = not analyzed or not applicable.
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
RRO = residual-range organics.
BKG = constituent exceeded its SLRBC; however, was not detected above default background concentrations in soil
Bolded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

¹ Lowest Risk-Based Concentration for ground water (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

Table 4. Further Evaluation of COPCs in Surface Soil

Contaminated Medium				SOIL mg/Kg (ppm)																Maximum Detected Concentration	Lowest Applicable RBC (Soil)	Constituent of Concern (COC)?
Exposure Pathway				Soil Ingestion, Dermal Contact, and Inhalation								Volatilization to Outdoor Air				Vapor Intrusion into Buildings						
				RBC _{ss}								RBC _{so}				RBC _{si}						
Receptor Scenario				Residential		Occupational		Construction Worker		Excavation Worker		Residential		Occupational		Residential		Occupational				
Direct or Indirect Pathway (see notes)				DC		DC		DC		DC		IVS		IVS		IVS		IVS				
Contaminant of Concern			Note		Note		Note		Note		Note		Note		Note		Note		Note	mg/Kg (ppm)	mg/Kg (ppm)	Y/N
Semivolatile Organic Constituents																						
2,3,7,8-TCDD (dioxin) equivalents			c, v	4.7441E-06		0.000016		0.00017		0.0048		0.01		0.13	>Csat	0.01		0.13	>Csat	0.0000905	4.74411E-06	Y

Notes:
mg/Kg = milligrams per Kilogram or parts per million (ppm).
c = carcinogenic
v = volatile
>Csat = This soil RBC exceeds the limit of three-phase equilibrium partitioning.
>Max = The constituent RBC for this pathway is greater than 100,000 mg/kg. The Department believes it is highly unlikely that such concentrations will ever be encountered.

Table 5. Further Evaluation of COPCs in ASB Sludge

Contaminated Medium		ASB SLUDGE mg/Kg (ppm)																Maximum Detected Concentration	Lowest Applicable RBC (ASB Sludge)	Constituent of Concern (COC)?
Exposure Pathway		Soil Ingestion, Dermal Contact, and Inhalation								Volatilization to Outdoor Air				Vapor Intrusion into Buildings						
		RBC _{ss}				RBC _{so}				RBC _{si}										
Receptor Scenario		Residential		Occupational		Construction Worker		Excavation Worker		Residential		Occupational		Residential		Occupational				
Direct or Indirect Pathway (see notes)		DC		DC		DC		DC		IVS		IVS		IVS		IVS				
Contaminant of Concern	Note		Note		Note		Note		Note		Note		Note		Note		Note	mg/Kg (ppm)	mg/Kg (ppm)	Y/N
Semivolatile Organic Constituents																				
Polychlorinated biphenyls (Total PCBs)	c, v	0.23		0.59		4.9	>Csat	140	>Csat	130	>Csat	1600	>Csat	130	>Csat	1600	>Csat	0.48	0.23	Y
2,3,7,8-TCDD (dioxin) equivalents	c, v	4.74411E-06		0.000016		0.00017		0.0048		0.01		0.13	>Csat	0.01		0.13	>Csat	0.0000905	4.74411E-06	Y
Total Petroleum Hydrocarbons																				
Generic Gasoline (GRO)	nc, v	1200		20000		9700		-	>Max	5900		69000		94		-	>Max	320 J	94	Y
Generic Diesel / Heating Oil (DRO)	nc, v	1100		14000		4600		-	>Max	-	>Max	-	>Max	-	>Max	-	>Max	18000	1100	Y

Notes:

— = not analyzed or not applicable.

mg/Kg = milligrams per Kilogram or parts per million (ppm).

c = carcinogenic

nc = noncarcinogenic

v = volatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

J = indicates the internal standard associated with the analyte is out of control limits; the reported concentration is an estimate.

>Csat = This soil RBC exceeds the limit of three-phase equilibrium partitioning.

>Max = The constituent RBC for this pathway is greater than 100,000 mg/kg. The Department believes it is highly unlikely that such concentrations will ever be encountered.

Table 6. Further Evaluation of COPCs, Ground Water

Contaminated Medium			GROUND WATER µg/L (ppb)										Maximum Detected Concentration	Lowest Applicable RBC (Ground Water) ¹	Constituent of Concern (COC)?
Exposure Pathway			Volatilization to Outdoor Air RBC _{wo}				Vapor Intrusion into Buildings RBC _{wi}				GW in Excavation RBC _{we}				
Receptor Scenario			Residential		Occupational		Residential		Occupational		Construction & Excavation Worker				
Direct or Indirect Pathway (see notes)			IVW		IVW		IVW		IVW		DS				
Contaminant of Concern		Note		Note		Note		Note		Note		Note	µg/L (ppb)	µg/L (ppb)	Y/N
Metals															
Arsenic		c, nv	-	NV	-	NV	-	NV	-	NV	6300		15.8	6,300	N
Copper		nc, nv	-	NV	-	NV	-	NV	-	NV	5400000		0.8	5,400,000	N
Lead		NA, nv	-	NV	-	NV	-	NV	-	NV	-	>S	0.1	-	N
Manganese		nc, nv	-	NV	-	NV	-	NV	-	NV	3200000		9750	3,200,000	N
Nickel		c, nv	-	NV	-	NV	-	NV	-	NV	1.3E+07	>S	160	13,446,802	N
Semivolatile Organic Constituents															
Polycyclic Aromatic Hydrocarbons															
Benzo[a]pyrene (BaP equivalents)		c, nv	-	NV	-	NV	-	NV	-	NV	-	>S	0.06	-	N
Dibenz[a,h]anthracene		c, nv	-	NV	-	NV	-	NV	-	NV	-	>S	0.06	-	N
Total Petroleum Hydrocarbons															
Generic Diesel / Heating Oil (DRO)		nc, v	-	>S	-	>S	-	>S	-	>S	-	>S	650	-	N

Notes:

— = not analyzed or not applicable.

ug/L = micrograms per Liter or parts per billion (ppb).

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

DRO = diesel-range organics.

¹ Lowest Risk-Based Concentration for groundwater (screening

>S = This groundwater RBC exceeds the solubility limit.

Table 7. Further Evaluation of COPCs, ASB Water

Contaminated Medium				ASB WATER µg/L (ppb)														Maximum Detected Concentration	Lowest Applicable RBC (ASB Water) ¹	Constituent of Concern (COC)?		
Exposure Pathway		Ingestion & Inhalation from Tapwater / Direct Contact RBC _{tw}				Volatilization to Outdoor Air RBC _{wo}				Vapor Intrusion into Buildings RBC _{wi}				Water in Excavation RBC _{we}		Ingestion & Inhalation from Recreational Use / Direct Contact RBC _{rw}						
Receptor Scenario		Residential		Occupational		Residential		Occupational		Residential		Occupational		Construction & Excavation Worker		Residential						
Direct or Indirect Pathway (see notes)		DS		DS		IVW		IVW		IVW		IVW		DS		DS						
Contaminant of Concern		Note		Note		Note		Note		Note		Note		Note		Note		Note	µg/L (ppb)	µg/L (ppb)	Y/N	
Semivolatile Organic Constituents																						
2,3,7,8-TCDD (dioxin) equivalents		c, v	9.12E-08		4.21E-07		0.022		0.11		0.0083		0.11		0.00045		9.9E-06		6.15E-06	9.9E-06	N	
Total Petroleum Hydrocarbons																						
Generic Diesel / Heating Oil (DRO)		nc, v	100		430		-	>S	-	>S	-	>S	-	>S	-	>S	450		320	>S	N	

Notes:
— = not analyzed or not applicable.
ug/L = micrograms per Liter or parts per billion (ppb).
c = carcinogenic
nc = noncarcinogenic
v = volatile
DRO = diesel-range organics.

Orange shaded cells indicate this exposure pathway was used as a surrogate for potential direct expsoure to a future resident and/or occupational worker as a future drinking water source, which it is not. Further evaluation assuming recreational exposure is considered a more applicable exposure pathway.

¹ Lowest Risk-Based Concentration for groundwater (screening
>S = This groundwater RBC exceeds the solubility limit.

Table 8. Further Evaluation of COPCs, Wetland Surface Water

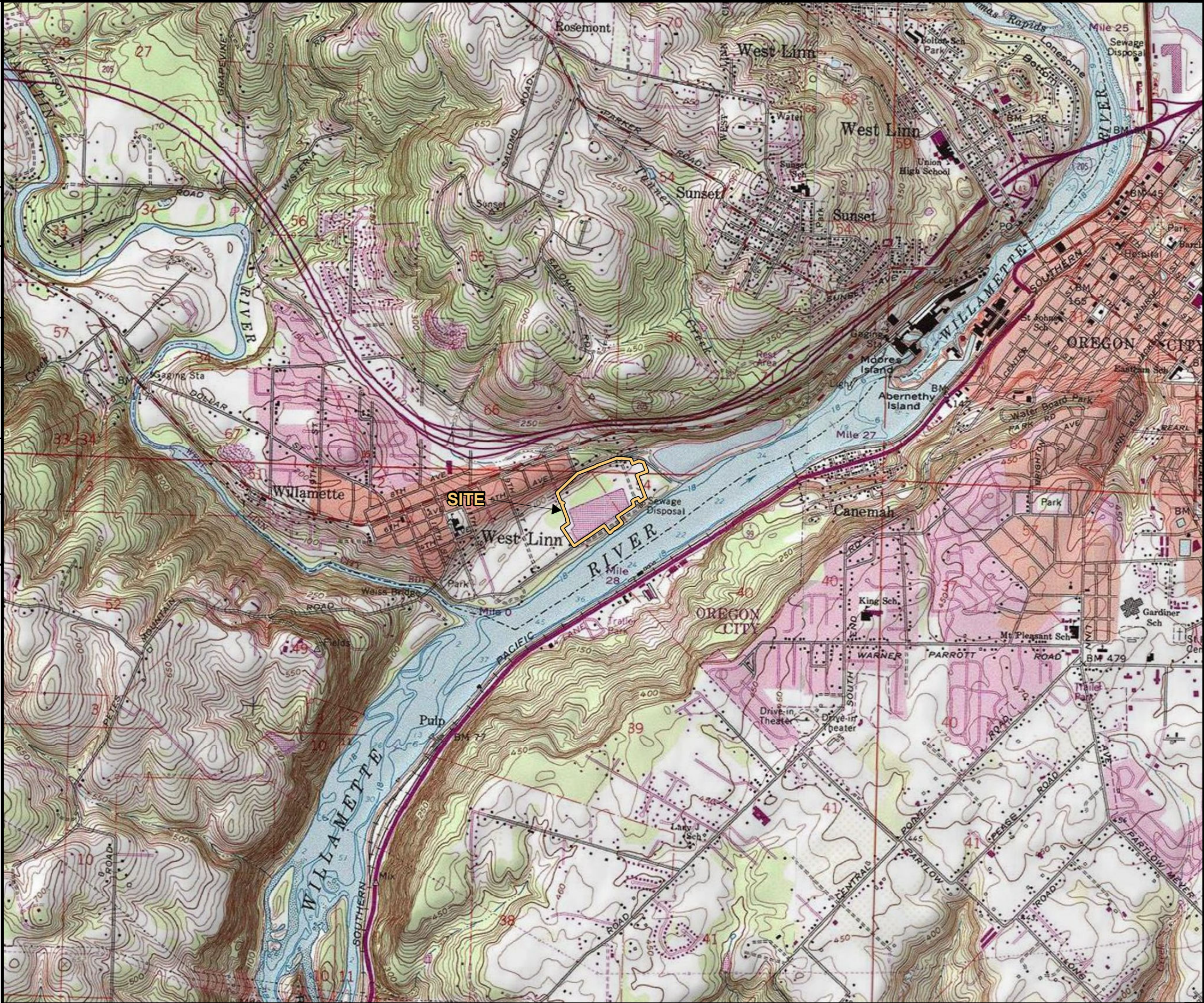
Contaminated Medium				WETLANDS SURFACE WATER µg/L (ppb)														Maximum Detected Concentration	Lowest Applicable RBC (Wetland Surface Water) ¹	Constituent of Concern (COC)?				
Exposure Pathway				Ingestion & Inhalation from Tapwater, Direct Contact RBC _{tw}				Volatilization to Outdoor Air RBC _{wo}				Vapor Intrusion into Buildings RBC _{wi}				Surface Water in Excavation RBC _{we}					Ingestion & Inhalation from Recreational Use / Direct Contact RBC _{rw}			
Receptor Scenario				Residential		Occupational		Residential		Occupational		Residential		Occupational		Construction & Excavation Worker					Residential			
Direct or Indirect Pathway (see notes)				DS		DS		IVW		IVW		IVW		IVW		DS					DS			
Contaminant of Concern		Note			Note		Note		Note		Note		Note		Note		Note	µg/L (ppb)	µg/L (ppb)	Y/N				
Semivolatile Organic Constituents																								
2,3,7,8-TCDD (dioxin) equivalents		c, v		9.12E-08		4.21E-07		0.022		0.11		0.0083		0.11		0.00045		9.9E-06		2.21E-06	9.9E-06	N		

Notes:
— = not analyzed or not applicable.
ug/L = micrograms per Liter or parts per billion (ppb).
c = carcinogenic
v = volatile

Orange shaded cells indicate this exposure pathway was used as a surrogate for potential direct expsoure to a future resident and/or occupational worker as a future drinking water source, which it is not. Further evaluation assuming recreational exposure is considered a more applicable exposure pathway.

¹ Lowest Risk-Based Concentration for groundwater (screening
>S = This groundwater RBC exceeds the solubility limit.

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
H. ROMER	T. BENNETT	L. GREEN	927-2005(V01)
2/1/2024	2/1/2024	2/1/2024	



LEGEND:

 SUBJECT PROPERTY BOUNDARY

NOTES:

1. BASE MAP DEVELOPED BY USGS, 1:24000, 2013

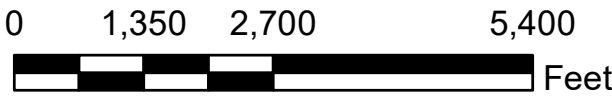


FIGURE 1

SITE VICINITY MAP

FORMER BLUE HERON PAPER MILL
1317 WILLAMETTE FALLS DRIVE
WEST LINN, OREGON

DRAWN BY		CHECKED BY	APPROVED BY	DRAWING NUMBER 927-2005(V01)
H. ROMER		T. BENNETT	L. GREEN	



LEGEND:

SUBJECT PROPERTY BOUNDARY

LOCALITY OF FACILITY

DELINEATED WETLAND (TURNSTONE, 2021)

SUBJECT BUILDING

DIFFUSER

EFFLUENT PIPE

OUTFALL

NOTES:

- BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2023 AND ENW FIELD NOTES.
- ALL BUILDING, STREET, AND FEATURE LOCATIONS ARE APPROXIMATE.
- SYMBOLS REPRESENT LOCATION AND DO NOT ALWAYS REPRESENT EXACT SHAPE, SIZE, OR ORIENTATION

0120240480

Feet



FIGURE 2

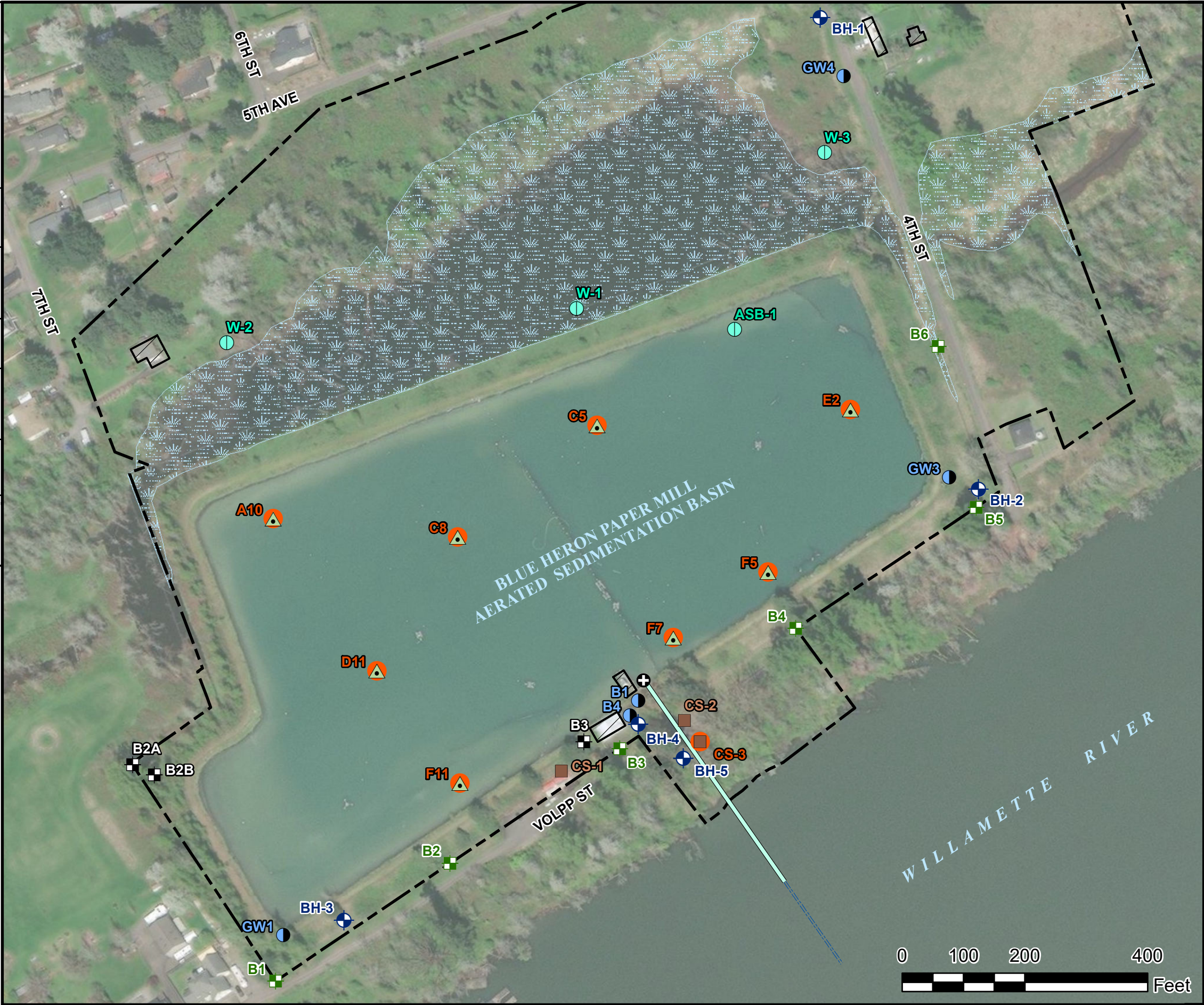
SITE PLAN

FORMER BLUE HERON PAPER MILL

1317 WILLAMETTE FALLS DRIVE

WEST LINN, OREGON

DRAWN BY H. ROMER	2/1/2024	CHECKED BY T. BENNETT	2/1/2024	APPROVED BY L. GREEN	2/1/2024	DRAWING NUMBER 927-2005(V01)



LEGEND:

SUBJECT PROPERTY BOUNDARY

DELINEATED WETLAND (TURNSTONE, 2021)

SUBJECT BUILDING

DIFFUSER

EFFLUENT PIPE

OUTFALL

SOIL BORING LOCATION, 2013 ⁴

SLUDGE SAMPLING LOCATION ⁴

GROUNDWATER SAMPLE LOCATION ⁴

MONITORING WELL LOCATION ⁵

SURFACE WATER SAMPLE LOCATION ⁵

COMPOSITE SURFACE SOIL SAMPLE COCATION ⁵

SOIL BORING LOCATION, 2008 ⁶

DETECTED CONCENTRATION EXCEEDS APPLICABLE ODEQ RBCS

- NOTES:**
 - BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2023 AND ENW FIELD NOTES.
 - ALL BUILDING, STREET, AND FEATURE LOCATIONS ARE APPROXIMATE.
 - SYMBOLS REPRESENT LOCATION AND DO NOT ALWAYS REPRESENT EXACT SHAPE, SIZE, OR ORIENTATION.
 - PER CDM SMITH, PHASE II ESA SAMPLE LOCATIONS (2012).
 - PER CDM SMITH, MONITORING WELL AND SAMPLE LOCATIONS (2013).
 - PER MAUL FOSTER ALONGI INC. (2008).
 - RBCs = RISK-BASED CONCENTRATIONS



FIGURE 3

SAMPLE LOCATION DIAGRAM AND EXTENT OF IMPACTS

FORMER BLUE HERON PAPER MILL
1317 WILLAMETTE FALLS DRIVE
WEST LINN, OREGON

