STAFF REPORT

RECOMMENDED REVISION OF THE REMEDIAL ACTION

For

Union Pacific Railroad Rail Yard Site

ECSI #1146

ASHLAND, OREGON

Prepared By:

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

Western Region Office

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1. INTRODUCTION

1.1 INTRODUCTION

This document presents recommended revisions to the remedial action for the Union Pacific Railroad Company (UPRR) former rail yard site located at 536 A Street in Ashland, Oregon (Site). UPRR has been working voluntarily with the Oregon Department of Environmental Quality (DEQ) to investigate and clean up the Site since the early 1990s. In 2001 UPRR proposed, and after significant public engagement DEQ approved, a cleanup plan and issued a Record of Decision (ROD) to address contamination on parts of the rail yard. The 2001 ROD was not implemented because of a change (increase) in the regulatory cleanup limits, which meant not as much contamination would need to be cleaned up. UPRR has now proposed a new cleanup plan to address the contamination at the Site. DEQ has reviewed the new plan and agrees it meets state regulatory criteria considering future uses of the Site. The most significant change in this proposed remedial action approach is that contaminated soil will be consolidated and capped on a portion of the Site instead of being hauled away to a landfill.

This recommendation was informed primarily by the 2021 Supplemental Remedial Investigation/Feasibility Study Report (RI/FS) (Jacobs; 2021), and draws heavily, and often verbatim, from the results of more recent investigations, conducted after the 2001 ROD, described in the administrative record included in Section 9. UPRR proposes to continue with the revised remedial action described herein under Voluntary Cleanup Agreement No. ECVC-SWR-93-02, dated March 30, 1993, between Southern Pacific Railroad and DEQ. UPRR became responsible party for the Site in 1996 when Southern Pacific merged with UPRR on Sept. 11, 1996.

This Staff Report describes in detail the revised remedial action activities UPRR is proposing and why DEQ believes it will be protective of human health and the environment as required by Oregon cleanup laws. A public comment period will be held for this proposal and DEQ will consider all comments on this revised remedial action before issuing a new ROD for the Site.

1.2 SCOPE AND ROLE OF THE RECOMMENDED REMEDIAL ACTION

1.2.1 Property Description

The property covered under Voluntary Cleanup Agreement No. ECVC-SWR-93-02, dated March 30, 1993, between UPRR and DEQ included the original UPRR property, Parcel 3 in the City of Ashland, Jackson County, Oregon (Attachment 1). Parcel 3 was 21 acres. The City of Ashland eventually subdivided the area around and including the original UPRR property into multiple parcels. The UPRR-owned 21 acres was included in new parcels 2,3,4,5, 6 and 7 of City of Ashland Partition Plat P-32-2000 (Attachment 2).

On December 7, 2000, DEQ issued a No Further Action Letter for UPRR-owned portions of City of Ashland Partition Plat P-32-2000 Parcels 2, 3, 4 and 5. The Letter determined that, under the Oregon Environmental Cleanup Law, ORS 465.200 et. seq., no further action was required for the identified parcels unless new or previously undisclosed information that would change the finding becomes available. The property covered by the 2000 NFA included approximately 3.2 acres located along the western boundary of the original UPRR property. This finding did not include non UPRR-owned portions of Parcels 2, 3 and

4. On September 11, 2001, DEQ issued a No Further Action Letter for UPRR-owned Parcel 6 of City of Ashland Partition Plat P-32-2000.

The remaining Parcel 7 of the City of Ashland Partition Plat P-32-2000 of the original UPRR property consists of the western 11.7 acres and eastern 2.85 acres. This Staff Report and recommended modification of the remedial action is for the western 11.7 acres of Parcel 7 of the City of Ashland Partition Plat P-32-2000. Based on historical site use and past investigations, the main area of concern includes the Former Car Repair Shed Area and the Locomotive Maintenance and Service Area within the Site. The remaining 2.85 acres of uninvestigated UPRR property is discussed below.

1.2.2 Uninvestigated Areas

The eastern 2.85 acres of Parcel 7 (undeveloped property) of the City of Ashland Partition Plat P-32-2000 is currently used for agricultural purposes and is not believed to have been associated with railyard-related activities. The eastern 2.85 acres has not been thoroughly investigated based on historical site use and lack of recognized environmental conditions identified on the undeveloped property. This undeveloped property is not included as part of the recommended remedial action.

1.2.3 2001 Record of Decision

The 2001 ROD was prepared for the western 11.7 acres of Parcel 7 of the City of Ashland Partition Plat P-32-2000. This area was referred to as the Yard in the 2001 ROD. The Yard was the subject area of the ROD where industrial rail yard activities were conducted within the 21-acre original UPRR property.

The Yard operated as a locomotive maintenance, service, and railcar repair facility between 1887 and 1986. Facility operations resulted in environmental contamination at the Site. Based on the probable sources of contamination and the findings of Site investigations, the constituents of concern (COCs) at the Yard consisted of:

- Inorganic lead and arsenic in soil;
- Polynuclear aromatic hydrocarbon compounds (PAHs) in soil (associated with heavy fuels and treated wood used for railroad ties); and
- Longer carbon chain petroleum hydrocarbons, such as those associated with heavier fuels, in soil and limited areas of groundwater.

Remedial Action Objectives (RAOs) are media-specific goals for protecting human health and the environment, while providing the framework for developing and evaluating remedial action alternatives. The RAOs presented in the 2001 ROD included:

- Prevent human exposure (via ingestion or inhalation) to soil that exceeds the residential cleanup goals;
- Remove surface features associated with former rail yard operations;
- Prevent human exposure to the Bunker C/TPH impacts in the former landfill area; and
- Quantify TPH impacts in the surface water in Ponds A and B and remove and handle pond water appropriately.

The 2001 selected remedial action addressed potential human health risks associated with exposure to the contaminated soil and surface water. No long-term ecological risks were identified. The selected remedial action consisted of the following elements:

- Excavate soil containing contaminants above residential cleanup levels, and transport this soil off site for treatment and/or disposal
- Remove the oil/water separator, tank saddles, and contaminated soil near the separator and saddles:
- Abandon the oil collection culverts and recovery wells, free-product observation probes, piezometer, and monitoring wells;
- Backfill man-made Ponds A and B after water and sediments have been sampled and/or removed and disposed of, if necessary;
- Excavate contaminated impacted soil in the Bunker C area and dispose of the soil off site; and
- Remove ballast and residual petroleum associated with the former Drip Slab.

These actions were protective, effective, reliable, implementable, and cost-effective. The selected remedy was consistent with the future anticipated use of the Site as a mixed commercial/residential land use area.

1.2.4 Revised Remedial Action

The remedial action described in the 2001 ROD was not implemented due to public comment and a change in the regulatory limits. This updated recommendation for remedial action includes the Site, the same 11.7-acre area referred to as the Yard in the 2001 ROD, but also includes updated cleanup levels, consideration of public comments, and the results of additional investigations conducted since 2001. The Site COCs were updated in the Supplemental Remedial Investigation/Feasibility Study Risk Evaluation (Jacobs 2019). Current COCs include:

- Arsenic, lead, Benzo(a)pyrene (BaP), TPH as diesel (TPH-d), TPH as oil (TPH-o) in shallow soil (0 to 3 feet below ground surface); and
- Arsenic, TPH-d and TPH-o in groundwater.

Based on the extent of impacts under the current and anticipated future land use scenario (Section 3.3.4), the RAOs for the recommended remedial action have been revised as follows, with reference to the two exposure areas shaded in color on Figure 5 (west 8.7 acres and east 3 acres):

- Prevent human exposure via ingestion or inhalation to soil that exceeds the urban residential cleanup goals and background levels;
- Prevent human exposure to the contaminated soil and Bunker C/TPH impacts within the eastern 3 acres of the Site that would result in unacceptable risk; and
- Prevent human exposure to impacted groundwater on the Site that would result in unacceptable risk.

These RAOs are consistent with those presented in the 2001 ROD, however, were revised to reflect changes in anticipated future Site use from single-family residential to urban residential and to include the results of the revised risk assessment (Section 3.2.2), current DEQ guidance (DEQ 2010), and the various cleanup activities conducted since 2001 (Section 3.1.1). Achievement of the RAOs will determine the success of the remedial action and serve as the basis for potential DEQ letter(s) of No Further Action for both of the 8.7-acre western and 3-acre eastern areas.

As noted in Section 3.3.4, the urban residential scenario, not single-family residential scenario, is the appropriate residential exposure scenario for the property given the current and anticipated future zoning and land use. After completion of the remedial action, additional deed restriction(s) will be required and managed by DEQ for the western 8.7-acre and the eastern 3-acre portion of the Site. These deed restriction(s) will specify that approval from DEQ will be required before any portion of the land from either area can be subdivided or redeveloped in the future for a use other than urban residential and/or commercial.

The revised recommended remedial action addresses the presence of lead, arsenic, polycyclic aromatic hydrocarbons (PAHs), and petroleum hydrocarbons in soil and arsenic and petroleum hydrocarbons in groundwater at the Site. The recommended remedial action consists of the following elements:

- Any standing water present in Ponds A and B during the soil consolidation project will be managed appropriately in manner approved by DEQ;
- Excavate soil exceeding applicable cleanup goals for COCs (Table 1) from the western 8.7-acre area and backfill the excavated areas with clean fill;
- Consolidate excavated soil in the eastern 3-acre area;
- Install vegetated soil cap over the eastern 3-acre area; and
- Deed restriction for eastern 3-acre area that restricts contact with underlying soil and groundwater use and requires regular inspection and maintenance of the vegetated cap.

These actions are considered to be protective, effective, reliable, implementable and cost-effective. The selected remedy is consistent with the future anticipated use of the Site as a mixed commercial/urban residential land use area.

2. SITE HISTORY AND DESCRIPTION

2.1 SITE LOCATION AND LAND USE

The Site consists of approximately 11.7 acres of the former rail yard Site located at 536 A Street in the city of Ashland, Jackson County, Oregon. Ashland lies within the Bear Valley in southwestern Oregon at an elevation of approximately 2,000 feet above mean sea level. The legal description includes Parcel 7, Tax Lots 6200 and 6700 within Section 9, Township 39 South, Range 1 East of the Willamette Baseline and Meridian (Attachment 3). The Site is shown on Figure 1 as the Project Area, along with the surrounding area.

The Site is currently inactive and is being considered for sale and redevelopment for urban residential, industrial, or commercial land use. The adjacent properties to the west and north are currently under development for a mixture of residential, industrial, and commercial land use. Agricultural and residential properties border the Site to the east, and residential and commercial properties border the Site to the south. A current zoning map, including the Site and surrounding areas, is shown on Figure 2.

2.2 PHYSICAL SETTING

2.2.1 Climate

Ashland receives approximately 20 inches of precipitation annually. Most of the precipitation falls in the fall, winter, and spring, with up to about 3 inches per month being the highest, in December. Precipitation totals in summer and early fall are generally less than one inch per month. The average annual high and low temperatures are approximately 67 and 38°F, respectively.

2.2.2 Geology

The shallow geology beneath the Site has been divided into four units, each with a unique lithologic character. These units include a surface soil unit, a silt/clay unit, a discontinuous sand unit, and an underlying dense sandy silt unit. The surface soil is composed of either native sandy clay or imported fill and extends to depths of approximately 3 to 4 feet below ground surface (bgs). Underlaying the surface soil is a silt/clay unit, which extends to between approximately 20 and 25 ft bgs. A discontinuous sand unit has been encountered within the silt/clay unit. This discontinuous sand unit is typically saturated and encountered at depths between approximately 10 and 15 feet bgs and is generally 1 to 5 feet thick, although it appears to be thicker in the eastern section of the Site. Underlying the silt/clay and discontinuous sand units is a dense sandy silt unit, which is encountered at approximately 18 to 30 ft bgs. Only the top 1 to 2 feet of this unit were observed during the RI fieldwork. However, the log for a water well located approximately 200 feet south of the Site indicates that a gray siltstone was encountered from approximately 14 feet bgs to a total depth at 499 feet bgs. Granite bedrock was encountered at total depth.

2.2.3 Hydrogeology

The groundwater table beneath the Site ranges between about 8 and 12 feet bgs. The silt/clay unit discussed in Section 2.2.2 generally acts as a confining layer for water and NAPL across the Site. The discontinuous sand unit was observed to be fully saturated while the underlying dense sandy silt unit was observed to be dry. A localized perched groundwater zone was identified in the area of the former drip slab foundation. Groundwater flow beneath the Site is northeast under an average hydraulic gradient of 0.05 foot/foot.

2.2.4 Surface Water and Stormwater Features

One pond is present in the north-central portion of the Site. The pond consists of a topographic depression that occasionally collects surface water via precipitation. A drainage ditch originates at the southwestern corner of the Site and reportedly drains into the pond as depicted in Figure 3. There are currently no surface water drainage pathways offsite. Two former man-made wastewater retention ponds, Pond A and Pond B, are located north of the former drip slab foundation and oil-water separator. These former wastewater retention ponds are now typically dry but can accumulate some ponded water during periods of extended precipitation. No surface water drains from these bermed ponds onto other areas of the Site.

Several creeks and areas of surface water drainage originate in the upland foothills to the south and flow generally northward to Bear Creek, a tributary to the Rogue River. None of these creeks or drainages traverses the Site.

2.3 RAIL YARD OPERATIONS

The Site operated as a locomotive maintenance, service, and railcar repair facility between 1887 and 1986. Various structures (including a hotel/passenger station, a freight station, a car repair shed, a turntable, a roundhouse, and miscellaneous work and storage buildings) were once present. A steel 55,000-barrel (2.3-million-gallon) aboveground Bunker C oil tank used for fueling steam locomotives was installed at the Site in the early 1900s and removed in the late 1940s.

Development of the Site reached its peak in the early 1900s, with some additional construction performed during the 1920s. Light locomotive maintenance and car repair functions were performed by the Southern Pacific Transportation Company (SPTCo), UPRR's predecessor, from the 1900s until the early 1970s. Most locomotive maintenance and fueling facilities were decommissioned before 1960. Diesel and steam locomotive fueling operations were performed in the same location and, similar to car repair activities, were limited to a relatively small area of the Site. No railroad maintenance activities were performed west of the car repair shed or east of the drip slab. UPRR acquired SPTCo and many of its assets, including the former Ashland Yard, in 1997. Since the acquisition, UPRR has not operated or performed any railroad-related activities at the Site.

The only structures and features currently remaining on the Site are the former drip slab foundation, former car repair shed foundation, former roundhouse foundation, and retention Ponds A and B. An interior fence surrounds the former oil-water separator location and Ponds A and B. An outer chain-link fence surrounds the Site (Figure 3).

2.3.1 Chemical Use and Waste Generation and Management

Based on results of the environmental investigations conducted at the Site, sources of environmental impacts at the Site may be attributed to (DEQ, 2001):

- Locomotive fueling and fuel storage (both Bunker C and diesel)
- Light locomotive maintenance and light car repair, which may have included limited use of paints and solvents
- Waste disposal

- Wastewater retention
- Potential historical application of lead arsenate pesticides at the Site prior to rail yard activities

3. RESULTS OF INVESTIGATION(S)

3.1 NATURE AND EXTENT OF CONTAMINATION

3.1.1 Summary of Environmental Investigations and Removal Actions

The Site has been the focus of multiple phases of environmental investigations conducted between 1990 and 1998. There have also been several completed focused cleanup activities and three proposed full-scale remedial actions since the original ROD was issued in 2001 that were not completed for various reasons. These proposed remedial actions have evolved based upon numerous regulatory and administrative changes and are summarized below.

Date	Investigation and Cleanup Activities
Mid-1980s	Ballast and soil impacted by former fueling operations were removed during installation of the former drip slab. Nine passive product recovery wells were installed downgradient to remove floating product from the perched groundwater zone. Additionally, an oil/water separator and two holding ponds (Ponds A and B) were installed.
1990	Phase I and Phase II Environmental Site Assessments performed. Assessments were performed near the drip slab, the oil-water separator, and ponds.
1999	Final Remedial Investigation Report (ERM 1999) submitted with COCs identified: lead and arsenic in soil, PAHs in soil, petroleum hydrocarbons from Bunker C and diesel in soil and limited areas of groundwater.
2001	Feasibility Study Report (ERM 2001) submitted. ROD prepared by Oregon Department of Environmental Quality (DEQ) (DEQ 2001), which specified excavation of all materials exceeding residential cleanup goals and offsite disposal. The quantity of impacted soil was estimated to be approximately 29,300 cubic yards (50,000 tons).
2006	A Remedial Design/Remedial Action Work Plan was prepared by Kennedy/Jenks in June 2006 (K/J 2006) that included excavation and disposal of all 29,300 cubic yards of impacted soil by truck. However, the project did not move forward because of public resistance regarding the high volume of dump trucks required (approximately 1,700 truckloads) in a residential area.
2010	All remaining monitoring wells and product recovery wells onsite were decommissioned. A total of twelve monitoring wells and nine product recovery wells were abandoned.
2012	A total of 54 test pits were dug to depths ranging from 2 to 8 feet below ground surface in order to better define the extent of NAPL onsite. A survey of the Site was conducted to support a pending remedial action.
2013	All remaining free-standing structures at the Site were demolished and removed, including an oil-water separator, catwalk, storage shed, and miscellaneous debris. Remedial action was re-evaluated, and a new Remedial Action Work Plan (RAWP) was submitted to DEQ and approved in February 2013 (CH2M 2013). However, the project was not implemented because of uncertainty as to whether the City of Ashland would concur that the conditions of an existing deed restriction on the property would be achieved after cleanup using the 90 percent UCL approach.
2016	The Ashland City Council agreed to revise the deed restriction to allow for a cleanup using the 90 percent UCL approach for a single residential parcel. An updated RAWP was submitted to DEQ (CH2M 2016).

Date	Investigation and Cleanup Activities
2017	DEQ approved the cleanup plan (February). EPA updated its toxicity standards for benzo(a)pyrene (BaP). As a result of the new toxicity standards, it was determined that the areas requiring excavation were greatly reduced (May). UPRR notified DEQ that it was withdrawing its cleanup plan, and that a new cleanup plan would be prepared based on current information (December).
2018	A Supplemental Remedial Investigation/Feasibility Study Work Plan (Jacobs 2018) was submitted (July). Updated groundwater and soil data collected (August).
2019	A revised risk assessment was presented in the Supplemental RI/FS Evaluation (Jacobs 2019). Data collected in 2018 replaced the historical data at the geographical locations where they were obtained. Updated toxicity standards for BaP were used to assess risk.
2021	A Supplemental Remedial Investigation/Feasibility Study Report (Jacobs 2021) was submitted and accepted by DEQ. The recommended remedial action alternative was: 1) excavate in the western 8.7-acre area, 2) consolidate excavated soil in the eastern 3-acre area, 3) install a vegetated soil cap in the eastern area, 4) deed restrictions.

3.1.2 Groundwater

The groundwater COCs identified in the 1999 Final RI Report (ERM 1999) were petroleum hydrocarbons from Bunker C and diesel (predominately in the form of nonaqueous liquid [NAPL]). Updated groundwater samples were collected in August 2018 and were used in a revised risk assessment (Section 3.2).

3.1.3 Soil

Soil COCs identified in the 1999 Final RI Report (ERM 1999) were lead, arsenic, PAHs, and petroleum hydrocarbons from Bunker C and diesel. Updated soil samples collected in August 2018 were used in a revised risk assessment (Section 3.2). Updated EPA toxicity standards for BaP were also incorporated into the revised risk assessment.

3.2 RISK ASSESSMENT

The standards for a protective cleanup are defined in the Oregon Revised Statute (ORS) and Oregon Administrative Rule (OAR). ORS 465.315 states in part:

Standards for degree of cleanup required; Hazard Index; risk protocol; hot spots of contamination; exemption. (1)(a) Any removal or remedial action performed under the provisions of ORS 465.200 to 465.510 and 465.900 shall attain a degree of cleanup of the hazardous substance and control of further release of the hazardous substance that assures protection of present and future public health, safety and welfare and of the environment.

(b) The Director of the Department of Environmental Quality shall select or approve remedial actions that are protective of human health and the environment. The protectiveness of a remedial action shall be determined based on application of both of the following:

(A) The acceptable risk level for exposures. For protection of humans, the acceptable risk level for exposure to individual carcinogens shall be a lifetime excess cancer risk of one per one million people exposed, and the acceptable risk level for exposure to noncarcinogens shall be the exposure that results in a Hazard Index number equal to or less than one. "Hazard Index number" means a number equal to the sum of the noncarcinogenic risks (hazard quotient) attributable to systemic toxicants with similar toxic endpoints. For protection of ecological receptors, if a release of hazardous substances causes or is reasonably likely to cause significant adverse impacts to the health or viability of a species listed as threatened or endangered pursuant to 16 U.S.C. 1531 et seq. or ORS 496.172, or a population of plants or animals in the locality of the facility, the acceptable risk level shall be the point before such significant adverse impacts occur.

(B) A risk assessment undertaken in accordance with the risk protocol established by the Environmental Quality Commission in accordance with subsection (2)(a) of this section.

OAR 340-122-0084 describes the requirements for risk assessments while OAR 340-122-0115 provides additional definition of protectiveness.

(1) "Acceptable risk level" with respect to the toxicity of hazardous substances has the meaning set forth in ORS 465.315 (1)(b)(A) and (B) and is comprised of the acceptable risk level definitions provided for carcinogenic exposures, noncarcinogenic exposures, and ecological receptors in sections (2) through (6) of this rule.

(2) "Acceptable risk level for human exposure to individual carcinogens" means: (a) For deterministic risk assessments, a lifetime excess cancer risk of less than or equal to one per one million for an individual at an upper-bound exposure; or (b) For probabilistic risk assessments, a lifetime excess cancer risk for each carcinogen of less than or equal to one per one million at the 90th percentile, and less than or equal to one per one hundred thousand at the 95th percentile, each based upon the same distribution of lifetime excess cancer risks for an exposed individual.

(3) "Acceptable risk level for human exposure to multiple carcinogens" means the acceptable risk level for human exposure to individual carcinogens and: (a) For deterministic risk assessments, a cumulative lifetime excess cancer risk for multiple carcinogens and multiple exposure pathways of less than or equal to one per one hundred thousand at an upper-bound exposure; or (b) For probabilistic risk assessments, a cumulative lifetime excess cancer risk for multiple carcinogens and multiple exposure pathways of less than or equal to one per one hundred thousand at the 90th percentile and less than or equal to one per ten thousand at the 95th percentile, each based upon the same distribution of cumulative lifetime excess cancer risks for an exposed individual.

(4) "Acceptable risk level for human exposure to noncarcinogens" means: (a) For deterministic risk assessments, a hazard index less than or equal to one for an individual at an upper-bound exposure; or (b) For probabilistic risk assessments, a hazard index less than or equal to one at the 90th percentile, and less than or equal to ten at the 95th percentile, each based upon the same distribution of hazard index numbers for an exposed individual.

(5) "Acceptable risk level for individual ecological receptors" applies only to species listed as threatened or endangered pursuant to 16 USC 1531 et seq. or ORS 465.172, and means: (a) For deterministic risk assessments, a toxicity index less than or equal to one for an individual ecological receptor at an upper-bound exposure, where the toxicity index is the sum of the toxicity quotients attributable to systemic toxicants with similar endpoints for similarly-responding species and the toxicity quotient is the ratio of the exposure point value to the ecological benchmark value; or (b) For probabilistic risk assessments, a toxicity index less than or equal to one at the 90th percentile and less than or equal to 10 at the 95th percentile, each based on the same distribution of toxicity index numbers for an exposed individual ecological receptor; or (c) The probability of important changes in such factors as growth, survival, fecundity, or reproduction related to the health and viability of an individual ecological receptor that are reasonably likely to occur as a consequence of exposure to hazardous substances is de minimis.

(6) "Acceptable risk level for populations of ecological receptors" means a 10 percent chance, or less, that no more than 20 percent of the total local population will be exposed to an exposure point value

greater than the ecological benchmark value for each contaminant of concern and no other observed significant adverse effects on the health or viability of the local population.

Human health and ecological risk assessments were originally performed as part of the 1999 RI and the results were incorporated into the 2001 ROD. A revised risk assessment was completed in the Supplemental RI/FS Risk Evaluation using new soil and groundwater data collected in 2018 at the locations shown in Figure 4 (Jacobs 2019).

The revised risk assessment for the recommended remedial action alternative is summarized in Section 8.2 of this document. The results of the risk assessment for human health and potential ecological receptors at the Site are summarized below incorporating the results from the 2019 revised risk assessment.

3.2.1 Conceptual Site Model

A conceptual site model (CSM) identifies the following elements:

- Sources of contamination,
- Pathways by which this contamination could reach human and ecological receptors, and
- The human and ecological receptors currently and reasonably likely affected, and the degree of their exposure.

Evaluation of human exposure to residual chemical contamination requires an assessment of the type and extent of that exposure. This is based on current and reasonably likely future use. The risk assessment for the Site developed what the acceptable risk levels are for various kinds of exposures. These levels are referred to as Risk Based Concentrations (RBCs). The sources, pathways, and receptors (both human and ecological, as applicable) are outlined below.

3.2.2 Human Health Risk Assessment

The potential for unacceptable human health risk was identified in the risk assessment reports using the following risk thresholds established by DEQ in OAR 340-122:

- If the risk for individual carcinogenic compounds exceeds one in one million ($1x10^{-6}$) excess risk for cancer, or one in one hundred thousand ($1x10^{-5}$) for cumulative risks from all carcinogenic compounds, the major risk-contributing constituents should be evaluated as COCs.
- If the non-cancer hazard index (HI) is 1.0 or greater, the major risk-contributing constituents should be evaluated as COCs.
- If lead concentrations in exposure media result in a predicted blood-lead level of 10 micrograms per deciliter (µg/dL) in greater than 5 percent of the potentially exposed population, lead should be identified as a COC.

This section provides a summary of the current potential risks associated with the chemicals and media at the Site. Details of the procedures and calculations of the risk assessment, along with the complete data set, can be found in the *Supplemental Remedial Investigation/Feasibility Study Risk Evaluation* (Jacobs 2019).

Chemicals of Concern (COCs). Several chemicals of concern were identified, which are listed below:

- Arsenic, lead, Benzo(a)pyrene (BaP), TPH as diesel (TPH-d), TPH as oil (TPH-o) in shallow soil (0 to 3 feet below ground surface).
- Arsenic, TPH-d and TPH-o in groundwater

Areas of Unacceptable Risk. The human health risk assessment evaluated the Site in three different ways for shallow soil:

- One exposure area: 11.7 acres (Sitewide)
- Eleven exposure areas: approximately 1 acre each
- Two exposure areas: 8.7 acres (west) and 3 acres (east)

These three exposure areas were assessed under three hypothetical exposure scenarios:

- Residential (single-family)
- Urban residential
- Occupational

A summary of the human health risks in shallow soil identified for the three exposure areas are outlined below: The areas indicated are shown on Figure 5.

Two Exposure Areas: 8.7 Acres (West) and 3 Acres (East)
Western Area • The cumulative ELCR is 4 x 10^{-5} for the residential scenario, and 2 x 10^{-5} for the urban residential scenario, which exceed the DEQ cumulative risk threshold of 1 x 10^{-5}. • The primary risk driver is arsenic. The chemical specific ELCR for arsenic is 4 x 10^{-5} for the residential scenario, 2 x 10^{-5} for the urban residential scenario, and 9 x 10^{-6} for the occupational scenario, which exceed the DEQ threshold of 1 x 10^{-6} for individual chemicals. The uncertainties associated with inclusion of arsenic into the risk estimates are discussed below. • The cumulative HI is 3 for the residential scenario and 1 for the urban residential scenario. • The primary driver to the HI is TPH-d for the residential (HQ = 2) scenario. **Eastern Area** • The cumulative ELCR is 8 x 10^{-5} for the residential scenario, and 3 x 10^{-5} for the urban residential scenario, which exceed the DEQ cumulative risk threshold of 1 x 10^{-5}. • The primary risk driver is arsenic. The chemical specific ELCR for arsenic is 7 x 10^{-5} for the residential scenario, 3 x 10^{-5} for the urban residential scenario, and 2 x 10^{-5} for the occupational scenario, which exceed the DEQ threshold of 1 x 10^{-6} for individual chemicals. The uncertainties associated with inclusion of arsenic into the risk estimates are discussed below. • The cumulative HI is 6 for the residential scenario and 3 for the urban residential scenario. • The primary driver to the HI is lead for the residential (HQ = 6) scenario.
One Exposure Area: 11.7 Acres (Sitewide)
• The cumulative excess lifetime cancer risk (ELCR) is 5 x 10^{-5} for the residential scenario, and 2 x 10^{-5} for the urban residential scenario, which exceed the DEQ cumulative risk threshold of 1 x 10^{-5}. • The primary risk driver is arsenic. The chemical specific ELCR for arsenic is 4 x 10^{-5} for the residential scenario, 2 x 10^{-5} for the urban residential scenario, and 1 x 10^{-5} for the occupational scenario, which exceed the DEQ threshold of 1 x 10^{-6} for individual chemicals. The uncertainties associated with inclusion of arsenic into the risk estimates are discussed below. • The cumulative hazard index (HI) is 8 for the residential scenario and 4 for the urban residential scenario. • The primary driver to the HI is TPH-d for the residential (hazard quotient [HQ] = 7) and urban residential (HQ = 3) receptor scenarios.
Eleven Exposure Areas: Approximately 1 Acre Each
• Seven areas had unacceptable cumulative risk or HI for one or more of the three receptor scenarios. • All 11 areas had reported arsenic levels that pose risks exceeding the DEQ threshold of 1 x 10^{-6} for individual chemicals. The uncertainties associated with inclusion of arsenic into the risk estimates are discussed below.

Uncertainties Associated with Arsenic in Soil. The cumulative risk evaluation indicates that arsenic is the primary risk driver for potential receptor exposure to Site soil for all exposure scenarios evaluated. Because arsenic detected in Site soil occurs naturally, it is important to consider the relative level of potential risk posed by naturally occurring levels when interpreting risks. It is not uncommon for natural levels of metals like arsenic to result in calculated risks exceeding DEQ regulatory thresholds. As a result, including arsenic in these risk calculations can introduce significant uncertainty for risk management decisions.

To address this uncertainty, the Site-wide data set for arsenic in soil was initially compared directly to the range of data used by DEQ to calculate background concentrations of arsenic in soil in Oregon (DEQ 2018a). This comparison indicated that Site-related releases of arsenic likely have occurred and should be further evaluated for potential remedial action.

To evaluate the extent of this potential remedial action, soil locations with arsenic concentrations above 30 mg/kg (the high end of the background data set [Klamath Mountain region]) were removed from the Sitewide data set, and the remaining data were statistically compared to the more conservative DEQ default background concentrations for metals in the Klamath Mountain region data set, (12 mg/kg). The statistical comparison was conducted using EPA's online calculation tool ProUCL Version 5.1, Form 1. The ProUCL output indicated that the residual Sitewide data set is statistically indistinguishable from the background data set for arsenic.

These results indicate that if the seven soil locations with arsenic concentrations above 30 mg/kg were addressed in a remedial action and removed from the Site data set, then Sitewide arsenic levels would be consistent with naturally occurring regional levels (12 mg/kg), thus attaining the remedial goal, as shown in the numerical Remedial Action Objectives in the following Section 5.1, below. Additional details of this analysis are presented in the Supplemental Remedial Investigation/Feasibility Study Report (Jacobs 2021).

Uncertainties Associated with Lead in Soil. A site-specific RBC was determined in the Supplemental RI/FS (Jacobs; 2021). The hazard quotient was rounded to 1 using one significant digit for lead under the residential and urban residential receptor scenarios. DEQ commented in its review of the revised risk assessment (DEQ 2019b) that concentrations of lead above 1,000 mg/kg should be addressed although the statistical calculations showed acceptable risk for some scenarios.

3.2.3 Ecological Risk Assessment

An ecological risk assessment was completed during the 1999 RI and was summarized in the 2001 ROD. The ecological screening assessment of the Site consisted of a survey by the Oregon Natural Heritage Program (ONHP) for rare, threatened, and endangered species, and comparisons of concentrations of chemicals detected in surface water and sediment to ecological preliminary remediation goals (PRGs). Although three animal species and one plant species listed by the ONHP as rare, threatened, or endangered are present within a 2-mile radius of the Site, the locations of these species are not on or adjacent to the Site. The Site is not known to serve as a habitat for any of these rare, threatened, or endangered species. The reported locations in which these species occur are unlikely to be affected by chemicals detected in soil, sediment, ground water, or surface water at the Site.

Ecological screening criteria were exceeded in some sediment and surface water samples from Ponds A and B and the sediment in the natural pond. Since the 1999 RI, Ponds A and B and the natural pond have dried out and are now typically dry. These ponds currently contain standing water briefly following periods of extended precipitation and are planned to be developed, thereby limiting or eliminating the available ecological habitat.

3.3 BENEFICIAL USE AND HOT SPOT DETERMINATION

3.3.1 Groundwater Beneficial Use Determination

A beneficial use determination for groundwater was completed during the 1999 RI and is summarized in the 2001 ROD. The groundwater beneficial use has not changed since the 2001 ROD. Beneficial uses were evaluated for onsite as well as offsite, considering current use and the following factors listed in OAR 340-122-0080(3)(f)(F):

- Historical land and water uses
- Anticipated future land and water uses
- Concerns of community and nearby property owners
- Regional and local development patterns
- Regional and local population projections
- Availability of alternate water sources

Elevated TPH-d and TPH-o concentrations in groundwater were noted in the 2001 ROD and in the 2021 Supplemental RI/FS. However, there are several reasons as to why beneficial use is not affected for onsite and offsite groundwater:

- Groundwater for beneficial use in the Site vicinity is drawn from a significantly deeper aquifer. There is no current or anticipated future use of shallow groundwater at or in the vicinity of the Site.
- The vertical separation between the shallow groundwater zone at the Site and the aquifer used for beneficial use is at least 40 to 60 feet thick, 20 to 40 feet of which is bedrock.
- Future land use in this area will continue to be devoted to mixed commercial and urban residential uses.
- Future property owners in this area are not likely to install wells because developments would be required to hook up to City of Ashland water lines.
- The viscous properties of Bunker C limit its mobility to transport offsite.

3.3.2 Surface Water Beneficial Use Determination

On-Site Surface Water: Ponds A and B and the natural pond have dried out and are now typically dry. These ponds currently contain standing water only briefly following periods of extended precipitation and have no current or future reasonably beneficial use. Areas of surface water drainage at the Site exist on the eastern and southeastern edges of the Site. This drainage appears to run only in response to storm water or other discharge from areas south of the Site.

Off-Site Surface Water: One irrigation canal was identified within the survey area. The intake to the canal is approximately ½-mile north of the Site near the intersection of Bear Creek and Oak Street. In addition to irrigation, likely future beneficial uses of Bear Creek include industrial water supply and livestock watering.

3.3.3 Land Use

Based on information from the City of Ashland's Department of Community Development, future land use in this area will continue to be devoted to employment, commercial, medical, and mixed-use residential uses. Current City of Ashland zoning for the Site and surrounding area is described in Figure 2, and summarized as follows:

- The Site and the adjacent property to the south and west are zoned as employment district (E-1) with residential overlay.
- The land further south and west of the Site is zoned as residential district (R-2).
- The adjacent area to the north of the Site is zoned as an employment district (E-1). The area north of the E-1 zoning and approximately 250 feet north of the Site is zoned E-1 with residential overlay.
- The area approximately 200 feet north of the northeast end of the Site is zoned as a multi-family residential district (R-2). The area approximately 100 to 150 feet north of this R-2 zone is zoned as a suburban residential district (R1-3.5).
- The land to the east is zoned as a single-family residential district (R-1-5).

Uses for land zoned E-1 with residential overlay include commercial use (i.e., retail, entertainment, offices) of at least 65 percent of first-floor space. Residential use is restricted to less than 15 units per acre, with residential use permitted on the second-floor space, and on no more than 35 percent of the first-floor space. No parks, other than the park presently at the corner of 6th and A Streets, are planned to be developed in the vicinity of the Site. Finally, there are no known structures protected at the Site, and there are no current conditional or non-confining uses existing within 350 feet of the Site boundaries.

In May of 2000, the City of Ashland restricted further development or land division on the former active railyard portion of the Site (shown as the 11.7-acre project area in Figure 1) until the property is remediated to residential standards, with written compliance provided by DEQ. Once the revised remedial action is complete and the property is remediated to urban residential standards, the City's deed restriction will be removed. However, a new deed restriction on the property will be filed with Jackson County that restricts single family residential use, without approval by DEQ.

3.3.4 Extent of Impacts Relative to a Commercial/Urban Residential Mixed Land Use Scenario

Oregon's Cleanup Law requires cleanup levels for properties that are protective of current and future likely use. Sites proposed for unrestricted multiple use are generally remediated to residential standards, which are the most restrictive. DEQ guidance (DEQ 2010) outlines two residential exposure scenarios to be considered when evaluating residential risk and cleanup alternatives, single-family residential or urban residential. The guidance specifies that the most appropriate residential scenario should be determined based on the current and reasonably likely future uses of the Site and adjacent properties. Areas proposed for commercial or industrial use are generally remediated to less stringent standards. Deed restrictions can be placed on industrial or commercial property to prevent future residential use, thereby enabling use of the less restrictive cleanup standards.

Various hypothetical future exposure area settings and receptor exposure scenarios were evaluated in the Supplemental RI/FS as summarized in Section 3.2.2. Some of these future risk assessment scenarios or exposure area settings are not appropriate for the expected current and future uses of the Site. Therefore, the Supplemental RI/FS focused on the following land use scenario to be consistent with 2010 DEQ guidance and produce the most achievable results:

- Two hypothetical future exposure area settings: 8.7 acres (west) and 3 acres (east)
- Urban residential hypothetical future receptor exposure scenario

The urban residential receptor exposure scenario is most consistent with the current land use zoning designation of Employment (E-1) with Residential Overlay and with the City's Master Plan for the Site (City of Ashland 2001). The current land use zoning of the Site does not allow single-family residential homes and residential dwelling units are only allowed in conjunction with a permitted commercial or employment use. The Risk-Based Concentrations (RBCs) presented in Table 1 were developed in the Supplemental RI/FS and are applicable for unlimited future commercial/residential mixed land use.

For the two hypothetical future exposure areas (an 8.7-acre western area and a 3-acre eastern area) and an urban residential hypothetical future receptor exposure scenario, the risk assessment (Section 3.2.2) showed that arsenic was the primary contaminant risk driver, with lead being a secondary driver. Figure 6 shows the sample locations where the arsenic and lead samples exceeded 30 and 1,000 mg/kg, respectively.

Contiguous rectangular polygons were drawn around sample locations with arsenic and lead exceedances within the 8.7-acre western area to form the remedial action target areas. Each of the rectangular polygons has a minimum dimension of 50 feet in all directions from the sample location. Adjacent areas were extended and connected when there were no clean samples in between. All the arsenic and lead samples to be addressed were in the upper 1.5 feet of the 0- to 3-foot depth horizon of the surface soil. Therefore, all the target areas extend to a depth of 1.5 feet. The dimensions and volumes of each of the target areas are shown on Figure 6. The total volume of soil to be excavated in the western area is 2,710 cubic yards.

The outer boundary of the 3-acre eastern area serves as its remedial action target area. Although the arsenic and lead exceedances were primarily in the upper 1.5 feet of the 0- to 3-foot depth horizon of the surface soil, the eastern area contains extensive petroleum NAPL at depths below 1.5 feet. Therefore, the remedial action alternatives considered in Section 5.2 will address various depths in the eastern 3-acre area, ranging from about 1.5 to 9 feet below ground surface. The volumes assumed for the eastern target area are shown on Figure 6 and range from 7,500 to 12,900 cubic yards.

3.3.5 Locality of Facility

Oregon regulations use "locality of the facility" to define the extent of facility-related hazardous substances, considering chemical and physical properties of COCs, migration pathways, natural and human activities affecting migration of COCs, biological processes affecting bioaccumulation of COCs, and the rate at which COCs migrate under these conditions. Based on the soil and ground water data collected during the various phases of RI, the locality of the facility is confined to within the 11.7-acre Site boundary (Figure 1). No current or potential future offsite impacts have been identified.

3.3.6 Hot Spots

A hot spot determination requires: (1) identification of hot spots as part of the RI/FS process, and (2) treatment of hot spots, to the extent feasible, as part of the remedial action selected or approved by DEQ.

The treatment requirement of hot spots is subject to the remedy selection balancing factors and criteria listed in OAR 340-122-0090(4), which specifies that a higher threshold be applied in evaluation of the reasonableness of costs for treating hot spots of contamination. Therefore, the purpose of identifying hot spots is to provide the information needed to evaluate the feasibility of various remedial action alternatives in light of the requirement to treat hot spots if feasible.

The definition of a hot spot depends upon the media that is potentially adversely impacted. Soil, NAPL, and groundwater are discussed in the following sections. A hot spot determination was conducted as part of the 2021 Supplemental RI/FS, and the results are summarized below.

Soil Hot Spot Determination. No hot spots were identified in soil for the two hypothetical future exposure areas (the 8.7-acre western area and 3-acre eastern area) and an urban residential hypothetical future receptor exposure scenario. Soil sample results were below the "highly concentrated" hot spot criteria of contaminant concentrations greater than 100 times (i.e., 1×10^{-4}) the acceptable risk level of 1×10^{-6} for human exposure to each individual carcinogen, or 10 times (i.e., HI = 10) the acceptable risk level (HI = 1) for human exposure to each individual noncarcinogen. Because the risk above acceptable levels was driven by arsenic and potentially lead, which are both strongly adsorbed to the soil particles, the hot spot criteria for "highly mobile" or "not reliably containable" contaminants are not a concern.

NAPL Hot Spot Determination. Past observations indicate that the present NAPL is from old releases, is highly weathered, and is not migrating. It is unlikely that under an urban residential use scenario people will come in direct contact with the NAPL given its generally observed depth from below about 3 feet bgs to the water table. Therefore, the NAPL-impacted regions of the Site are not considered to be hot spots. However, there is the potential for direct contact with NAPL during excavation activities, so the potential for exposure to NAPL via the construction or excavation worker receptor scenarios will be considered in the evaluation of alternatives for the 3-acre eastern area.

Groundwater Hot Spot Determination. A groundwater hot spot determination was performed for this Site in accordance with OAR 340-122-0115 (32)(a) and the DEQ Guidance for Identification of Hot Spots, (DEQ,1998b). As noted in Section 3.3.1, there are several reasons why no beneficial groundwater use exists at the Site, therefore, no groundwater hot spots are present.

4. PEER REVIEW SUMMARY

Technical documents produced during the investigation of the UPRR Ashland Site have been reviewed by a technical team at DEQ. The team consists of the project manager, a hydrogeologist, and a toxicologist. Because of the extended duration of the investigation, some team members have changed, while others have retired. The current team, some of whom have been actively working on this project for over 10 years, unanimously supports the recommended remedial action. Refer to the technical team evaluation file for more detailed information.

5. DESCRIPTION OF REMEDIAL ACTION ALTERNATIVES

5.1 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are media-specific goals for protecting human health and the environment, while providing the framework for developing and evaluating remedial action alternatives. The RAOs have been updated from those presented in the 2001 ROD:

2001 RAOs (from 2001 ROD):

- Prevent human exposure (via ingestion or inhalation) to soil that exceeds the residential cleanup goals;
- Remove surface features associated with former rail yard operations;
- Prevent human exposure to the Bunker C/TPH impacts in the former landfill area; and
- Quantify TPH impacts in the surface water in Ponds A and B and remove and handle pond water appropriately.

Revised RAOs:

Based on the extent of impacts under the current and anticipated future land use scenario of commercial/urban residential mixed use (Section 3.3.4), the RAOs for this remedial action have been revised as follows, with reference to two exposure areas shaded in color on Figure 5:

- Prevent human exposure via ingestion or inhalation to soil that exceeds the urban residential cleanup goals and background levels;
- Prevent human exposure to the contaminated soil and Bunker C/TPH impacts within the eastern 3 acres of the Site that would result in unacceptable risk; and
- Prevent human exposure to impacted groundwater on the Site that would result in unacceptable risk.

These RAOs are consistent with those presented in the 2001 ROD, however, were revised to reflect updated planned site use changed from residential to urban residential and to include the results of the revised risk assessment (Section 3.2.2), current DEQ guidance (DEQ 2010), and the various cleanup activities conducted since 2001 (Section 3.1.1). Achievement of the RAOs will determine the success of the remedial action and serve as the basis for potential DEQ letter(s) of No Further Action for both of the 8.7-acre western and 3-acre eastern areas.

Upon completion of the remedy, as noted by approval of a Remedial Action Completion report by DEQ, the conditions of the existing deed restriction will have been met and the City of Ashland will remove their existing deed restriction on the property. The existing Cleanup Restriction Covenant on the property (Parcel 7) as revised on January 5, 2017 reads as follows:

> *Parcel 7 is restricted from further development or land division until Grantor obtains a determination from the Department of Environmental Quality that the property meets cleanup standards applicable to a single residential property. Thereafter, development of or any subdivided parcel cannot occur until Grantor obtains a determination from the Department of Environmental Quality that the property meets cleanup standards applicable to the use proposed for the subdivided parcel. Grantor will provide written document from the*

Department of Environmental Quality demonstrating compliance with these standards to the City.

As noted in Section 3.3.4, the urban residential scenario, not single-family residential scenario, is the appropriate residential exposure scenario for the property given the current and anticipated future zoning and land use. After completion of the remedial action, additional deed restriction(s) will be required and managed by DEQ for the western 8.7-acre and the eastern 3-acre portion of the Site. These deed restriction(s) will specify that approval from DEQ will be required before any portion of the land from either area can be subdivided or redeveloped in the future for a use other than urban residential and/or commercial.

5.1.1 Acceptable Risk Levels

Acceptable risk levels, or Site-specific Risk Based Concentrations (RBCs) were established for each of the COCs based on the results of the human health risk assessment as described in Section 3.2.2. It is important to note that the RBCs are specific to a particular exposure scenario. However, they do not necessarily represent an acceptable risk threshold within a given exposure area, because of the statistical calculations involved with multiple data points within that exposure area. Therefore, RBCs are useful for screening purposes only, and not for determination of actual risk. Specifically, RBCs are used to:

- Screen and select technologies for assembly into remedial action alternatives,
- Assess the effectiveness of individual remedial action alternatives, and
- Assess the relative progress a remedial action.

The RBCs for the COCs in soil are listed in Table 1 for the urban residential and occupational exposure scenarios via soil ingestion, dermal contact, and inhalation. Most of these values correspond to an increased excess lifetime cancer risk of 1 in 1,000,000 (1 x 10^{6}), or noncancer hazard index of 1, as presented in Risk Based Concentrations (DEQ, 2018) for individual chemicals. For multiple chemicals and/or pathways, the risks are additive and acceptable cancer risk is 1 in 100,000 (1 x 10^{5}). The excess lifetime cancer risk of 1 in 1,000,000 and the hazard index of 1 correspond to the acceptable risk level under OAR 340-122-0115. The target and site-specific RBCs for arsenic and lead in surface soil, (30 and 1000 mg/kg, respectively) were determined as described in Section 3.2.2.

5.2 REMEDIAL ACTION ALTERNATIVES

Remedial action alternatives were developed in the Supplemental RI/FS Study Report (Jacobs 2021). The Remedial action alternatives considered in the Supplemental RI/FS are described below.

5.2.1 Alternative 1 – No Action

A No Action alternative is required to be evaluated in the remedy selection process.

5.2.2 Alternative 2 – Excavation and Offsite Disposal of Shallow Soil (Western 8.7 Acres) and Shallow and Deep Soil (Eastern 3 Acres)

Alternative 2 involves the excavation of soils in the remedial action target areas as shown on Figure 6. This alternative most closely matched the 2001 ROD selected alternative, except excavation areas are reduced. Excavation areas are estimated based on concentrations of COCs in soil that exceed urban residential RBCs as opposed to residential RBCs referenced in the 2001 ROD. Approximately 2,710 cubic yards of excavated soils from the western 8.7-acre area and 12,900 cubic yards of excavated soils from the eastern 3-acre area would be disposed of offsite by rail. The excavation depth in the western 8.7-acre area would be 1.5 feet, whereas the excavation depth is expected to range from 2.5 to 9 feet over the majority of the eastern 3-acre area. The depths and extents of the excavation from the Updated RAWP (CH2M 2016) are assumed for the eastern 3-acre area to determine the volume estimates used for this alternative. After excavation, clean backfill would be purchased and delivered to the Site by rail to replace the excavated soils and fill in the former holding pond depressions. The entire 11.7-acre Site would then be graded and hydroseeded with native plants. This graded and vegetated Site would readily allow for annual mowing for fire suppression as required by the City of Ashland.

5.2.3 Alternative 3 – Excavation and Offsite Disposal of Shallow Soil (Western 8.7 Acres) and Shallow Soil (Eastern 3 Acres) and Institutional Controls

Alternative 3 involves the excavation of soils in the remedial action target areas as shown on Figure 6. Approximately 2,710 cubic yards of excavated soils from the western 8.7-acre area and 7,500 cubic yards of excavated soils from the eastern 3-acre area would be disposed of offsite by rail. The excavation depth in the western 8.7-acre area would be 1.5 feet, whereas the excavation depth in the eastern 3-acre area would need to be extended to 2.5 feet to capture all of the samples with concentrations exceeding updated applicable RBCs. The horizontal extents of the excavation from the Updated RAWP (CH2M 2016) are assumed for the eastern 3-acre area, excluding the deep excavations in the NAPL areas, to determine the volume estimates used for this alternative. After excavation, clean backfill would be purchased and delivered to the Site by rail to replace the excavated soils and fill in the former holding pond depressions. The entire 11.7-acre Site would then be graded and hydroseeded with native plants. This graded and vegetated Site would readily allow for annual mowing for fire suppression as required by the City of Ashland. A deed restriction would be required for the eastern 3-acre area as part of the institutional controls.

5.2.4 Alternative 4 – Excavation (Western 8.7 Acres) with Consolidation and Vegetated Soil Cap (Eastern 3 Acres) and Institutional Controls

Alternative 4 involves the excavation of soils from the remedial action target areas shown on Figure 6. Approximately 2,710 cubic yards of excavated soils from the western 8.7-acre area would be consolidated in the lowest spots in the eastern 3-acre area. An additional approximately 2,870 cubic yards of clean backfill would be purchased and delivered to the Site from the existing rail siding using side-dump railcars. The clean backfill would be used to supplement the consolidated soil from the western side to fill in the former holding pond depressions. After consolidation and grading, approximately 2,640 cubic yards of additional clean backfill would be delivered to the Site via side-dump railcars and consolidated in a 6-inch base layer on the eastern 3-acre area. This would be followed by delivery of approximately 2,640 cubic yards of clean topsoil via side-dump railcars and consolidated in a 6-inch top layer on the eastern 3-acre area. The combined base and top layers would form a 1-foot clean soil cap that would serve to protect potential receptors from contact with the underlying impacted soil. The entire 11.7-acre Site would then be graded and hydroseeded with native plants. This graded and vegetated Site would readily allow for annual mowing for fire suppression as required by the City of Ashland, until the property can be sold. The eastern 3-acre area would be fenced to limit access. The Site will carry a deed restriction requiring that future development be limited to mixed use commercial/urban residential land use and include measures to prevent receptor contact with the underlying impacted soils on the eastern 3-acre area.

6. EVALUATION OF REMEDIAL ACTION OPTIONS

6.1 EVALUATION CRITERIA

The criteria used to evaluate the remedial action alternatives described in Section 5 are defined in OAR 340-122-090 and establish a two-step approach to evaluate and select a remedial action. The first step evaluates whether a remedial action is protective; if not, the alternative is unacceptable, and the second step evaluation is not required. The remedial alternatives considered protective are evaluated and compared with each other using five balancing factors. The five balancing factors are 1) effectiveness in achieving protection, 2) long-term reliability, 3) implementability, 4) implementation risk, and 5) reasonableness of cost.

The alternative that compares most favorably against these balancing factors is selected for implementation. A residual risk assessment is then conducted for the selected alternative to document that it is protective of human health and the environment.

6.2 PROTECTIVENESS

The protectiveness of a given remedial action is evaluated by comparing its ability to mitigate the unacceptable risk due to the soil impacts as noted in Section 3.3.4. The pathways or beneficial uses for which the impacted soil results in unacceptable risk are:

- Urban residential and occupational scenarios (surface soil/0-3 feet) – 8.7-acre western area
- Urban residential and occupational scenarios (surface soil/0-3 feet and subsurface soil/3-15 feet) – 3-acre eastern area

These are the pathways and beneficial uses that will be directly evaluated to establish if a given remedial alternative is protective.

OAR 340-122-090 states that protectiveness may be achieved by any of the following methods:

- Treatment
- Excavation and off-Site disposal
- Engineering controls
- Institutional controls
- Any other method of protection
- A combination of the above

With the exception of hot spots, there is no preference for any one of the above methods for achieving protectiveness. Where a hot spot has been identified, OAR 340-122-0090(4) establishes a preference for treatment to the extent feasible, including a higher threshold for evaluating the reasonableness of costs for treatment. No hot spots have been identified at this Site.

6.2.1 Alternative 1 – No Action

Alternative 1 would not take any action to minimize potential human exposure by reducing concentrations of COCs or using engineering or institutional controls. The potential for future exposure of receptors to soil that exceeds the acceptable risk levels would still exist. Therefore, Alternative 1 is not protective and will not be evaluated further.

6.2.2 Alternative 2 – Excavation and Offsite Disposal of Shallow Soil (Western 8.7 Acres) and Shallow and Deep Soil (Eastern 3 Acres)

Excavation of impacted soil would be protective of human health by eliminating risks associated with an urban residential exposure scenario over the entire 11.7-acre Site. Alternative 2 would enable unrestricted urban residential and occupational future use without any engineering or institutional controls. There would be no deed restrictions on any portion of the Site. Alternative 2 would be more protective than the other alternatives.

6.2.3 Alternative 3 – Excavation and Offsite Disposal of Shallow Soil (Western 8.7 Acres) and Shallow Soil (Eastern 3 Acres) and institutional Controls

Excavation of impacted soil would be protective of human health by eliminating risks associated with an urban residential exposure scenario in the western 8.7-acre area. The protectiveness of the shallow excavation in the eastern 3-acre area would depend on ent6gineering and institutional controls to protect receptors against potential contact with the NAPL-contaminated deep soil. Direct receptor exposure to impacted surface soil would be prevented by the removal of shallow soil over the entire 11.7-acre Site. A deed restriction would be required for the eastern 3-acre area as part of the institutional controls. There would be no deed restrictions or other engineering or institutional controls on the western 8.7-acre area. The protectiveness of Alternative 3 is about the same as that of Alternative 4, below.

6.2.4 Alternative 4 – Excavation (Western 8.7 Acres) with Consolidation and Vegetated Soil Cap (Eastern 3 Acres) and Institutional Controls

Excavation of impacted soil would be protective of human health by reducing risks associated with an urban residential exposure scenario in the western 8.7-acre area. Protectiveness in the eastern 3-acre area will be established through engineering controls, which include a vegetated soil cap and fence. Additionally, institutional controls would be used to maintain that the cap remain in place and in good condition. Direct receptor exposure to impacted soil on the eastern 3-acre area would be prevented by the soil cap, fence, and a deed restriction limiting potential future excavation activities. A deed restriction on the Site would also limit land use to urban residential, commercial, or industrial use. The protectiveness of Alternative 4 is about the same as that of Alternative 3.

6.3 BALANCING FACTORS

The three remedial action alternatives determined to be protective were evaluated against the following balancing factors defined in OAR 340-122-0090(3):

- **Effectiveness in achieving protection.** The evaluation of this factor includes the following components:

  – Magnitude of the residual risk from untreated waste or treatment residuals, without considering risk reduction achieved through on-Site management of exposure pathways (e.g., engineering and institutional controls). The characteristics of the residuals are considered to the degree that they remain hazardous, considering their volume, toxicity, mobility, propensity to bio-accumulate, and propensity to degrade.

  - Adequacy of any engineering and institutional controls necessary to manage residual risks.

  - The extent to which the remedial action restores or protects existing or reasonably likely future beneficial uses of water.

  - Adequacy of treatment technologies in meeting treatment objectives.

  - The time until remedial action objectives are achieved.

- **Long-term reliability.** The following components are considered when evaluating this factor, as appropriate:

  - The reliability of treatment technologies in meeting treatment objectives.

  - The reliability of engineering and institutional controls needed to manage residual risks, taking into consideration the characteristics of the hazardous substances being managed, the ability to prevent migration and manage risk, and the effectiveness and enforceability over time of the controls.

  - The nature and degree of uncertainties associated with any necessary long-term management (e.g., operations, maintenance, monitoring).

- **Implementability.** This factor includes the following components:

  - Practical, technical, legal difficulties and unknowns associated with the construction and implementation of the technologies, engineering controls, and/or institutional controls, including the potential for scheduling delays.

  - The ability to monitor the effectiveness of the remedy.

  - Consistency with regulatory requirements, activities needed to coordinate with and obtain necessary approvals and permits from other governmental bodies.

  - Availability of necessary services, materials, equipment, and specialists, including the availability of adequate treatment and disposal services.

- **Implementation Risk.** This factor includes evaluation of the potential risks and the effectiveness and reliability of protective measures related to implementation of the remedial action, including the following receptors: the community, workers involved in implementing the remedial action, and the environment; and the time until the remedial action is complete.

- **Reasonableness of Cost.** This factor assesses the reasonableness of the capital, O&M, and periodic review costs for each remedial alternative; the net present value of the preceding; and if a hot spot has been identified at this Site, the degree to which the cost is proportionate to the benefits to human health and the environment created through treatment of the hot spot.

In general, the least expensive remedial action is preferred unless the additional cost of a more expensive corrective action is justified by proportionately greater benefits to one or more of the other balancing factors. For sites with hot spots, the costs of remedial actions must be evaluated to determine the degree to which they are proportionate to the benefits created through restoration or protection of beneficial uses of water. A higher threshold will be used for evaluating the reasonableness of costs for treatment of hot spots than for remediation of areas other than hot spots. The sensitivity and uncertainty of the costs are also considered.

6.4 EVALUATION OF BALANCING FACTORS

This section evaluates each of the remedial action alternatives that met the protectiveness criteria against the balancing factors described in Section 6.3. The table in Section 7 describes how each alternative compares to all of the sub-criteria for each of the balancing factors. The sections below summarize the major conclusions of this comparison and provide additional discussion for differentiating issues at the Site.

6.4.1 Effectiveness

Alternatives 2, 3 and 4 are equally effective at achieving protection in the western 8.7-acre area since the same quantity of soil will be excavated in all cases. Alternative 2 is the most effective at achieving protection in the eastern 3-acre since the most contaminated soil would be removed. Alternative 4 would rely on engineering and institutional controls to be effective. Alternative 3 would rely on only institutional controls so would be less effective than Alternative 4. However, all of the alternatives adequately manage residual risks and meet the RAOs.

6.4.2 Long-term Reliability

The biggest reliability uncertainty with Alternatives 3 and 4 is that of the institutional controls. Because Alternative 2 does not rely on institutional controls, it is the most reliable. While institutional controls are relatively simple to implement by placing a deed restriction on the land or preparing management plans and health and safety plans, the larger challenge is making sure that the land is used appropriately and that future users are aware of the residual contamination, the plans, and restrictions; and that the plans are properly implemented. Alternative 4 will also have engineering controls in a vegetated soil cap and fence that will need to be periodically inspected and maintained until the land is developed for an appropriate use given the underlying soil contamination. For this reason, Alternative 4 is less reliable than Alternative 3. However, these types of controls are not uncommon for former industrial properties and if long term management is done properly, they all can be reliable.

6.4.3 Implementability

Alternative 4 is the easiest of the alternatives to implement, as it involves no removal of contaminated soil from the Site. Alternatives 2 and 3 would require the removal of 15,610 and 10,210 cubic yards of soil, respectively, from the Site by rail and the construction of a new rail spur on the Site to load the soil. Alternative 2 would also involve deep soil excavation and would be the most difficult of the alternatives to implement.

6.4.4 Implementation Risks

All of the alternatives have the potential short-term risks associated with excavating surface soil, which are dust generation and risks to Site workers. These risks could be addressed with dust suppression and air monitoring procedures. Stormwater runoff associated with excavation and offsite transportation of surface soils may also pose a risk, which would be controlled with erosion prevention and sediment control measures. Risks to the community would be controlled by restricting Site access.

Alternatives 2 and 3 would require construction of a new rail spur, loading onto rail cars, and transporting the contaminated soil by rail to a landfill, all of which would come with added implementation risks. With Alternative 2, the excavation of soil deeper than 5 feet would require shoring and/or other measures to protect against collapse. Also, deep NAPL contamination could potentially end up in larger and/or deeper excavation areas than originally estimated.

6.4.5 Reasonableness of Cost

Based on the March 2021 costs from the FS, the cost estimates for Alternative 2 ($7,240,00) and Alternative 3 ($5,800,00) are significantly higher than Alternative 4 ($1,960,00). Alternatives 2 and 3 are 3.7 and 3.0 times more expensive than the estimated cost of Alternative 4, respectively.

6.5 SUSTAINABILITY/GREEN REMEDIATION

Beginning in 2011 DEQ began evaluating effects remedial actions may have on the community and the environment to advance DEQ’s mission of restoring, maintaining and enhancing the quality of Oregon’s air, land and water. DEQ’s Green Remediation Policy supports the implementation of more sustainable practices that lessen the overall environmental impacts from investigation and remediation at cleanup projects. This includes encouraging the regulated community to implement greener approaches to remediation, such as by reducing air emissions and waste generation, limiting greenhouse gasses, and reduce energy usage.

Alternative 4 would have the least amount of greenhouse gas emissions because the soil would not need to be transported by rail long distances for disposal. Also, no waste would be generated with Alternative 4, because all waste would be managed onsite.

7. COMPARATIVE ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

Balancing Factors	Alt. 2	Alt. 3	Alt. 4
Effectiveness			
- Magnitude of the residual risk			
- Adequacy of any engineering and institutional controls			
- Time to achieve remedial action objectives			
Long-term Reliability			
- Meet treatment objectives			
- Reliability of engineering and institutional controls			
- Nature and degree of uncertainties			
Implementability			
- Practical, technical, legal difficulties and unknowns			
- Ability to monitor effectiveness			
- Consistency with regulatory requirements			
- Availability of necessary services, materials, equipment, and specialists			
Implementation Risk			
- Potential risk and reliability of protective measures for the community			
- Potential risk and reliability of protective measures for remediation workers			
- Potential risk and reliability of protective measures for the environment			
- Time to remedial action completion			
Reasonableness of Cost			
- Net present value of capital, O&M, and periodic review costs			
Green Remediation			
- Sustainable: lessens overall environmental impacts (lower energy use, fewer greenhouse gasses, less waste generation.			

	Performs very well against the criteria relative to the other alternatives with minor disadvantages or uncertainty.
	Performs moderately well against the criteria relative to the other alternatives with some disadvantages or uncertainty.
	Performs poorly against the criteria relative to the other alternatives with significant disadvantages or uncertainty.

8. RECOMMENDED REMEDIAL ACTION ALTERNATIVE

Based on the detailed evaluation of the alternatives in Section 6 and 7, Alternative 4 is recommended for implementation at the UPRR Ashland Site. DEQ is recommending Alternative 4 because it is protective, is relatively easy to implement, is the most cost effective, and will have the lowest carbon footprint.

Under Alternative 4, deed restrictions will be required on the property to maintain that the soil cap remains intact on the eastern portion and that the future use of the entire Site remains mixed use urban residential and occupational. For the western 8.7-acre area, the parcel will be restricted from being subdivided into lots for single family residential use. For the eastern 3-acre area, the parcel will remain restricted from uses that could potentially result in exposure to the underlying contaminated soil. If the land from either area is sold, subdivided, or redeveloped in the future for a different use, then additional assessment and approval from DEQ would be required before the intended land use could be changed. The following sections detail the selected alternative, including engineering and institutional controls.

8.1 DESCRIPTION OF THE RECOMMENDED ALTERNATIVE

8.1.1 Excavation and Consolidation

- 2,710 cubic yards of soil will be excavated from the western 8.7-acre area of the Site and consolidated in the eastern 3-acre area as follows:
    - Surface soils in the western 8.7-acre area will be removed as shown in Figure 6 to a depth of 1.5 feet.
    - The 2,710 cubic yards of excavated soil will be consolidated in the lowest spots in the eastern 3-acre area.
    - Clean backfill will be purchased and delivered from the existing rail siding using side-dump railcars. The clean backfill will include 2,710 cubic yards to fill in the excavation areas on the west side plus an additional 2,870 cubic yards to supplement the consolidated soil on the eastern side and fill in the former holding pond depressions.

8.1.2 Engineering Controls

- A 1-foot-thick vegetated soil cap will be constructed over the eastern 3-acre area as follows:
    - Approximately 2,640 cubic yards of additional clean backfill would be delivered to the Site via side-dump railcars and consolidated in a 6-inch base layer on the eastern 3-acre area.
    - This would be followed by delivery of approximately 2,640 cubic yards of clean topsoil via side-dump railcars and consolidated in a 6-inch top layer on the eastern 3-acre area.
    - The combined base and top layers would form a 1-foot clean soil cap that would serve to protect potential receptors from direct contact with the underlying impacted soil with concentrations of COCs exceeding urban residential RBCs.
    - The entire 11.7-acre Site would then be graded and hydroseeded with native plants. This graded and vegetated Site would readily allow for annual mowing for fire suppression as required by the City of Ashland, until the property can be sold.
    - The eastern 3-acre area will be fenced to limit access until developed with approval by DEQ.
    - An Operation and Maintenance (O&M) Plan will be developed, approved by DEQ and maintained under the Institutional Controls.

8.1.3 Intuitional Controls

- Institutional Controls (ICs) would be developed and implemented to limit exposures to residents and workers from subsurface soils, as well as to prevent exposure to NAPL should any excavation and maintenance activities need to be conducted on the eastern 3-acre parcel.
  - Such ICs may include a Site Management Plan and a Contaminated Media Management Plan.

- Deed restriction(s) consisting of an Easement and Equitable Servitudes (EES) will be developed and agreed on by UPRR and DEQ to define the controls used to:
  - Limit potential exposures to onsite workers to soils and NAPL beneath the cap in the eastern 3-acre area.
  - Restrict the eastern 3-acre area from uses that could potentially result in compromising the soil cap and/or exposure to the underlying contaminated soil. Such restricted uses may include:
    - Single-family residential development;
    - Gardening/food production.
    - Underground structures; and
    - Intentional development within and below the vegetated soil cap.
  - Require DEQ review and approval of development planned on the eastern 3-acre area
  - Restrict the entire 11.7-acre Site from subdivision or redevelopment in the future for use other than commercial or urban-residential without additional assessment and/or approval from DEQ.

- The Site Management Plan and EES documents will dictate the level of periodic IC reviews and reporting to DEQ by UPRR to document how the ECs and ICs are working and any unforeseen circumstances or situations that may require addressing to ensure the protectiveness of the remedy.

8.1.4 Five Year Reviews

The remedy, and its protectiveness, will be reviewed every 5 years for the eastern 3-acre area. The 5-Year reviews will evaluate the effectiveness of the vegetated soil cap and fence and the performance of the ICs.

8.2 RESIDUAL RISK EVALUATION

OAR 340-122-0084(4)(c) requires a residual risk evaluation of the recommended alternative that demonstrates that the standards specified in OAR 340-122-0040 will be met, namely:

- Assure protection of present and future public health, safety, and welfare, and the environment
- Achieve acceptable risk levels
- For designated hot spots of contamination, evaluate whether treatment is reasonably likely to restore or protect a beneficial use within a reasonable time
- Prevent or minimize future releases and migration of hazardous substances in the environment

After excavation of 1.5 feet soil from the western 8.7-acre area and backfill with clean soil (as shown in Figure 6), the residual risk in the western area would be reduced to acceptable levels for the urban residential and occupational exposure scenarios. The cumulative ELCR is below the threshold of 1×10^{-5} and the chemical specific ELCRs are below the threshold of 1×10^{-6} for individual chemicals. The cumulative HI is less than 1. Estimated residual arsenic and lead concentrations of 7.5 and 217 mg/kg, respectively, within a 90 percent upper confidence limit were calculated assuming soil removal (DEQ 2019b), which are below the RBCs in Table 1. The residual risk remaining after implementation of the preferred alternative will be recalculated based on the results of confirmation sampling in the western 8.7-acre area.

On the eastern 3-acre parcel where contaminated soil will be consolidated and capped, the residual risk will be at or below acceptable risk levels as long as institutional controls and long-term site management prevent uncontrolled exposures to contamination beneath the cap.

8.3 FINANCIAL ASSURANCE

UPRR will provide a financial assurance mechanism to cover the performance of the remedial actions described above that meets the requirements of 40 CFR §264.143(f)(1)(i) or a performance bond or letters of credit.

9. PROJECT COMPLETION

After active remedial action elements are completed as described in Section 8 and the EES is recorded, UPRR shall issue a Remedial Action Completion Report (Completion Report) to DEQ for review. Once DEQ approves the Completion Report, DEQ will prepare a draft Certification of Completion letter for public comment. DEQ will also provide public notice in the Secretary of State's Bulletin and a local paper stating that DEQ has made an NFA decision for the Site.After any comments are addressed, DEQ will issue the Certification of Completion. The City of Ashland will then remove their existing deed restriction on the property. The existing Cleanup Restriction Covenant on the property (Parcel 7) as revised on January 5, 2017, reads as follows:

> *Parcel 7 is restricted from further development or land division until Grantor obtains a determination from the Department of Environmental Quality that the property meets cleanup standards applicable to a single residential property. Thereafter, development of or any subdivided parcel cannot occur until Grantor obtains a determination from the Department of Environmental Quality that the property meets cleanup standards applicable to the use proposed for the subdivided parcel. Grantor will provide written document from the Department of Environmental Quality demonstrating compliance with these standards to the City.*

A new deed restriction on the property will be filed with Jackson County that restricts single family residential use without approval by DEQ.

10. ADMINISTRATIVE RECORD INDEX

Administrative Record Index

Union Pacific Railroad Rail Yard Site

Ashland, Oregon

The Administrative Record consists of the documents on which the recommended remedial action for the Site is based. The primary documents used in evaluating remedial action alternatives for the UPRR Ashland Site are listed below. Additional background and supporting information can be found in the UPRR Ashland project file (ECSI No. 1146) located at DEQ Western Region Office, 165 E. 7th Avenue, Suite 100, Eugene, Oregon 97401.

SITE-SPECIFIC DOCUMENTS

Cascade Earth Sciences Ltd. 1992. Phase II Environmental Site Assessment - Ashland Package - Parcel 2; Southern Pacific Transportation Company, March 10.

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Jacobs Engineering Group Inc. (Jacobs). 2019. Supplemental Remedial Investigation/Feasibility Study Preliminary Risk Evaluation (Rev. 2). June 5.

Kennedy Jenks (K/J). 2006. Ashland Railyard Remedial Design/Remedial Action Work Plan, Union Pacific Railroad Company, Ashland Oregon. June 16.

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SP Environmental Systems 1991. Preliminary Environmental Site Assessment, Ashland Package - Parcel l, Southern Pacific Transportation Company, January 22.

SP Environmental Systems 1991. Preliminary Environmental Site Assessment -Ashland Package - Parcel 3, Southern Pacific Transportation Company, February 6.

Terranext 1996. February 1996 Ground Water Sampling, Ashland Rail Yard, Southern Pacific Transportation Company, April 16.

<u>STATE OF OREGON</u>

DEQ 2000. No Further Action Required Union Pacific-Owned Portions of Parcels 2, 3, 4, and 5 Ashland Partition Plat P-32-2000. December 7.

DEQ 2001a. Remedial Action Recommendation for Union Pacific Railroad Ashland Rail Yard Site – Staff Report, Oregon DEQ. May 15.

DEQ 2001b. Record of Decision for Union Pacific Railroad Rail Yard Site, Ashland, Oregon. Western Region Cleanup Program. September 10.

DEQ 2001c. No Further Action Required Sale Parcel 6 - Ashland Partition Plat P-32-2000 Former Ashland Rail Yard. September 11.

DEQ 2018a. Fact Sheet: Background Levels of Metals in Soils for Cleanup. January 25. Full data set obtained from Susan Turnblom on March 5, 2019.

DEQ 2019b. Comments on the Supplemental Remedial Investigation/Feasibility Study Risk Evaluation 2nd Revision dated June 5, 2019. November 5.

Oregon's Environmental Cleanup Laws, Oregon Revised Statutes 465.200-.900, as amended by the Oregon Legislature in 1995.

Oregon's Hazardous Substance Remedial Action Rules, Oregon Administrative Rules, Chapter 340, Division 122, adopted by the Environmental Quality Commission in 1997.

Oregon's Hazardous Waste Rules, Chapter 340, Divisions 100 - 120.

Oregon's Water Quality Criteria, Chapter 340, Division 41, Willamette River Basin.

Oregon's Groundwater Protection Act, Oregon Revised Statutes, Chapter 468B.

GUIDANCE AND TECHNICAL INFORMATION

DEQ 1998. Consideration of Land Use in Environmental Remedial Actions. July.

DEQ 1998. Guidance for Conducting Beneficial Water Use Determinations at Environmental Cleanup Sites. July.

DEQ 1998. Guidance for Conducting Feasibility Studies. July.

DEQ 2001. Guidance for Ecological Risk Assessment: Levels I, II, III, IV. April 1998 (updated 12/01).

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DEQ 2001. Cleanup Program Quality Assurance Policy. September 1990, updated April 2001.

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DEQ 2013. Fact-Sheet: Background Levels of Metals in Soils for Cleanup. Web access: http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf

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EPA 1992. Integrated Risk Information System. Office of Research and Development. Cincinnati, Ohio. 1992.

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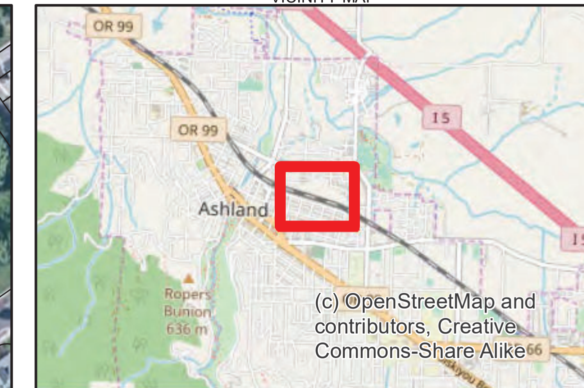
EPA 2018. Regional Screening Levels. https://www.epa.gov/risk/regional-screening-levels-rsls. May.

FIGURES



LEGEND

- Previous Identified Property Boundary
- Property Boundary
- Parcels

N

0 200 400
Feet

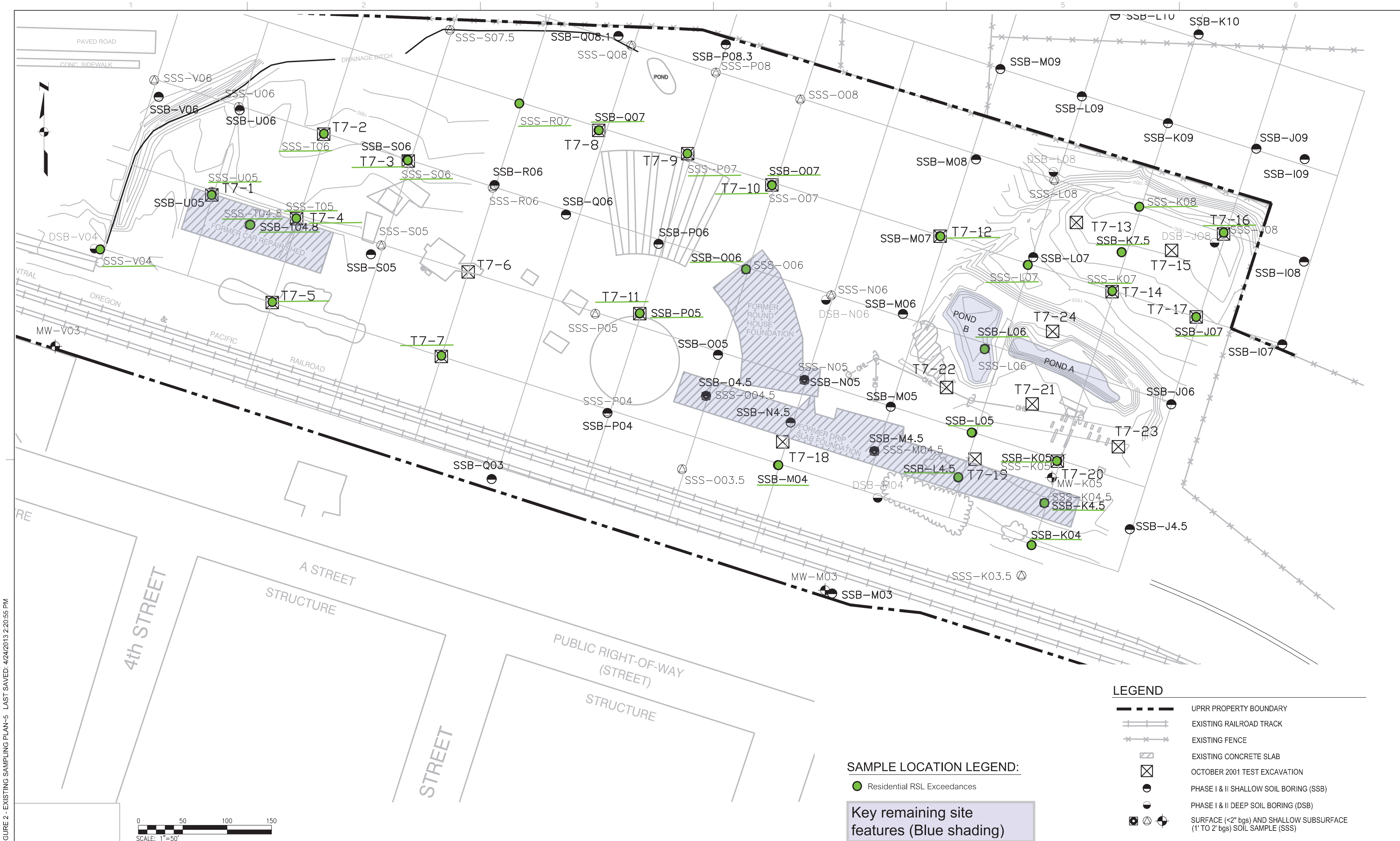
1 inch = 200 feet

Figure 1
Site Location
Supplemental Remedial Investigation/Feasibility Study, Former SP Yard, Ashland, Oregon

DVR \\MNUSTRICTGFS01\PROJECTS\UPRR_ASHLAND_20001136\MAPFILES\EXCAVATIONAREAS.MXD GMOON 8/29/2017 8:37:38 PM

JACOBS

Figure 2
City of Ashland Zoning Map



PRELIMINARY

NOT FOR CONSTRUCTION

DSGN	R STRAUSS					
DR	A STEPHENSON					
CHK	M NIEMET					
APVD	M OCHSNER	NO.	DATE	REVISION	BY	APVD

VERIFY SCALE

BAR IS ONE HALF INCH ON ORIGINAL DRAWING.

0 1/2"

IF NOT ONE HALF INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

JACOBS

FIGURE 3

HISTORICAL RISK-BASED CONCENTRATION EXCEEDANCES

Supplemental Remedial Investigation/Feasibility Study,

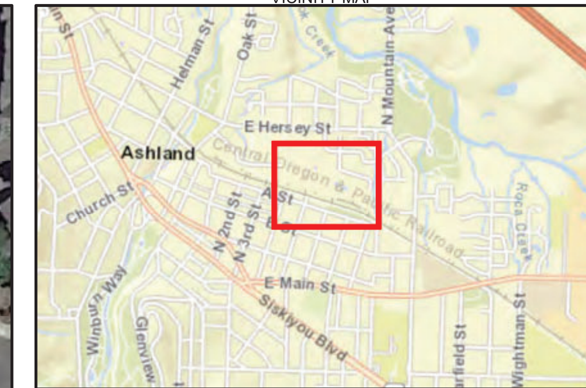
Former SP Yard, Ashland, Oregon

SHEET	1
DWG	1 OF 1
DATE	NOVEMBER 2020
PROJ	UPSROR43

USER: 5543 TAB: "FIGURE 2 - EXISTING SAMPLING PLAN-5 LAST SAVED: 4/24/2013 2:20:55 PM

FILENAME: C:\A2K_ROCKWELL\FIGURE 2 - EXISTING SAMPLING PLAN.DWG PLOT DATE: 24-Apr-13 PLOT TIME: 3:23:54 PM

VICINITY MAP



LEGEND

- Residentail RSL Exceedance Location
- Temporary Groundwater Sampling Point

Location ID	Lat	Long
SSS-R07	42° 11' 58.039" N	122° 42' 20.805" W
SSS-Q07	42° 11' 57.753" N	122° 42' 19.636" W
SSS-T06	42° 11' 57.597" N	122° 42' 23.645" W
SSS-S06 & T7-3	42° 11' 57.351" N	122° 42' 22.425" W
SSS-U05	42° 11' 56.897" N	122° 42' 25.229" W
SSS-TO4.8 & SSB-TO4.8	42° 11' 56.574" N	122° 42' 24.664" W
SSS-T05 & T7-4	42° 11' 56.664" N	122° 42' 23.993" W
SSB-P05 & T7-11	42° 11' 55.785" N	122° 42' 18.943" W
SSS-006	42° 11' 56.304" N	122° 42' 17.387" W
SSB-007 & T7-10	42° 11' 57.263" N	122° 42' 17.057" W
SSB-K7.5	42° 11' 56.669" N	122° 42' 11.897" W
SSB-J07	42° 11' 56.009" N	122° 42' 10.783" W
T7-21	42° 11' 54.998" N	122° 42' 13.118" W
SSS-K05	42° 11' 54.363" N	122° 42' 12.732" W
SSB-K4.5	42° 11' 53.922" N	122° 42' 12.907" W
SSB-K04	42° 11' 53.443" N	122° 42' 13.046" W
SSB-L4.5	42° 11' 54.129" N	122° 42' 14.143" W
SSS-V04	42° 11' 56.212" N	122° 42' 26.852" W
SSS-P07	42° 11' 57.547" N	122° 42' 18.331" W
T7-5	42° 11' 55.739" N	122° 42' 24.294" W
T7-7	42° 11' 55.219" N	122° 42' 21.810" W
SSB-M04	42° 11' 54.218" N	122° 42' 16.811" W
SSB-L05	42° 11' 54.633" N	122° 42' 14.023" W
SSB-L06	42° 11' 55.566" N	122° 42' 13.851" W
SSS-K07	42° 11' 56.248" N	122° 42' 12.025" W
SSS-L07	42° 11' 56.480" N	122° 42' 13.291" W
T7-12	42° 11' 56.776" N	122° 42' 14.569" W
SSS-K08	42° 11' 57.176" N	122° 42' 11.689" W
T7-16	42° 11' 56.932" N	122° 42' 10.439" W
TGW-001	42° 11' 57.730" N	122° 42' 12.370" W
TGW-002	42° 11' 57.510" N	122° 42' 11.290" W
TGW-003	42° 11' 57.980" N	122° 42' 10.180" W
TGW-004	42° 11' 56.440" N	122° 42' 10.220" W

Projected Coordinate System: NAD_1983_UTM_Zone_10N

N

0 300 Feet

FIGURE 4
2018 Sample Locations
Supplemental Remedial Investigation/Feasibility Study, Former SP Yard, Ashland, Oregon

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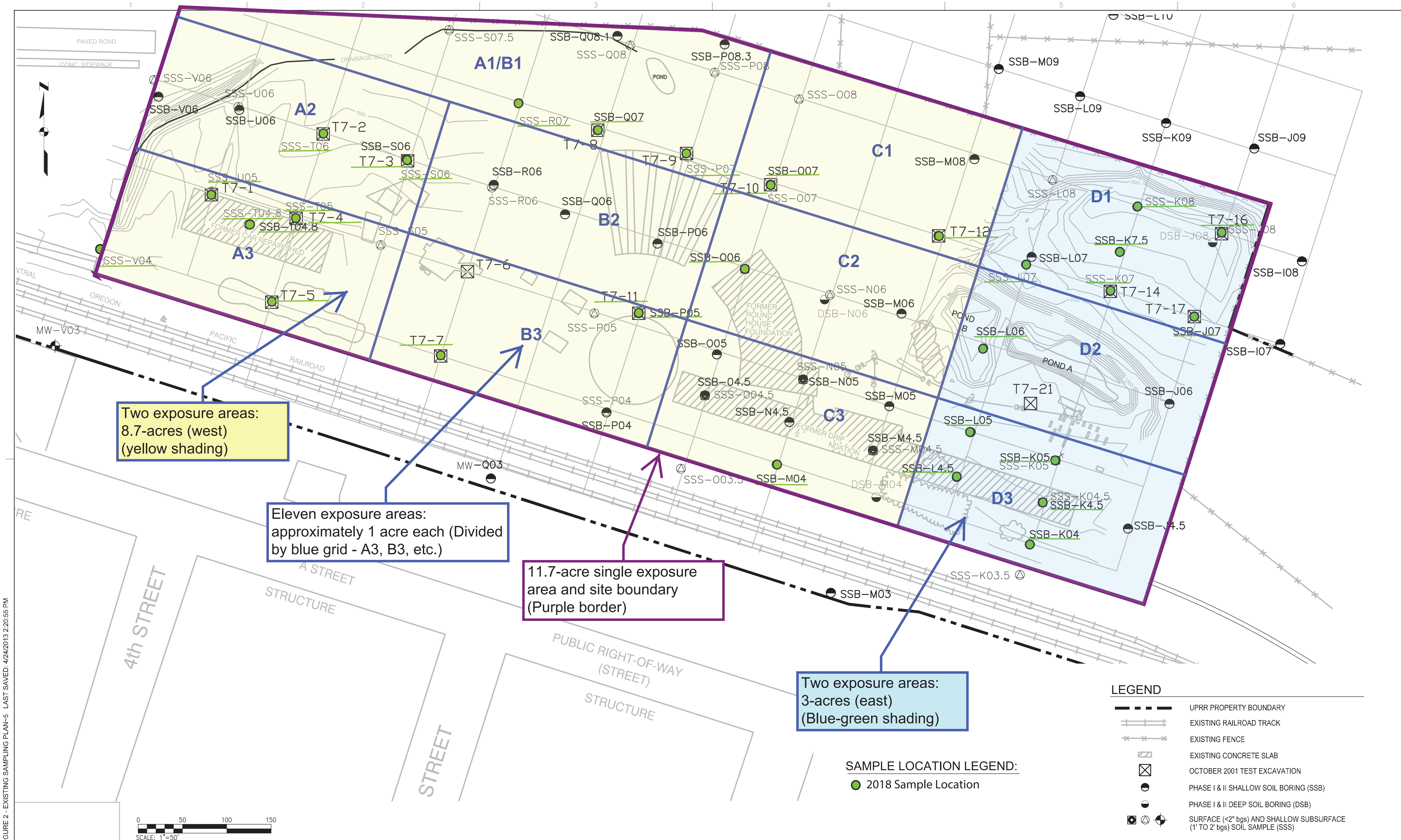

DSGN	R STRAUSS
DR	A STEPHENSON
CHK	M NIEMET
APVD	M OCHSNER

VERIFY SCALE
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IF NOT ONE HALF INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

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FIGURE 5
HYPOTHETICAL FUTURE EXPOSURE AREAS
Supplemental Remedial Investigation/Feasibility Study,
Former SP Yard, Ashland, Oregon

SHEET	1
DWG	1 OF 1
DATE	NOVEMBER 2020
PROJ	UPSROR43

FILENAME: C:\A2K_ROCKWELL\FIGURE 2 - EXISTING SAMPLING PLAN.DWG PLOT DATE: 24-Apr-13 PLOT TIME: 3:23:54 PM

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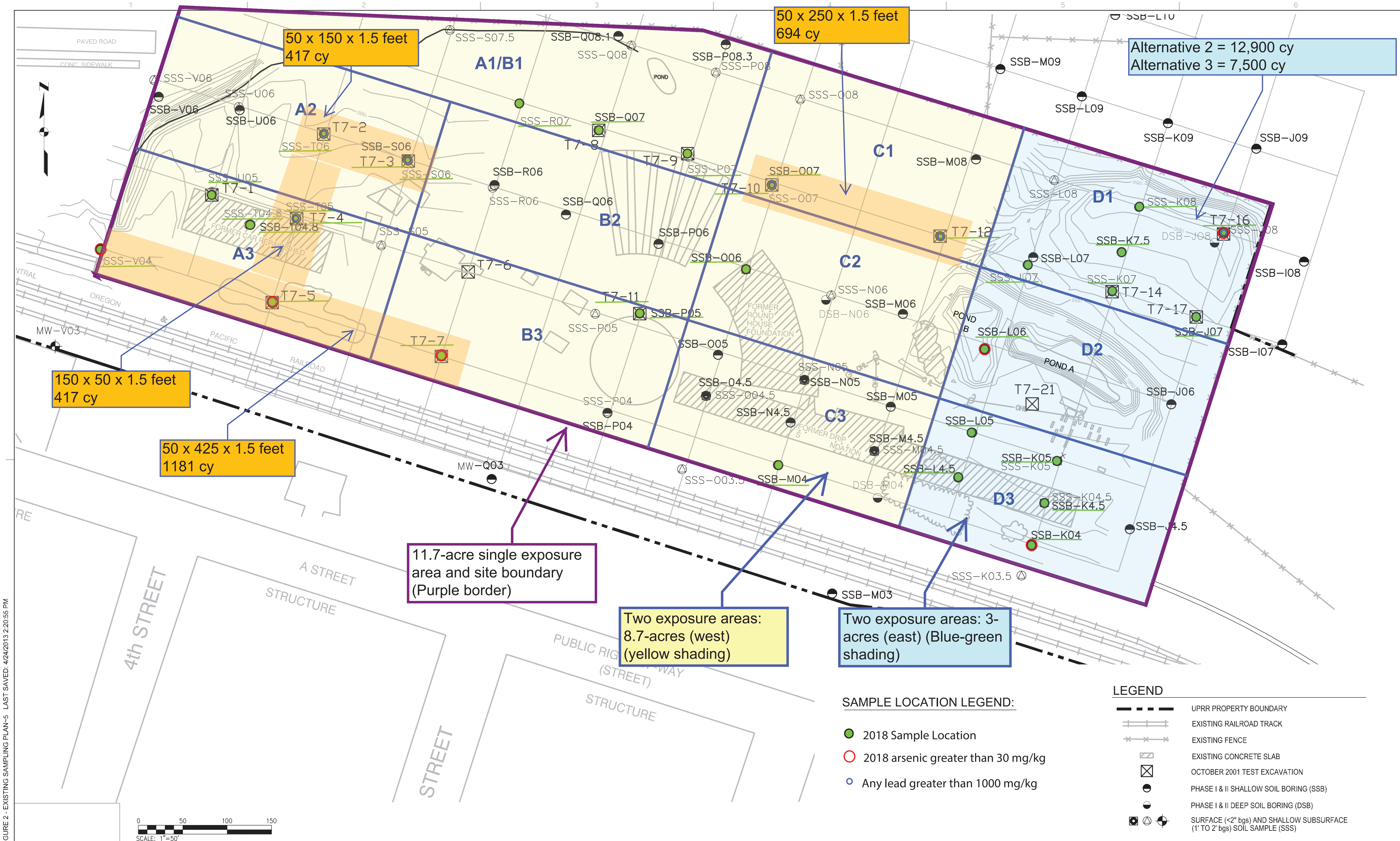

PRELIMINARY

NOT FOR CONSTRUCTION

DSGN	R STRAUSS					
DR	A STEPHENSON					
CHK	M NIEMET					
APVD	M OCHSNER	NO.	DATE	REVISION	BY	APVD

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IF NOT ONE HALF INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

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FIGURE 6
REMEDIAL ACTION TARGET AREAS
Supplemental Remedial Investigation/Feasibility Study,
Former SP Yard, Ashland, Oregon

SHEET	1
DWG	1 OF 1
DATE	NOVEMBER 2020
PROJ	UPSROR43

USER: 5543 TAB: *FIGURE 2 - EXISTING SAMPLING PLAN-5 LAST SAVED: 4/24/2013 2:20:55 PM

FILENAME: C:\A2K_ROCKWELL\FIGURE 2 - EXISTING SAMPLING PLAN.DWG PLOT DATE: 24-Apr-13 PLOT TIME: 3:23:54 PM

TABLES

Table 1. Site-Specific Risk-Based Concentrations for Shallow Soil

Former SP Yard, Ashland, Oregon

Analyte	Urban Residential (mg/kg	Occupational	Final Site-Specific Cleanup Goal	Basis
Arsenic	30	30	30	Site-specific background (refer to Section 3.2.2)
Lead	400	800	1,000 [a]	Oregon Department of Environmental Quality (DEQ). 2018. Risk Based Concentrations. May.
TPH as diesel	2,200	14,000	2,200	Oregon Department of Environmental Quality (DEQ). 2018. Risk Based Concentrations. May.
TPH as gasoline	2,500	20,000	2,500	Oregon Department of Environmental Quality (DEQ). 2018. Risk Based Concentrations. May.
TPH as oil [b]	4,600	29,000	4,600	Oregon Department of Environmental Quality (DEQ). 2019. Calculating RBCs for Total Petroleum Hydrocarbons. http://www.deq.state.or.us/Docs/cu/RBCsTPH11a.xlsm
PAHs as BaP-Equiv	0.25	2.1	0.25	Oregon Department of Environmental Quality (DEQ). 2018. Risk Based Concentrations. May.

[a] Concentrations of lead above 1,000 mg/kg should be addressed although the statistical calculations showed acceptable risk for some scenarios (refer to Section 3.2.2).

[b] Calculated using DEQ (2019) and default exposure assumptions for Residential and Occupational scenarios, assuming a 0%/100% mixture of high carbon range (>C21-C34) aliphatic/aromatic compounds. For the Urban Residential scenario, the default exposure frequency was changed to 175 days per year (Jacobs 2019).

mg/kg = milligram(s) per kilogram
PAHs as BaP-Equiv = polycyclic aromatic hydrocarbons, calculated as total benzo(a)pyrene equivalents
TPH = total petroleum hydrocarbons

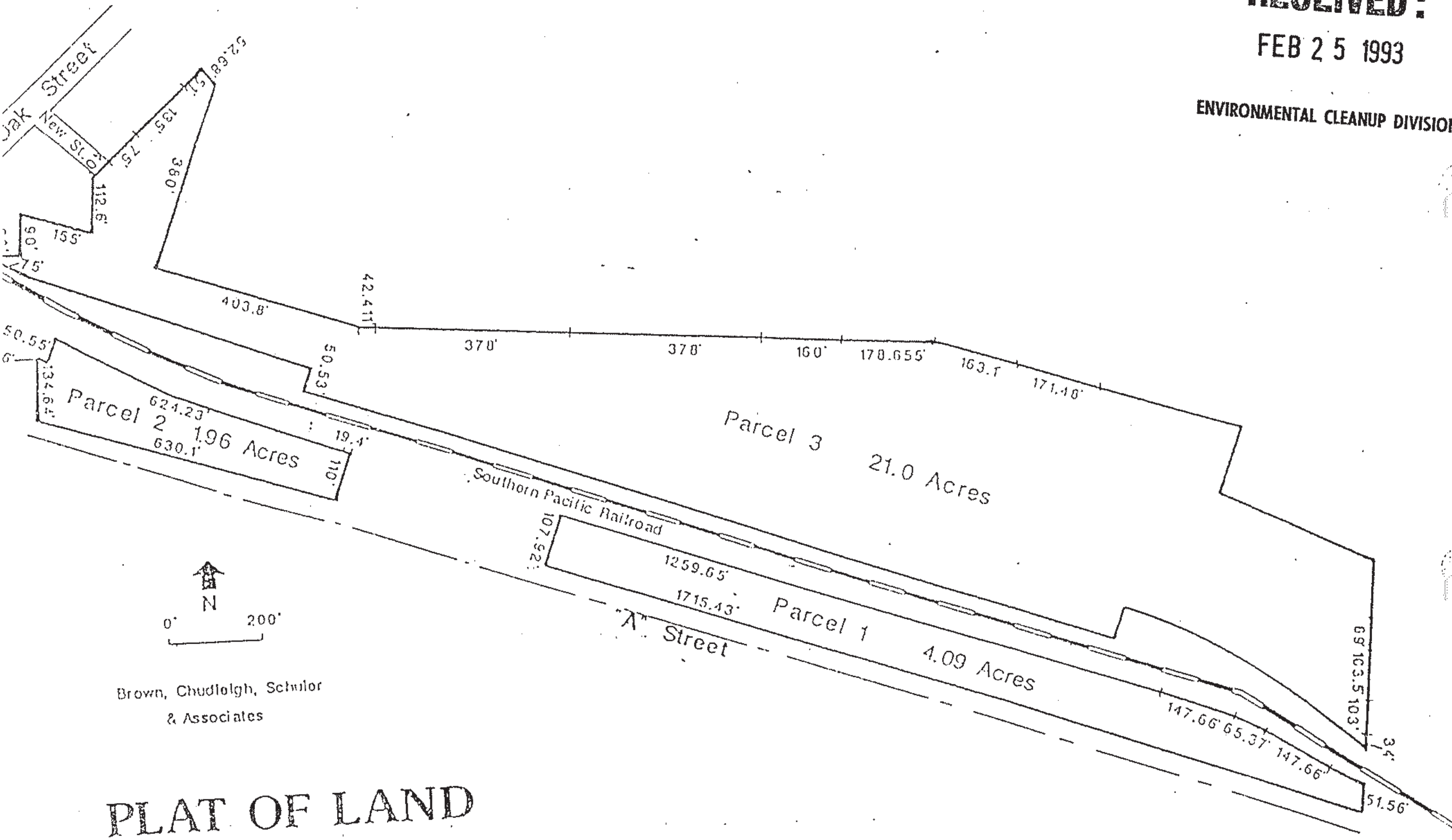
ATTACHMENTS

Attachment 1

Original UPRR Property, Parcel 3

DRAWING
No. 1, DATED 11-20-90

DEPT. OF ENVIRONMENTAL QUALITY
RECEIVED:
FEB 25 1993
ENVIRONMENTAL CLEANUP DIVISION



PLAT OF LAND

"A" Street Parcels

Ashland, Oregon

Attachment 2

New Parcels 2, 3, 4, 5, 6 and 7 of City of Ashland Partition Plat P-32-2000

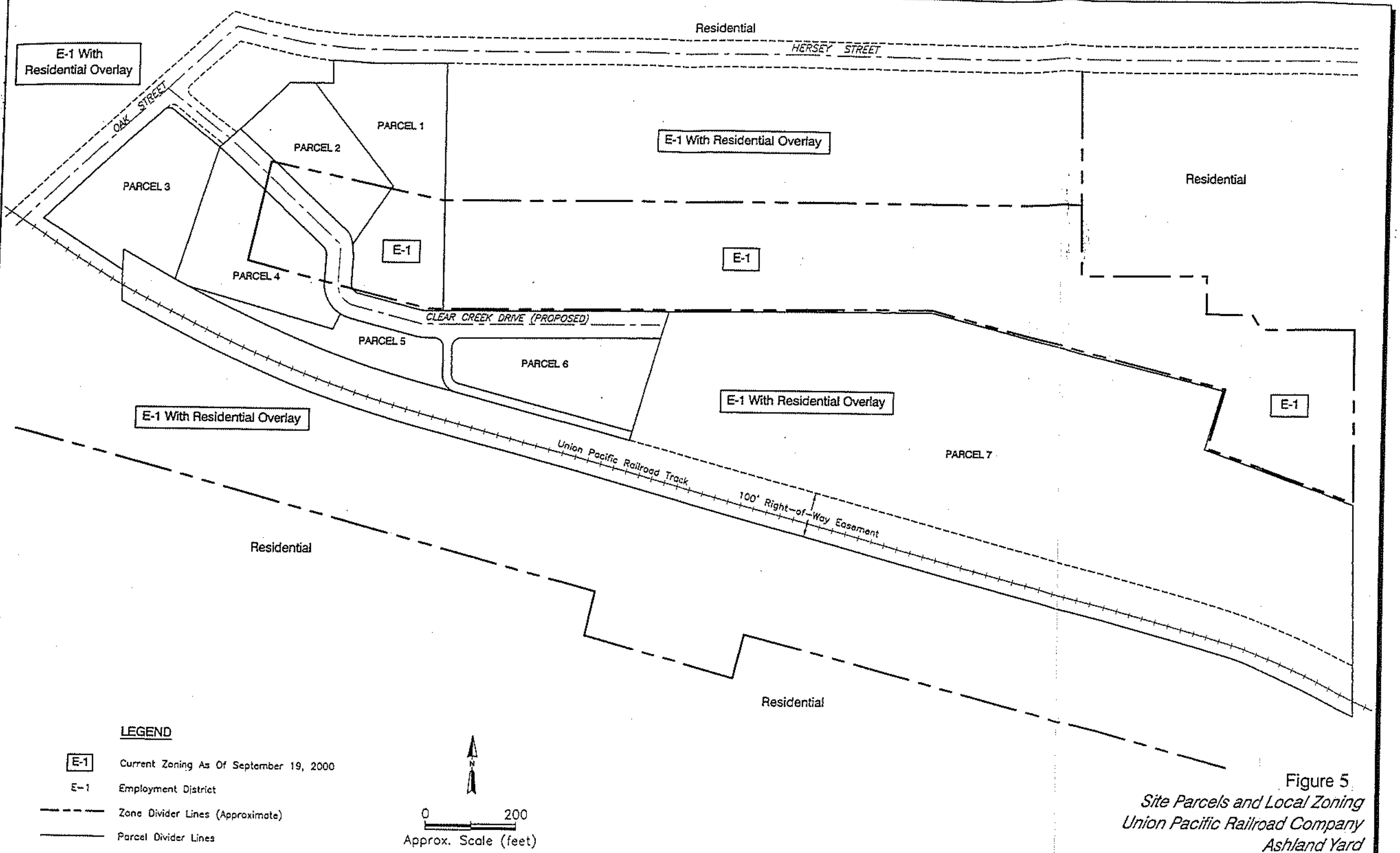


Figure 5
Site Parcels and Local Zoning
Union Pacific Railroad Company
Ashland Yard
Ashland, Oregon

Attachment 3

Parcel 7, Tax Lots 6200 and 6700

FOR ASSESSMENT AND TAXATION ONLY

N.E.1/4 N.E.1/4 SEC.9 T.39S. R.1E. W.M.
JACKSON COUNTY
1" = 100'

391E9AA
ASHLAND

CANCELLED TAX LOT NUMBERS
1800 ADDED TO 1600
200 REMAPPED TO 391E10
2000 ADDED TO 2200
2803 REMAPPED TO 90000
391E04DD-601 ADDED TO 1000

391E9AA
ASHLAND
NEW MAP January 27, 2009
REV March 29, 2021

GIS DATA
04/20/2021 8:23:39 AM: yatesja

FOR ASSESSMENT AND TAXATION ONLY

N.W.1/4 N.E.1/4 SEC.9 T.39S. R.1E. W.M.
JACKSON COUNTY
1" = 100'

CANCELLED TAX LOT NUMBERS
100-1900 REMAPPED TO 391E09AA
10000 ADDED TO 9800
10100 REMAPPED TO 90000
4801 ADDED TO 4800
6400 REMAPPED TO 391E09AA
6401 ADDED TO 6400
6500M1-6509M1
6510 REMAPPED TO 391E09AA
6600 REMAPPED TO 391E09BA
6601 REMAPPED TO 90000
6604 ADDED TO 6605
6701 REMAPPED TO 391E09AA
90000-90003 REMAPPED TO 391E09BA3
9900 ADDED TO 9800

GIS DATA
05/26/2021 9:43:34 AM: thompsam

NEW MAP January 27, 2009
REV May 18, 2021