Report
Independent Clean Up Action
Riverside Business Park
Everett, Washington

August 22, 2002

Prepared for

The Port of Everett
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PROJECT BACKGROUND/SITE DESCRIPTION

This report documents an independent remedial action that was performed by the Port of Everett (Port) at the Riverside Business Park in Everett, Washington, referred to as the "project site." The independent cleanup action was accomplished pursuant to the Washington State Model Toxics Control Act [MTCA, Washington Administrative Code (WAC) 173-340]. Landau Associates prepared this report for the Port (the property owner) to fulfill the post-construction documentation requirements under MTCA. The Port completed the cleanup action activities described in this report in April 2001.

The site remedial activities consisted of excavating arsenic-affected soil, and capping the excavated arsenic-affected soil onsite with a low-permeability geosynthetic clay liner (GCL). Future remedial action at the site is expected to include covering other arsenic-affected areas with buildings and asphalt concrete or Portland cement concrete pavement (driveways, parking areas, sidewalks, etc.). These activities are consistent with the plan Landau Associates developed for addressing arsenic-affected soil and groundwater at the site during initial site development (Landau Associates 2000a). A copy of the above-referenced plan was forwarded to Judith Aitken at the Washington State Department of Ecology (Ecology) on March 20, 2000. Ms. Aitken confirmed her concurrence with the planned approach for handling arsenic-affected soil and groundwater in a letter to the Port dated April 20, 2000.

The remainder of this document presents a description of the project site history, site conditions, the nature and extent of contamination, a cleanup level comparison, a description of the remedial action, and remedial action implementation.

LOCATION

The Riverside Business Park is located adjacent to the Snohomish River in Everett, Washington, as shown on the Vicinity Map, Figure 1. The property street address is:

501 East Marine View Drive
Everett, WA 98201

The offsite Port contact is:

John Klekotka, P.E., Director of Engineering and Planning
425-388-0715

The Riverside Business Park is bounded on the west by the Burlington Northern and Santa Fe Railway Company (BNSF) railroad tracks and Delta Yard, a major switching yard. The SR 529 Snohomish River Bridge and BNSF railroad drawbridge bound the project site on the north. To the south, the project site narrows to a location northwest of the I-5 bridge across the Snohomish River. The property limits are shown on the Site Map, Figure 2. The project site includes an area formerly called the

Weyerhaeuser East Site. Another parcel, referred to as the *Mill E Site*, is not within the Port's property. Land use in the vicinity of the project site includes industrial properties situated adjacent to the river, and commercial and residential uses on the hillside west of the site.

The Port is currently in the process of redeveloping the project site (an under-utilized industrial property) into a 78-acre business park with about 1,350,000 ft^2 available for industrial, warehousing, and/or manufacturing space. Construction of project-site infrastructure (i.e., main access road and site utilities) was completed in 2001. It is anticipated that buildings, secondary roads, parking areas, drives, and related site improvements will be constructed at the project site in the next few years.

TOPOGRAPHY AND GEOLOGY

This section discusses the general topographic and geologic conditions in the vicinity of the project site.

Topography

Project site topographic information is based on site survey and other information provided by the Port's project engineer (Reid Middleton). The existing project site topography is generally level. Prior to site development activities in 2000 and 2001, site elevations ranged from between about 6 and 10 ft above mean sea level (MSL). Following site development activities in 2000 and 2001, the majority of the site is now at about elevation 10 ft. Future buildings constructed at the project site will have a minimum finish floor elevation of 11 ft. The minimum elevation of the recently constructed access road that parallels the western boundary of the project site is 8 ft. Offsite to the west of the project site, lie moderately sloped, glaciated ridges and hills reaching up to 500 ft above sea level, bordering the low-lying floodplain upon which the site is located.

Geology

Interpretations of project site geologic conditions are based on the results of our review of available information and the results of subsurface explorations and laboratory testing conducted by Landau Associates and others.

The project site is generally underlain by surficial fill consisting primarily of up to 20 ft of sand and silty sand dredged from the nearby Snohomish River. The most recent fill, placed as part of site development activities in 2000 and 2001, consists of dredge sand from about 1 to 4 ft thick.

Natural alluvium is present beneath the fill, and consists of layers of sand and silt with varying organic content. The upper portion of the alluvium typically consists of fine to medium sand with

varying silt content, previously identified as the Upper Sand Unit (EMCON 1995). The Upper Sand Unit is underlain by very soft to stiff silt with trace sand, lenses of sand, and organics, previously identified as the Silt Unit (EMCON 1995). The Silt Unit was about 5 to 15 ft thick where fully penetrated. Soil encountered at depths below the Silt Unit consists of grey to black, fine to coarse, silty sand to clean sand with interbeds of silt, previously identified as the Lower Sand Unit (EMCON 1995). The Silt Unit forms an aquitard between an upper aquifer in the fill and Upper Sand Unit and a lower aquifer in the Lower Sand Unit.

No units of the Vashon drift were found at the project site; only fill and younger alluvium were observed within the depths of the excavations and borings at the site. However, Vashon drift is present in the hillsides west and south of the site and may underlie the alluvium at depth beneath the site. Regional geologic data indicate that the Vashon drift is underlain by the Whidbey formation. This unit consists mostly of medium- to coarse-grained, cross-stratified sand, and interbeds of fine-grained sand and silty sand. This unit was not observed in any of the explorations completed at the site.

GROUNDWATER

A review of previously collected and compiled project site and vicinity data (Dalton, Olmsted & Fuglevand 1996; Dames & Moore 1995; EMCON 1995; GeoEngineers 1996; Hart Crowser 1989a,b, 1990, 1991; Landau Associates 2000a,b) indicate that three hydrologic units have been identified at the project site. These units include a shallow unconfined aquifer in the fill and Upper Sand Unit (upper sand aquifer), an aquitard in the Silt Unit (silt aquitard), and a semi-confined aquifer in the Lower Sand Unit (lower sand aquifer). The available data, which were collected at various times throughout the years, suggest that depth to groundwater in most areas of the project site was approximately 1 to 10 ft below the ground surface (BGS) at the time of explorations. Subsequent construction activities in 2000 and 2001 raised site grades on the order of about 1 to 4 ft.

RELEASE INFORMATION AND SITE CHARACTERIZATION

The Riverside Business Park is located at the site of the former Weyerhaeuser Everett East Mill Site (East Site), adjacent to the Snohomish River in Everett, Washington. The Weyerhaeuser East Mill began operation in 1902 on a former estuarine tide flat that was built up by dredge fill in the early 1900s. In 1915, the tide flat was filled and the facility was expanded. The site consisted of several lumber processing facilities that included saw mills, wood processing and storage areas, diesel and gasoline fuel storage tanks, and wood sap stain and end seal treatment tanks.

The long history of lumber processing operations at the site led to contamination (related to these processes) of the soil and groundwater beneath the site, and the site was later ranked and listed as a cleanup site under the MTCA. Remediation of contaminated soil at the former East Site was conducted by Weyerhaeuser in accordance with a 1997 Consent Decree between the of Ecology and the Weyerhaeuser Company (Ecology 1997). Remediation activities for the contaminants of concern (COCs) identified at that time (total petroleum hydrocarbons, polychlorinated biphenyls, carcinogenic polycyclic aromatic hydrocarbons, and pentachlorophenol) were performed in 1996 and 1997, as described in the *Soil Remediation Completion Report* (Dalton, Olmsted & Fuglevand 1997). The cleanup actions accomplished by the Weyerhaeuser Company in 1996 and 1997 addressed specific locations and prescribed actions related to the most significant contamination issues and constituents of concern identified at that time (but did not include addressing arsenic contamination). Consequently, soil and groundwater at lower contamination levels of the constituents of concern remain across the site above cleanup levels for unrestricted site use. For this reason, consistent with actual site use and zoning and under the site consent decree, the property is restricted to industrial use.

The project site has also been impacted by offsite sources of contamination, notably the nearby ASARCO smelter site. These impacts include elevated concentrations of arsenic in the soil and groundwater beneath the site. Initial studies by others associated with the original site Consent Decree indicated that the site soil had arsenic concentrations below 200 mg/kg, the MTCA cleanup level for industrial sites prior to August 2001. Accordingly, arsenic was not addressed during the 1996/1997 remedial action for the former East Site. However, more recent studies conducted by others (ASARCO 1998, 1999; Hydrometrics 1999) indicate site soil arsenic concentrations above 200 mg/kg. There are also several locations where site soil concentrations are above the current MTCA industrial cleanup level of 20 mg/kg. These studies form the basis for the remedial activities described in this report.

Following Ecology's approval of the former East Site soil remediation of COCs identified in the 1997 Consent Decree, the site was transferred to the Port according to the terms of a purchase/sale agreement between the Port and Weyerhaeuser. The Port subsequently prepared plans for developing the former East Site into a light industrial/business park. Construction activities at the site in 2000 and 2001 included raising the existing grades between about 1 and 4 ft throughout the site, installing utilities, and constructing a main access road and two stormwater ponds.

PREVIOUS INVESTIGATIONS AND DOCUMENTATION

The nature and extent of project site arsenic distribution was evaluated based on available data in Landau Associates' files associated with the previous investigations for the former East Site

(encompassing the current site area), the ASARCO Everett Smelter Site, and the Mill E Site. Landau Associates did not conduct any of these investigations.

SOIL DATA

A number of environmental investigations have been conducted at and near the planned Riverside Business Park, including the former East Site (which encompasses the project site) and the Mill E Site, by Weyerhaeuser and ASARCO. Soil arsenic data were collected from several reports, which are identified at the end of this report in the references section. This information was used to identify the distribution of arsenic in soil at and near the project site. Maximum concentrations of arsenic detected in the soil on the project site are presented on Figure 2. These data were acquired after remedial actions at the former East Site and the adjacent Mill E Site were complete. Arsenic concentrations in most soil samples were below the MTCA Method A industrial cleanup level of 200 mg/kg in effect prior to August 2001. However, some arsenic concentrations exceeding 200 mg/kg were detected.

The primary area where arsenic concentrations approach or exceed 200 mg/kg is at the north end of the site, near the existing bridge and roadway embankment, as shown on the shaded areas on Figure 2. The maximum detected soil concentration of arsenic, 954 mg/kg from test pit TP-30, was identified approximately 300 ft west of the former Mill E Site, near the south end of the planned Riverside Business Park. This elevated arsenic concentration was detected in a sample collected at a depth of 2 ft BGS and no other arsenic concentrations exceeding 200 mg/kg were observed at this location or in this area.

Metals leachability data are not available for the former East Site; however, the toxicity characteristic leaching procedure (TCLP) was performed for arsenic on eight samples from the former Mill E Site (which is adjacent to the project site) and the ASARCO Everett Smelter Site (which is the likely source of elevated arsenic concentrations at the project site). TCLP results for the Mill E Site samples (which had soil concentrations ranging from 15.7 to 459 mg/kg) ranged from nondetect to 0.7 mg/L, nearly one order of magnitude less than the regulatory level of 5 mg/L for designation as a dangerous waste. TCLP results for the ASARCO Everett Smelter site indicated that soil arsenic concentrations less than 3,700 mg/kg are not likely to correspond to a TCLP arsenic concentration greater than 5 mg/L. The maximum soil arsenic concentration observed at the project site is about ¼ of the 3,700 mg/kg concentration. As a result, we do not anticipate that soil samples from the project site would designate as dangerous waste.

GROUNDWATER DATA

Groundwater samples are collected at the project site (the former East Site) as required by the Consent Decree (Ecology 1997). Arsenic contamination is not addressed by the Consent Decree and, as a result, arsenic analyses are not consistently performed on groundwater samples collected for project site compliance monitoring. However, arsenic analyses was performed on samples collected in June 1998, in site samples collected during characterization of the project site (the former East Site) and the Mill E Site, and in geoprobe samples collected by ASARCO. Shallow aquifer groundwater arsenic data from these sampling events are presented on Figure 3. The samples show that in many areas, the shallow groundwater at the site has been impacted above the MTCA Method A cleanup level of 5 µg/L.

Arsenic groundwater concentrations in the shallow aquifer are generally less than 20 µg/L, except for an area in the northern portion of the project site and an area in the general vicinity of the former Mill E Site, as shown on Figure 3. Many of the groundwater samples exhibiting elevated arsenic concentrations were collected by geoprobe (e.g., all locations identified with a triangle on Figure 3), which often have high levels of suspended particulates, even after filtering. The high levels of suspended solids in the sample frequently result in detected metals concentrations that are higher than is actually present in the groundwater because the metals sorbed on the solids readily desorb into the groundwater sample.

SELECTION OF CLEANUP STANDARDS

In accordance with WAC 173-340-700, cleanup standards were developed for the project site for arsenic in soil. The cleanup standards include cleanup levels protective of human health and the environment and locations where cleanup levels must be attained (i.e., points of compliance). Because removal of all contaminated soil within the cleanup action area (the project site) was not intended for this remedial action, compliance with the cleanup standards was achieved through non-removal actions. The cleanup standards were also used to determine remedial action objectives (RAOs) which are discussed later in this report.

The cleanup levels developed for the project site related to the 2001 remedial action are limited to those for arsenic in soil. To develop the cleanup levels for the project site soil, it was assumed that the current and future use of the Riverside Business Park is, and will be, consistent with use as an industrial site, and that land use in the immediate vicinity of the facility is, and will remain, primarily industrial. This assumption is consistent with the designation for the site for previous site remedial actions under the site Consent Decree.

The arsenic soil cleanup level selected for the site is the MTCA Method A cleanup level for industrial soil in effect at the time the independent cleanup action was implemented. This soil cleanup level is based on direct human exposure. Exceedances of this soil cleanup level based on industrial soil are shown in shaded areas on Figure 2. As noted previously, arsenic cleanup levels for industrial soil were exceeded at several locations, notably near the north part of the project site.

Based on direct contact, the point of compliance for soil cleanup levels is identified as throughout the site from the ground surface to a depth of 15 ft BGS. It is important to note that, according to the MTCA [WAC 173-340-740(6)(d)], it is not expected that soil cleanup levels will be met at the point of compliance at sites where a containment remedy is selected. Instead, the final remedy is determined to comply with the cleanup standards if the requirements for the containment remedy (including compliance monitoring) are met.

EXPLANATION OF REMEDIAL ACTIONS

This section presents the RAOs and summarizes the remedial action that was selected and implemented.

REMEDIAL ACTION OBJECTIVES

The RAOs for arsenic-affected soil are to:

- Contain all known soil with arsenic above the soil cleanup level within areas that will be covered by a low-permeability surface (soil with elevated arsenic levels outside these areas will be removed)
- Reduce the threat to human health by eliminating potential exposure to affected soil through direct contact
- Reduce surface water infiltration through affected soil for protection of groundwater and to minimize the potential threat to human health or the environment resulting from groundwater discharge to the Snohomish River.

SELECTED REMEDIAL ACTION

To address the RAOs, the selected remedial action consists of: 1) limited removal of arsenic contaminated soil in areas not anticipated to be covered by low permeability features as part of site development (e.g., pavement and buildings) and placement of this soil beneath a low permeability cover onsite; 2) placement of pavement and buildings over other areas with arsenic soil concentrations above the selected cleanup level as part of site development (note that this activity will not be fully completed

until site development has been finished); and 3) development of institutional controls to address arsenic-affected soil for future site development and normal maintenance activities.

The remedial action completed in 2001 consisted of excavating soil with elevated arsenic concentrations (e.g., above the MTCA Method A industrial soil cleanup level of 200 mg/kg applicable at the time of the action) from areas that would not be covered by low permeability surfaces during site development. The area excavated was in planned planting areas along both sides of an access road, as shown on Figure 4. The excavated soil was placed in an area east of the bridge and roadway embankment and covered with a GCL, as shown on Figures 2 and 4. Future site remedial actions will occur during site development and will include covering arsenic-affected areas of the site with buildings or pavement.

Consolidation and capping of the contaminated soil prevents direct human contact with arsenic-affected soil, provides containment, and minimizes the migration of arsenic from soil to groundwater due to infiltration. Recently completed site paving (roadways and sidewalks) on the west part of the site also minimizes the migration of arsenic from soil to groundwater.

The independent action also included controls to prevent arsenic-affected groundwater from impacting stormwater. During the wet season, groundwater elevations at the project site are likely to exceed surface water elevations in the two stormwater detention ponds that were constructed. Therefore, the remedial action included installation of an HDPE (high density polyethylene) flexible membrane liner in both ponds to prevent groundwater/surface water interaction.

REMEDIAL ACTION IMPLEMENTATION

The Port solicited bids from contractors in the spring of 2000. Wilder Construction of Everett, Washington was selected by the Port as the lowest responsible, responsive bidder, and site construction activities began in June 2000. Most site construction activities were focused on general site development; however, the following remedial activities were also accomplished:

- Soil Excavation. Soil containing arsenic above the cleanup level beneath planned planter strips along the paved access road was excavated in October 2000 and placed at the east end of the bridge embankment.

- GLC Cap Placement. The GLC cap was placed over the excavated soil and other materials in April 2001.

Port and Reid Middleton personnel provided construction oversight. Mr. Jack Olson of the Port and Mr. Jeff Lundt, P.E. of Reid Middleton were the primary representatives during construction. Mr. Steven Wright, P.E. of Landau Associates conducted limited site visits. Landau Associates' description and evaluation of the remedial action are based on verbal and written information provided by

Port and Reid Middleton personnel and site visits by Steven Wright, P.E. on October 10, 2000 and April 5 and 26, 2001.

Soil Excavation

Approximately 1,300 yd^3 of soil with arsenic concentrations potentially exceeding the arsenic cleanup level of 200 mg/kg were excavated from the planned landscape strips along the access road (see Figure 4). The soil excavation was approximately 10 ft wide and 4 ft deep, with a total length of about 440 ft, excavated from two separate strips on either side of the access road. This arsenic-affected soil was temporarily stockpiled near the southeast corner of the northern stormwater pond.

The over-excavated areas were backfilled with clean, imported dredge sand. Landau Associates was not onsite to witness the over-excavation process and backfilling activities. Accordingly, the thickness of the fill was verified by Landau Associates personnel in several areas by manually excavating through the sand fill. The fill thickness was checked on both sides of the new access road and at all locations checked, the depth of the fill measured about 4 ft.

Soil Containment

During April 2001, Wilder Construction moved the stockpile of arsenic-affected soil to near the eastern bridge approach (see Figure 4). On April 5, 2001, Landau Associates personnel confirmed that no additional soil remained in the former stockpile area.

On April 26, 2001 Landau Associates personnel visited the site to observe the completion of arsenic-affected soil capping. Landau Associates personnel did not observe all capping activities; the capping description below is based on information provided by Jeff Schock and Todd Snyder of Wilder Construction. The cap was constructed by installing a reinforced, needle punched GCL (Bentomat DN) over the arsenic-affected soil. Prior to placing the GCL, the area was crowned to promote surface water runoff. Because the width of the area being capped exceeded the width of the GCL, multiple strips were deployed. Placement of the GCL was started near the low point of the capped area, and GCL strips were placed with an overlap of between about 12 and 18 inches. The GCL strips were overlapped in a manner similar to roof shingles (i.e., surface water runoff will flow over the overlaps, not under the overlaps). Consistent with manufacturer's recommendations, the GCL strips were sealed at the overlaps with bentonite powder.

Following deployment of the GCL, Wilder Construction used a wide-tracked dozer to place an approximate 1-ft layer of topsoil over the GCL and the underlying soils. Landau Associates personnel

observed the topsoil spreading and documented that a minimum of 12 inches of topsoil was maintained between the dozer and the GCL to prevent damage to the GCL.

CONCLUSIONS AND LIMITATIONS

Landau Associates' observations during the remedial activities were limited to the sites visits described earlier in this report. Based on information provided to us by others, the remedial action described in this report was implemented generally consistent with amended plans and specifications prepared by Reid Middleton. We do not warrant the accuracy of information supplied by others, nor are we responsible for the use of, or reliance on, such information.

This remedial action report has been prepared for the exclusive use of the Port of Everett for the purpose of documenting the remedial action related to arsenic-impacted soils at the Riverside Business Park site in Everett, Washington. The reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that, within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under the similar conditions as this project.

We appreciate the opportunity to provide these services to the Port. Please contact us if you have any questions regarding the information contained in this report.

LANDAU ASSOCIATES, INC.

Lawrence D. Beard, P.E.
Principal

Steven R. Wright, P.E.
Senior Engineer

8/21/02

EXPIRES 4/24/04

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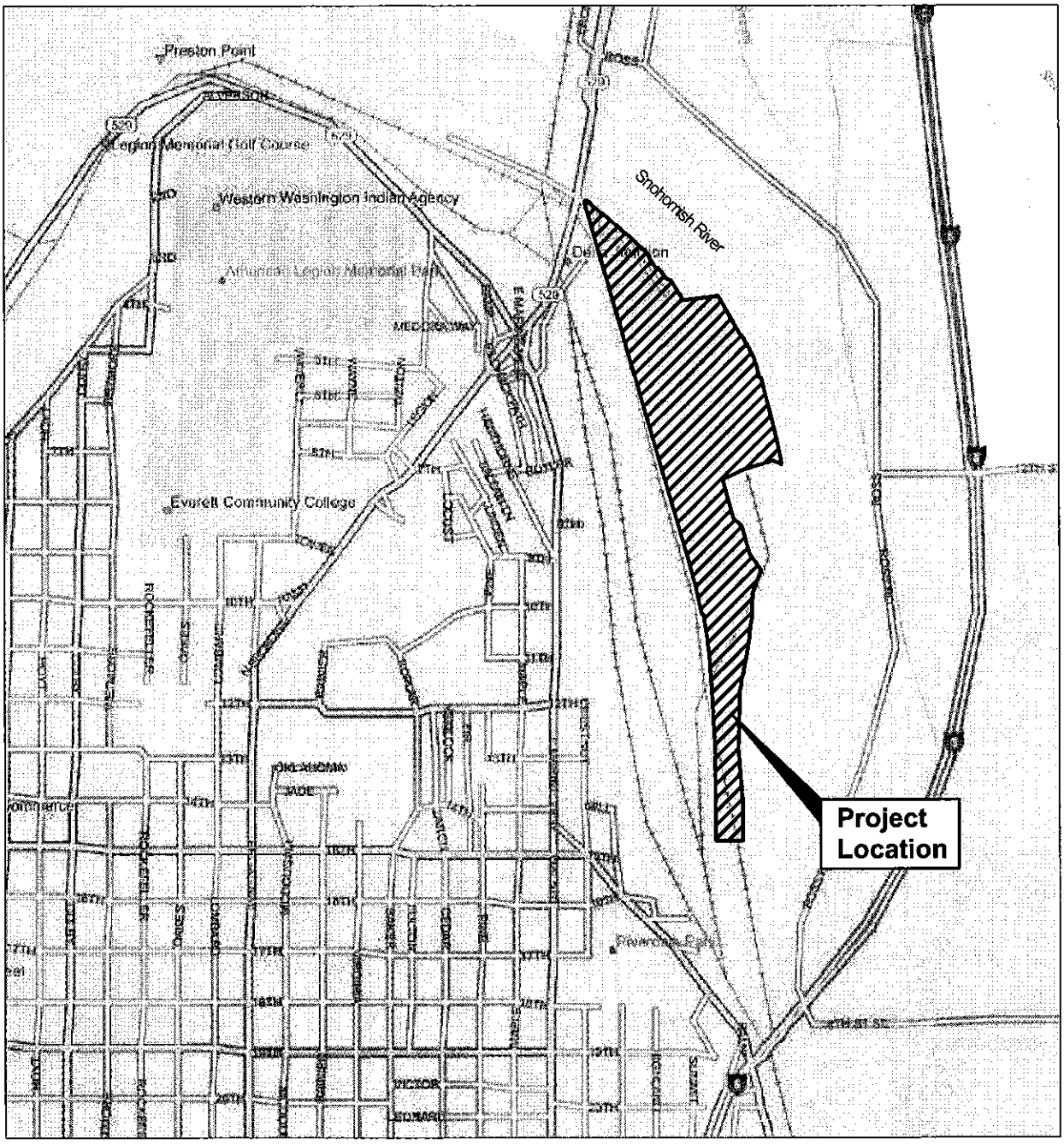

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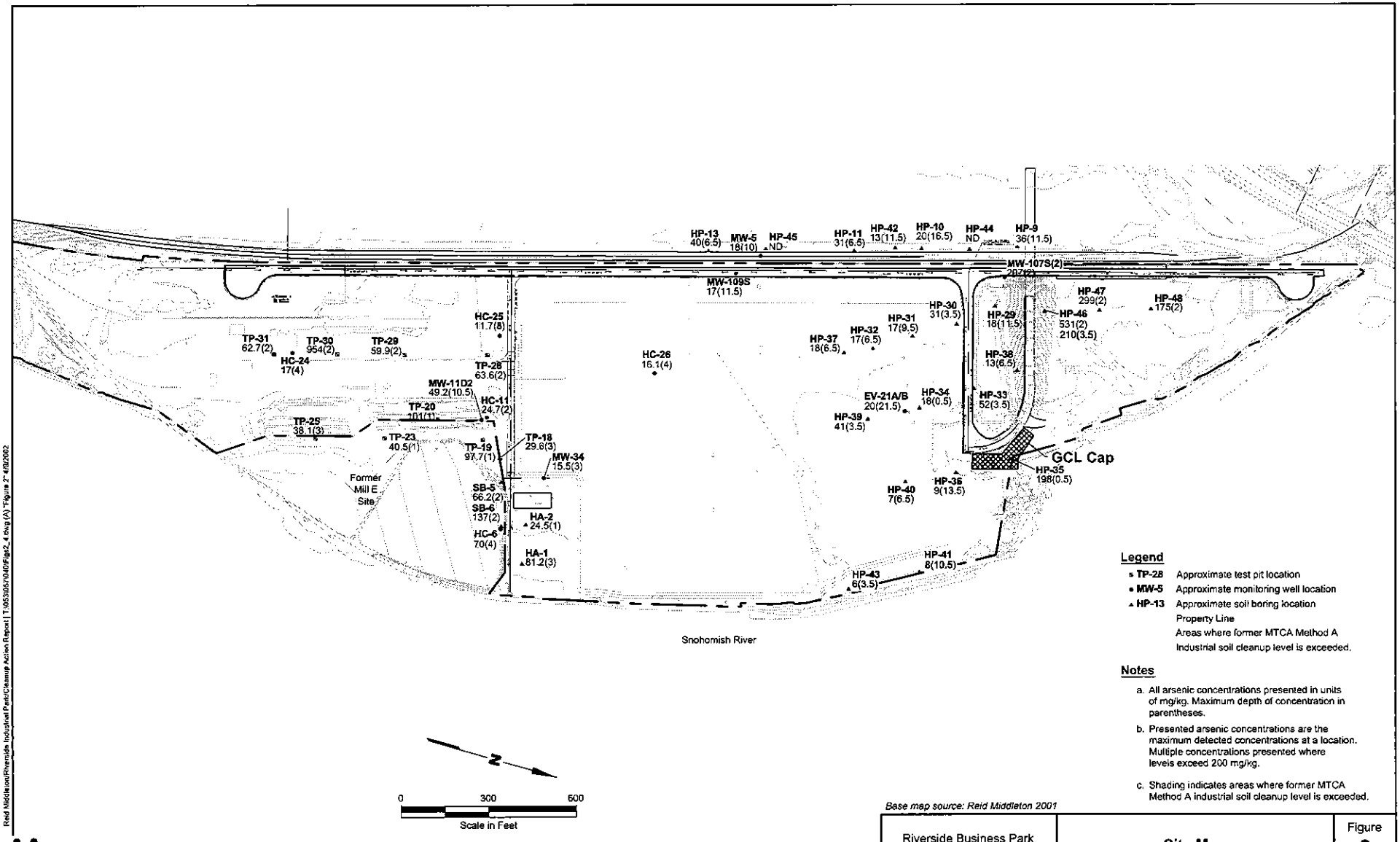
Riverside Business Park Everett, Washington	**Vicinity Map**	Figure 1



Legend

- ▪ TP-28 Approximate test pit location
- • MW-5 Approximate monitoring well location
- ▲ HP-13 Approximate soil boring location

Property Line

Areas where former MTCA Method A Industrial soil cleanup level is exceeded.

Notes

a. All arsenic concentrations presented in units of mg/kg. Maximum depth of concentration in parentheses.

b. Presented arsenic concentrations are the maximum detected concentrations at a location. Multiple concentrations presented where levels exceed 200 mg/kg.

c. Shading indicates areas where former MTCA Method A industrial soil cleanup level is exceeded.

Base map source: Reid Middleton 2001

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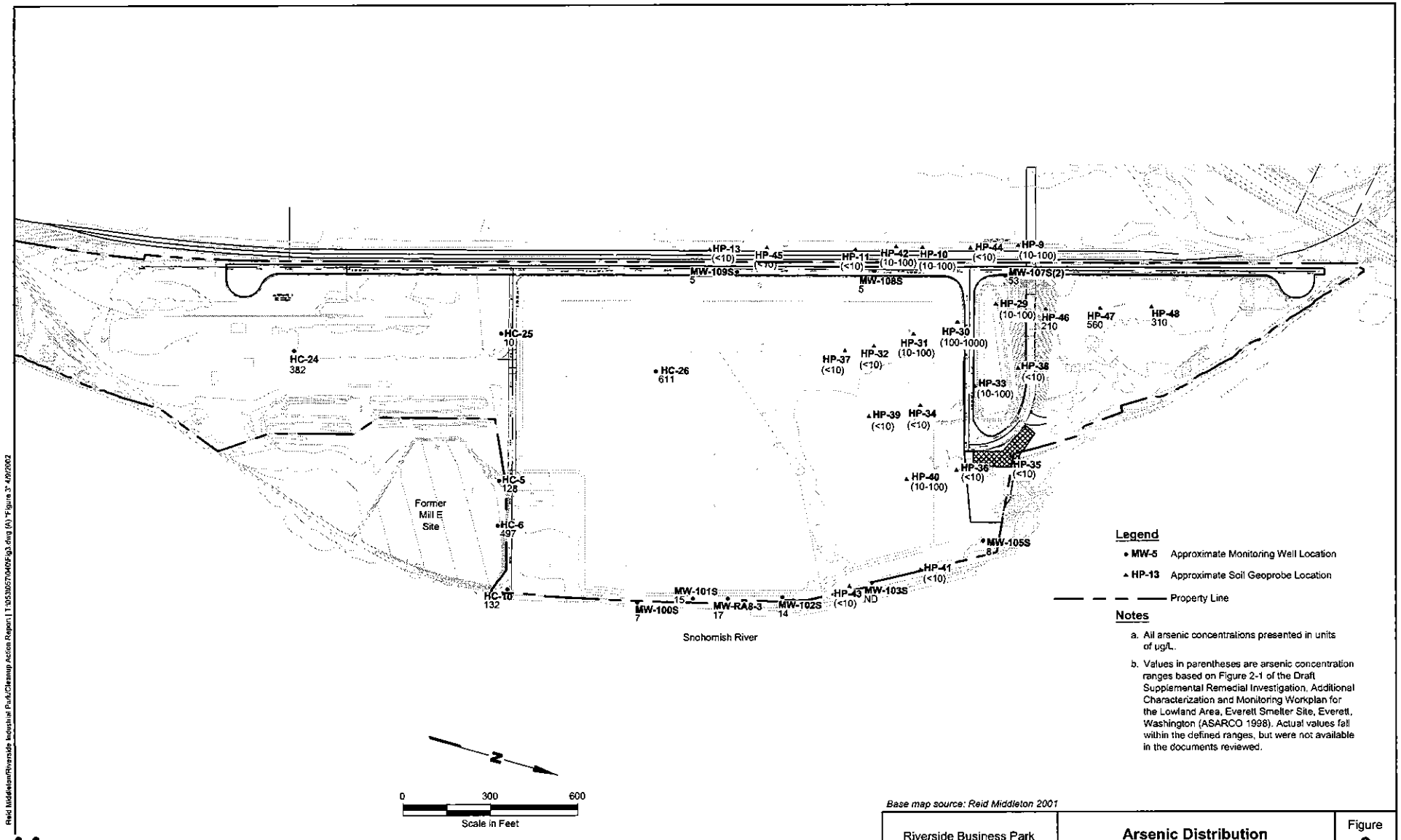
Riverside Business Park Everett, Washington	**Site Map**	Figure 2



Base map source: Reid Middleton 2001

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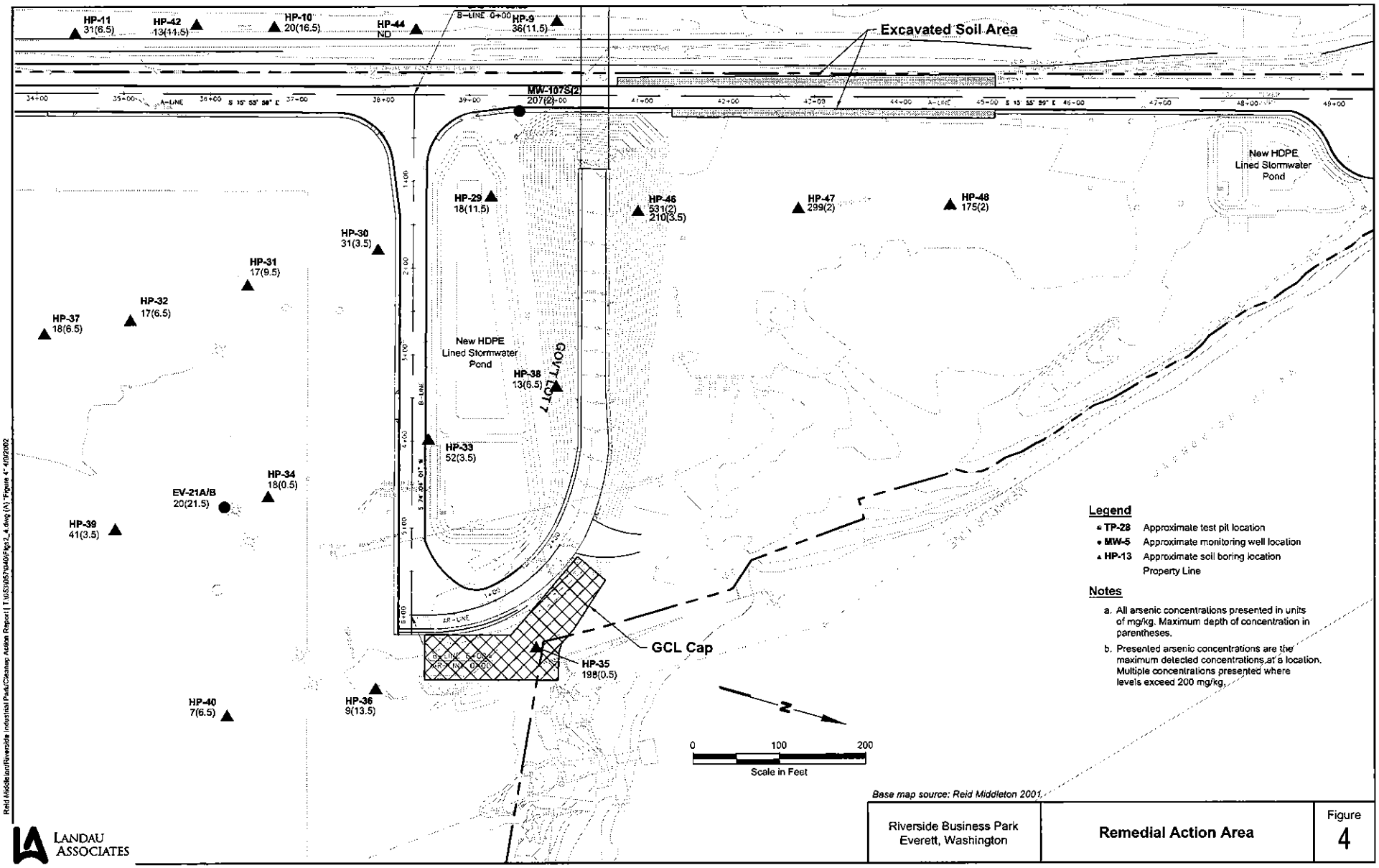
Riverside Business Park Everett, Washington	**Arsenic Distribution in Shallow Groundwater**	Figure 3


HP-11
31(6.5)
HP-42
13(11.5)
HP-10
20(16.5)
HP-44
ND
HP-9
36(11.5)
Excavated Soil Area
MW-107S(2)
207(2)
New HDPE
Lined Stormwater
Pond
HP-29
18(11.5)
HP-45
531(2)
210(3.5)
HP-47
299(2)
HP-48
175(2)
HP-30
31(3.5)
HP-31
17(9.5)
HP-32
17(6.5)
HP-37
18(6.5)
New HDPE
Lined Stormwater
Pond
GOVT LOT 7
HP-38
13(6.5)
HP-33
52(3.5)
HP-34
18(0.5)
EV-21A/B
20(21.5)
HP-39
41(3.5)
GCL Cap
HP-35
198(0.5)
HP-40
7(6.5)
HP-36
9(13.5)
N
0
100
200
Scale in Feet
Legend
TP-28 Approximate test pit location
MW-5 Approximate monitoring well location
HP-13 Approximate soil boring location
Property Line
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Base map source: Reid Middleton 2001.
Riverside Business Park
Everett, Washington
Remedial Action Area
Figure
4
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