State of Oregon
Department of Environmental Quality Memorandum

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To: ECSI FILE #4063

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Subject: Staff Memorandum for a Conditional No Further Action Determination Tigard Library Site at 1300 SW Hall Boulevard Tigard, Oregon ECSI # 4063

This document presents the basis for the Oregon Department of Environmental Quality's (DEQ's) recommended Conditional No Further Action (cNFA) determination for the Tigard Library Property (Site), ECSI #4063, located at 13500 SW Hall Boulevard Tigard, Oregon.

A September 3, 2004 (DEQ, 2004) letter agreement between DEQ and the City of Tigard provides the basis for site investigations oversight. The proposed cNFA determination meets the requirements of Oregon Administrative Rules Chapter 340 Division 122, Sections 010 to 0140, and ORS 465.200 through 465.455.

The proposed cNFA is based on information documented in the following references and other references included in this memo:

- GeoEngineers, 2008. July 11, 2008 GeoEngineers Tigard Library Human Health Risk Assessment and Level 1 and Level 2 Ecological Risk Assessments.
- DEQ, 2011. August 1, 2011 Record of Decision (ROD) for Remedial Action Alternatives.
- GeoEngineers, 2012. November 16, 2012 GeoEngineers Comprehensive Management Plan for Arsenic-Contaminated Soil and Sediment (also known as the Contaminated Media Management Plan, CMMP).
- City of Tigard, 2020. City of Tigard Easement and Equitable Servitudes (EES).

Unacceptable arsenic soil contaminant concentrations are present below barriers such as pavement, building foundations, or clean soil, thereby preventing current exposure. Groundwater and surface water contaminant concentrations were acceptable for human and ecologic receptors. These results allow for a cNFA determination. The conditional nature of the NFA determination is based on arsenic contamination in the soil below the unpaved areas, site buildings, and paved parking areas exceeding one or more acceptable risk levels for occupational, construction worker, and excavation worker receptors. This risk for soil is for potential future use or excavation work that disturbs the building foundation and paved or unpaved site surfaces that have clean soil covers. The conditions for the Site risk management are detailed in the Record of

Decision (ROD).

1. BACKGROUND AND HISTORIC SITE USES

Site Location

The Site is located east of the intersection of SW Hall Boulevard and SW Wall Street in Tigard, Oregon (Washington County). Fanno Creek borders the north and east sides of the Site, with roadways and mixed residential and commercial development to the west and south. The approximate 14.7-acre Site is located in the southeast quarter of Section 2, Township 2 South, Range 1 West (Willamette Baseline and Meridian).

The Site is defined as the property occupied by the library facility (Washington County tax lots 2S102DA00600, 2S102DD00100, and 2S102DD00200), public rights-of-way (ROW) adjacent to the south (Wall Street) and west (Hall Boulevard) sides of the library property, and stream/wetland areas at the south and southeast of these areas. The Site does not include Fanno Creek or areas north or east of Fanno Creek. The Site maps and risk assessment information are shown in Attachments 1 through 6 (DEQ, 2011). The Locality of the Facility (LOF) is considered the Tigard Library Property, as shown in Attachment 2.

Physical Setting

A library and associated parking and vegetated areas currently occupy the Site. A pedestrian trail traverses the east and north sides of the Site. The elevation of most of the Site is approximately 150 feet above mean sea level (MSL). The Site is relatively flat, except for a low area occupied by Pinebrook Stream that traverses the south side of the Site in a west-east direction. A gentle swale, oriented in a southwest-northeast direction, runs through the middle of the Site. Much of the southwest-northeast trending swale was filled during the library's construction, and the swale no longer channels stormwater at the Site.

Pinebrook Stream flows across the Site's south side after entering the Site through a culvert underneath Hall Boulevard. Pinebrook Stream discharges to Fanno Creek near the southeast corner of the Site. A stormwater pond (the "pond") is located at the SE corner of the Site, adjacent to and north of Pinebrook Stream. The pond receives stormwater runoff from parking areas at the Site. The stormwater enters the north side of the pond through a constructed channel. During high water events, the pond and Pinebrook Stream may be connected. Fanno Creek is a perennial stream with heavily vegetated banks approximately 5 feet high. Fanno Creek discharges to the Tualatin River approximately 2 miles south of the Site. The Site is bordered by residences to the west and south and vacant land to the north and east. Southwest Hall Boulevard borders the west side of the Site.

Site History

The Site was used for agriculture before the library's construction. The arsenic impacts to soil are suspected from previous orchard pest control spraying.

2. LAND USE AND BENEFICIAL WATER USE DETERMINATION

Land Use

The Site's current and reasonably likely future land use is for the City of Tigard public library. A pedestrian trail traverses the east and north sides of the Site. The 14.7-acre Site has Fanno Creek bordering the north and east sides of the Site, with roadways and mixed residential and commercial development to the west and south (DEQ, 2011).

Groundwater Use
The only current and reasonably likely future beneficial groundwater use at the Site is surface water recharge. Groundwater in the Site vicinity is not used for drinking water or other purposes, as confirmed by a Beneficial Water Use Determination (2008, GeoEngineers). The City of Tigard provides domestic water for the Site and surrounding properties.

Surface Water Features
Pinebrook Stream flows across the Site's south side after entering the Site through a culvert underneath Hall Boulevard. Pinebrook Stream discharges to Fanno Creek near the southeast corner of the Site. A stormwater pond (the "pond") is located at the SE corner of the Site, adjacent to and north of Pinebrook Stream. The pond receives stormwater runoff from parking areas at the Site. The stormwater enters the north side of the pond through a constructed channel. During high water events, the pond and Pinebrook Stream may be connected. Fanno Creek is a perennial stream with heavily vegetated banks approximately 5 feet high. Fanno Creek discharges to the Tualatin River approximately 2 miles south of the Site. The location of Fanno Creek and surface water features are shown in Attachment 2.

3. SITE INVESTIGATION WORK

Site investigation work was completed at the Site between 2008 and 2011. The sampling and investigation efforts are summarized in the DEQ Staff Report (DEQ, 2011) and described briefly below. For complete documentation of investigations, please refer to the RI and the *Revised Feasibility Study* (GeoEngineers, 2009) and other data reports in the Administrative Record.

2002 Phase II Environmental Site Assessment
Hahn Associates, Inc. (HAI) conducted a Phase II Environmental Site Assessment (ESA) at the Site in 2002 to evaluate potential impacts to the Site from agricultural chemicals. Pesticides and herbicides were not detected; only arsenic was detected at concentrations exceeding natural background concentrations.

2003 Assessments and 2004 Soil Removal
Apex Environmental Consulting Services, Inc. (Apex) completed two phases of soil assessment under the footprint of the library, the pre-2007 parking area, and the driveway. Approximately 38 surface soil samples were analyzed for arsenic. Apex managed to remove approximately 3,682 tons of contaminated soil from the Site in 2004.

Hahn Associates 2005 Assessment and Remediation
HAI analyzed soil for arsenic at 55 sample locations collected between the ground surface and approximately 6 feet bgs. HAI also managed the removal of 155 tons of contaminated soil from areas in the pedestrian path's footprint that traverses the Site's east side. The results of their investigation and remediation and previously completed work are presented in the 2006 S*upplemental Site Investigation Report* (HAI, 2006).

GeoEngineers 2007 Assessment
GeoEngineers collected soil samples from the south portion of the Site in areas where the Pinebrook Stream channel was scheduled for restoration (GeoEngineers, 2007). Arsenic was detected in eight soil samples collected from five borings at concentrations between 7.22 and 20.4 milligrams per kilogram (mg/kg). Leachable arsenic was not detected in a composite sample. Arsenic was detected in samples collected from eight test pits down to 4 ft bgs at concentrations ranging between 7.96 and 21.1 mg/Kg. Subsurface samples demonstrated that arsenic concentrations declined to background levels by four feet bgs and that the vast majority of elevated arsenic is associated with the surface soil.

GeoEngineers 2008 Soil, Surface Water Investigation, and Sediment
GeoEngineers evaluated soil/sediment and surface water quality in areas affected by the 2007 construction activities (Hall Boulevard/Wall Street improvements) and in the pond. The total concentration of arsenic in the surface water samples ranged between 1.12 and 1.21 micrograms per liter (µg/l). GeoEngineers collected 21 soil/sediment samples and two 3-point composite soil samples. Arsenic was detected in those samples at concentrations up to 32 mg/kg.

GeoEngineers also conducted sediment sampling in 2008 to further assess whether the arsenic concentrations in sediment could pose an unacceptable risk to aquatic receptors (GeoEngineers, 2009). GeoEngineers collected three incremental soil/sediment samples with 30 increments from the pond/wetland area. The concentrations of arsenic detected in the composite samples ranged between 10.5 and 12.9 mg/kg, slightly exceeding the background (8.8 mg/kg) but well below the Probable Effect Concentrations (33 mg/kg), which would suggest toxicity.

4. NATURE AND EXTENT OF CONTAMINATION

On-Site Soil. Soil and sediment are difficult to distinguish in some areas of the Pinebrook Stream channel and the associated wetland areas near the retention pond and Fanno Creek. Therefore, soil and sediment have been addressed as a single contaminated media during the discussion of nature and extent of contamination. Soil and sediment were treated separately during the ecological risk evaluation. Attachment 3 presents summary statistics for arsenic concentrations by soil depth interval.

Arsenic has been detected in soil/sediment between the ground surface and approximately 7.5 feet bgs at concentrations exceeding the DEQ default background concentration for arsenic at the time of 7 milligrams per kilogram.[1] The Arsenic concentrations that exceed the default background concentration generally occur in the upper 2 to 3 feet of soil/sediment.

The highest concentrations of arsenic have been detected in shallow soil near the west and northwest sides of the pond (113 mg/kg in sample "W", collected between the ground surface and 1-foot bgs) and near the southwest corner of the Site (264 mg/kg in sample "12S DUP", collected between the ground surface and 2.8 feet bgs). The area from which sample "12S DUP" was collected is covered by asphalt concrete underneath the SW Hall Boulevard ROW and is identified in Attachment 2 as sample location 12S. The horizontal and vertical distribution of arsenic generally corresponds to the conceptual site model, whereby arsenic was transported

[1] The background value for arsenic was updated to 8.8 mg/kg in 2018 for the Portland Basin (DEQ, 2018).

across the Site via surface soil erosion and overland flow to another depositional area. The approximate extent of arsenic-contaminated soil and past sample locations are shown in Attachment 4.

Off-Site Soil. Because the contaminants were sourced from adjacent off-site activities (orchards to the west), off-site contamination has not been evaluated. It is not part of this investigation and remedial action.

Groundwater. Shallow groundwater data was not collected as part of historical investigations. Based on several factors, groundwater is not believed to be impacted with arsenic at the Site:

The highest concentrations of arsenic are present in near-surface soil. Most of the year, groundwater levels are likely to be deeper than 3 feet bgs across the majority of the Site; therefore, groundwater is generally not in contact with the most highly contaminated soil at the Site.

Arsenic adsorbs to surfaces of a variety of soil materials, including iron oxides, aluminum oxides, and clay minerals. Aten et al. (1980) report that arsenic is nearly immobile in topsoil, and arsenic in arsenical pesticide-contaminated topsoil leaches over several decades or more. This is consistent with the observed soil profile on the Site, which shows very limited vertical mobility of arsenic after decades of surface water infiltration.

The 1980 Aten et al. conclusions were confirmed by the United States Geological Survey (USGS). The 1999 USGS Hinkle and Pollette report conducted a survey of arsenic in groundwater in the Willamette Basin (which includes the subject Site). One of the primary goals of the survey was to determine if arsenical agricultural chemicals are a significant source of arsenic contamination in groundwater. The USGS concluded that, "regional patterns of arsenic concentrations in groundwater of the Willamette Basin as a whole probably reflect primarily natural sources".

In 2007, GeoEngineers collected soil samples from five borings in the south portion of the property, where Pinebrook Stream was scheduled for restoration. Eight soil samples contained arsenic concentrations ranging from 7.22 mg/Kg to 20.4 mg/Kg. A composite sample from these eight samples was analyzed for leachable arsenic, which was not detected. This further supports that the arsenic at the Site is not readily mobile for transport to shallow groundwater.

Further, it has been concluded that groundwater is not used for consumption within the LOF or at nearby properties.

Surface Water and Sediment. Sediment samples were collected from Pinebrook Stream, and sediment and surface water samples in the on-site retention pond in 2008 (following the 2007 stream restoration activities) to evaluate whether the Site is a significant source of arsenic contamination to Fanno Creek. The soil/sediment and surface water data (discussed in Section 4.0 above) show that surface water and sediment discharging from the Site to Fanno Creek are not likely to result in unacceptable risk to ecological receptors in Fanno Creek. Specifically: Surface water discharging from the pond to Fanno Creek contains very low concentrations of arsenic, even during periods when discharge water contains elevated concentrations of suspended solids. The concentrations of arsenic detected in discharge from the pond are less than DEQ's Level II Screening Level Values (SLVs) for aquatic receptors, indicating that the arsenic in pond discharge water does not pose an unacceptable risk to ecological receptors in Fanno Creek.

The concentrations of arsenic in mobile sediment (*i.e.,* sediment that was apparently deposited in the lower (east) end of the Pinebrook Stream channel during winter 2007/2008 [samples HA-23 (0-1), HA-24(0-0.5), HA-27(0-0.5), HA-28(0-0.5), HA-29(0-0.5), and HA-30(0-0.5)]) range

between non-detect (below the method reporting limit of 2.8 mg/kg) and 12 mg/kg. The concentrations of arsenic in mobile sediment are within the range of or slightly exceed the DEQ default background concentration for arsenic (8.8 mg/kg); therefore, it appears that the sediment transported by Pinebrook Stream is not likely to have a significant impact on water and sediment quality in Fanno Creek. The Site is close to the South Willamette Valley boundary with a DEQ default arsenic background of 18 mg/kg.

5. RISK EVALUATION

A human health risk assessment (HHRA) identifying baseline and occupational risks, and a Level 1 and Level II ecological risk assessment (ERA) were performed by GeoEngineers (2008, GeoEngineers). The risk assessment evaluated baseline human health risk based on the current site impacts at the property, considering four potential receptors based on the Conceptual Site Model: Librarian, Maintenance Worker, Adult/Child Park User, and Excavation Workers. The exposure assumptions, site-specific Risk Based Concentrations (RBCs), and the calculated risk for each receptor are summarized below.

Librarian: Exposure assumptions used for this receptor were default DEQ occupational worker values, with the exception of exposure frequency. It was assumed that the librarians (and other library employees) would spend most of their time inside the library and that exposure to site soils would be limited. An exposure frequency of 52 days per year (or one day per week) was selected to evaluate the potential for library employees to be exposed to site soils during periods outside the library building. The calculated, site-specific RBC (using the above exposure frequency) for arsenic is 8.3 mg/kg for the Librarian receptor. Based on exposure to surface soil, the librarian's estimated carcinogenic risk is $1x10^{-6}$. This estimate is equal to the DEQ acceptable risk level of 1×10^{-6} for individual carcinogens, which means there is no excess cancer risk for Librarians based on their expected exposures.

Maintenance Worker: This exposure scenario evaluates persons responsible for maintaining the library facilities, including landscaping. The exposure assumptions are a combination of site-specific exposure frequency and default DEQ occupational and excavation/construction worker values. An exposure frequency of 12 days per year (or one day per month), a soil ingestion rate of 330 mg/day, an adherence factor of 0.3 mg/cm2-day, and an exposure duration of 25 years were selected for this receptor. The soil ingestion rate and adherence factor are the default values for construction and excavation workers. The rationale for the higher soil ingestion rate and adherence factor is that the maintenance workers are assumed to have more direct contact with soil during weeding or planting. The exposure duration is the default value for occupational workers. The calculated, site-specific RBC (using the above exposure factors) for arsenic is 11 mg/kg for the Maintenance Worker receptor. Based on exposure to surface soil, the Maintenance Worker's estimated carcinogenic risk is 1×10^{-6}. This estimate equals the DEQ acceptable risk level of 1×10^{-6} for individual carcinogens.

Adult and Child Park Users: Exposure assumptions for this receptor are default DEQ residential values except for exposure frequency. An exposure frequency of 52 days per year (or one day per week) was selected to represent reasonable maximum exposure to site soils. This exposure scenario would cover library visitors that use the park during their visits to the library and neighbors using the park or pedestrian path. The calculated, site-specific RBC (using the above exposure factors) for arsenic is 2.6 mg/kg for the Adult and Child Park User receptors.

DEQ's default background concentration for naturally occurring arsenic in soil is 7 mg/kg. Based on exposure to surface soil, the estimated carcinogenic risk for adult and child park users is 5 x 10^{-6}. This estimate exceeds the DEQ acceptable risk level of 1 x 10^{-6} for individual carcinogens. Because the Adult and Child Park User site-specific RBC is less than the naturally occurring arsenic concentration, the lower concentration was used to determine the extent of arsenic contamination in the soil (Attachment 4).

Excavation Worker: The exposure assumptions are default DEQ excavation worker values. This scenario would cover instances when excavation activities necessitate exposure to contaminated subsurface soils. The arsenic RBC for the Excavation Worker is 370 mg/kg. Based on exposure to surface soil, the estimated carcinogenic risk for the excavation worker is 3 x 10^{-8}. This estimate is well below the DEQ acceptable risk level of 1 x 10^{-6} for individual carcinogens.

The carcinogenic risk estimates for occupational receptors (librarian, maintenance worker, and excavation worker) are equal to or less than DEQ's acceptable risk level of 1 x 10^{-6} for individual carcinogens. These estimates indicate that the concentrations of arsenic in soil do not present an unacceptable risk to librarians, maintenance workers, or excavation workers. The estimated carcinogenic risk for park users (adults and children) exceeds DEQ's acceptable risk level of 1 x 10^{-6} for individual carcinogens.

The extent of soil that contains arsenic at concentrations exceeding both the RBC for park users and the background concentration (excluding the restoration and pond areas and areas with an existing or proposed cap) are shown in Attachment 4.

Level I and Level II ERA. The ecological risk assessment (ERA), consisting of Level I and Level II ERAs, was completed to assess potential risks to ecological receptors from contaminants in soil/sediment within the LOF. The Level I ERA was completed to assess the LOF for habitat suitability for threatened and endangered (T&E) species and other species, and the Level II ERA was completed to assess the risks to these species from arsenic in soil and sediment within the LOF. The conclusions of the ERAs are presented below.

Sensitive habitat (wetlands and riparian buffer) and potentially complete receptor-contaminant exposure pathways were identified within the LOF based on the results of the Level I ERA. Ecological receptors that may utilize habitat within the LOF and become exposed to arsenic in soil/sediment include both terrestrial species (plants, mammals, birds, and other terrestrial organisms) and aquatic species (fish, plants, and aquatic invertebrates within the Pinebrook Stream channel and the pond).

Species of special concern, including two species of T&E fish, were identified within a 2-mile radius of the Site. With the exception of the Northern Pacific Pond Turtle (a non-T&E species), suitable habitat for species of special concern does not exist within the LOF. An on-site survey of the Northern Pacific Pond Turtle was not conducted as part of this ERA; however, the pond turtle is known not to occur within the LOF under normal conditions.

Terrestrial Evaluation. Results of the Level II ERA show that arsenic in soil is not a concern to terrestrial ecological receptors, with the exception of non-T&E plants. Arsenic may be a terrestrial contaminant of potential ecological concern (CPEC) because the exposure concentration (EC, based on the maximum detected concentration of arsenic in soil [113 mg/kg])

exceeds the DEQ Level II Screening Level Value (SLV) for non-T&E plants (50 mg/kg). The site-wide average (90 percent UCL) concentration of arsenic (11.9 mg/kg) does not exceed the DEQ Level II SLV for non-T&E plants.

Aquatic Evaluation. Arsenic is an aquatic CPEC within the Pinebrook Stream channel because the arsenic exposure concentration within the stream channel (33.4 mg/kg, based on the 90 percent UCL) exceeds the 1998 DEQ freshwater sediment Level II Screening Level Value (SLV) of 6 mg/kg and the sediment bioaccumulation SLV of 7 mg/kg. The freshwater sediment SLV and the sediment bioaccumulation SLV were used to evaluate sediment within the proposed stream bed. Areas in the restoration and pond area where arsenic concentrations exceed the freshwater sediment and sediment bioaccumulation SLVs are shown in Attachment 4.

Arsenic was not identified as an aquatic CPEC in areas outside the stream channel, but within the restoration area, based on an evaluation of the soil-to-sediment exposure pathway. Based on the 90 percent UCL of 33.4 mg/kg, the arsenic EC for this exposure pathway within the restoration area is equal to the PEC of 33 mg/kg (DEQ, 2005). Therefore, arsenic is not a CPEC for soils adjacent to the stream channel (*i.e.,* within the wetland area and the stream bank).

6. REMEDY SELECTION AND DESIGN

The Revised Focused Feasibility Study Report (FS) described remedial alternatives available to address unacceptable risk to human health and the environment. The FS concluded that construction and maintenance of soil caps and restricting access would be (GeoEngineers, 2009) needed. The FS determined that much of the near-surface soil in five portions of the Site (the Pine Tree Area, the Parking Lot Area, the Wetland Area, the Wild Area, and the North Field) required some action to prevent unacceptable exposures. Based on this report, DEQ completed a Staff Report identifying a recommended remedial action for the Site (DEQ, 2011a), which was submitted for public notice and comment. Subsequently, DEQ issued a ROD that described the selected remedy and included a responsiveness summary to public comments on the Staff Report (DEQ 2011b).

Specifically, DEQ selected the following remedy by area, shown in the Attachment 5 figure.

- **Parking and Pine Tree Areas** – A demarcation layer and a minimum 6-inch layer of bark dust were installed. The city will annually inspect these areas and maintain the demarcation layer/cap. The soil near the walkways or the parking areas may be removed to provide at least 4 inches of cover and will be graded to the completed depth of 6 inches within 2 feet of the edges.
- **Wetland Area and Wild Areas** – Public access to these areas is limited through the installation and maintenance of a minimum 36-inch-high fence, and the city will additionally maintain the wild character in this area to discourage use by the public. Fencing has already been installed around a portion of the wetland area (south and east of Wall Street Extension), and additional fencing is not necessary with the vegetation maintained in a wild state. Any unintended trails (i.e., created by users that do not stay on designated walkways) that may develop through the overgrown areas need to be repaired and returned to a natural state such that they will no longer be readily usable.

- **The North Field** – The areas containing arsenic above DEQ's background concentration (at the time of the ROD) of 7 mg/kg require access limitations or surface soil replacement. The North Field Area remedy was selected to be accomplished in two phases. Initially, access to the field is restricted by allowing area vegetation to grow (i.e., no vegetation cutting beyond rough seasonal mowing for fire prevention). This potential action was allowed through 2014 for the city to secure funding to remove the top six inches of soil, replace it with clean fill, and re-plant the area with grass. Funding for the excavation work could not be secured. Access was further limited by installing a minimum 36-inch fence around the entire area. Seasonal rough mowing of the area for fire protection is acceptable.

The selected remedy also required a contaminated media management plan (CMMP) and a deed restriction. A DEQ-approved CMMP covers both maintenance and potential excavation activities (GeoEngineers, 2012). An Easement and Equitable Servitude (EES) is recorded with the property deed and identifies the nature of site soil contamination and outlines cover maintenance requirements, access restrictions, and prohibitions on-site use (City of Tigard, 2020).

Remedial Action Objectives

The goal of remediation at each remedial action areas (RAAs) is to prevent or minimize human exposure to unacceptable concentrations of that are greater than RBCs. The regional arsenic background is 8.8 mg/kg and if exceeded idencated unacceptable risk. The remedial action objectives can be achieved through the reduction of arsenic concentrations in soil or by preventing human exposure to contaminated soil.

Hot Spots Evaluation

The highly concentrated hot spot level for arsenic is 300 mg/kg (for cancer endpoints) or 4,800 mg/kg (for non-cancer endpoints). The highest detected concentration of arsenic in soil at the Site (264 mg/kg) is lower than the hot spot concentrations for cancer and non-cancer endpoints.

An area of impacted soil is considered a "highly mobile" hot spot if hazardous substances in the soil can migrate to groundwater or surface water and cause significant adverse effects to the beneficial uses of the water and if treatment is reasonably likely to restore or protect such beneficial uses within a reasonable time. Migration mechanisms may include infiltration and leaching of contaminants in soil to groundwater or stormwater runoff into surface water.

Leaching of arsenic from soil to groundwater was not considered a significant contaminant transport pathway at the Site due to the limited mobility of arsenic in the subsurface. Stormwater discharge from the pond is not likely to cause significant adverse effects to Fanno Creek because discharge water contains extremely low arsenic concentrations, based on 2008 stormwater samples.

Arsenic-contaminated sediment migrating in Pinebrook Stream is unlikely to adversely affect Fanno Creek due to the generally low concentrations of arsenic in the sediment. Three 30-point composite sediment samples collected from Pinebrook Stream and adjacent wetland areas (seasonally inundated by Pinebrook Stream) contained concentrations of arsenic that were well below the Probable Effect Concentration (PEC) (33 mg/kg).

Periodic Review and Contingencies.
Annual inspections of site controls started in 2012. Future re-development or improvement of the Site (by the City of Tigard or another entity) will be allowed with approval by DEQ. This includes work performed by adjacent property owners (i.e., continuation of Wall Street Extension east over Fanno Creek and future utility work performed in the City of Tigard.).

7. ONGOING REQUIREMENTS

The remedial actions implemented at this Site require ongoing inspections, monitoring, maintenance, and reporting to ensure the remedy remains effective. These actions are described in the Comprehensive Management Plan for Arsenic-Contaminated Soil and Sediment (GeoEngineers, 2012) (also known as a CMMP) and the 2020 EES (City of Tigard, 2020).

Ongoing requirements are listed below and are a condition of the conditional No Further Action determination.

Institutional Controls (Site Restrictions).

An Easement and Equitable Servitudes between the City of Tigard and the State of Oregon, acting by and through the Oregon Department of Environmental Quality, is filed with the County Clerk in Washington County, Oregon, on November 6, 2020. The EES requires the property owner to maintain the soil cap and restrict access to portions of the Site following the Comprehensive Management Plan for Arsenic-Contaminated Soil and Sediment Media Management Plan (November 16, 2012), the ROD (August 15, 2011) and approved in writing by DEQ.

- **Parking and Pine Tree Areas** – A demarcation layer and a minimum 6-inch layer of bark dust will be maintained. The city will annually inspect these areas and retain the layer demarcation/cap. The soil near the walkways or the parking areas may be removed to provide at least 4 inches of cover and graded to the completed depth of 6 inches within 2 feet of the edges.
- **Wetland Area and Wild Areas** –Public access to these areas will be limited through the installation and maintenance of a minimum 36-inch-high fence, and the city will additionally maintain the wild character in this area to discourage use by the public. Fencing has already been installed around a portion of the wetland area (south and east of Wall Street Extension), and additional fencing is not necessary with the vegetation maintained in a wild state. Any unintended trails (i.e., created by users that do not stay on designated walkways) that may develop through the overgrown areas need to be repaired and returned to a natural state such that they will no longer be readily usable.
- **The North Field** – Public access to the North Field Area will be restricted through the installation of a minimum 36-inch fence around the entire area and by allowing area vegetation to grow (i.e., no cutting of vegetation beyond rough seasonal mowing for fire prevention).

Long-Term Monitoring and Maintenance.

The fencing, asphalt, concrete pavement, and soil cover must be maintained to prevent future contact with subsurface soils that pose a risk to workers (occupational, construction, and excavation). The Comprehensive Management Plan for Arsenic-Contaminated Soil and Sediment (GeoEngineers, 2012) describes the inspection and reporting requirements. This plan includes an annual visual inspection and report submitted to DEQ by December 31 of each year.

In addition, the plan outlines a Contaminated Media Management Plan for the city and its contractors regarding the identification, characterization, handling, and disposal of arsenic-contaminated soil. This plan or an updated version approved by DEQ in writing must be used during any subsurface work conducted at the locations identified with site restrictions on the Site.

8. PROTECTIVENESS EVALUATION

The remedy for the Tigard Library, as described above, meets the requirements set forth in the ROD and is protective of present and future public health, safety, welfare, and the environment, as specified in OAR 340-122-0040. The remedy was selected based on balancing of remedy selection factors and satisfies the requirements for remediation of hot spots of contamination.

The Comprehensive Management Plan for Arsenic-Contaminated Soil and Sediment (GeoEngineers, 2012) and the 2020 EES (City of Tigard, 2020) provide comprehensive requirements and guidelines for maintaining the effectiveness of the remedial actions in the long term through ongoing inspections, monitoring, and maintenance.

9. RECOMMENDATION

Based on the findings documented in this memorandum, pursuant to OAR 340-122-0072 (5)(d), DEQ recommends a conditional No Further Action (cNFA) determination, in accordance with the Oregon Environmental Cleanup Law, ORS 465.200 et seq, except to conform with ongoing requirements listed in Section 8, outlined in the CMMP (GeoEngineers, 2012), and as memorialized in the 2020 EES (City of Tigard, 2020).

10. PUBLIC NOTICE AND COMMENTS

Public notice of DEQ's proposed Conditional No Further Action (cNFA) determination for the Tigard Library Property (Site), ECSI #4063, will be published in the Secretary of State Bulletin and the Tigard Times. This section will be updated based on the comments received.

11. ATTACHMENTS

Attachment 1. Vicinity Map
Attachment 2. Site Layout
Attachment 3. Summary of Soil Analytical Data by Depth
Attachment 4. Areas Exceeding Screening Criteria
Attachment 5. Proposed Remedial Action Areas
Attachment 6. Table 1 Comparative Analysis of Remedial Alternatives

12. ADMINISTRATIVE RECORD INDEX

Below is a selection of the DEQ's Voluntary Cleanup Program files for Tigard Library, ECSI# 4063.

Apex, 2003. APEX Environmental, Inc., *Arsenic Contaminated Soils Removal Close Out Report/Work Plan Update;* prepared by City of Tigard, 2003.

Aten, et al., 1980. Aten, C.F., Bourke, J.B., Martini, J.H., and Watson, J.C., 1980, Arsenic and Lead in an Orchard Environment; Bulletin of Environmental Contamination and Toxicology, v.24, p, 108-115.

City of Tigard, 2020. Easement and Equitable Servitudes between the City of Tigard and the State of Oregon through the Oregon Department of Environmental Quality. Recorded November 6, 2020, in Washington County, OR.

City of Tigard, 2022. Annual Inspection Report in accordance with the Comprehensive Management Plan for the Tigard Library Arsenic Contaminated Soil and Sediment Report. Also known as a CMMP. October 26, 2022.

DEQ, 1998. Oregon Department of Environmental Quality, 1998, Guidance for Ecological Risk Assessment, Level I Scoping, Level II Screening, (Updated December 2001), Waste Management and Cleanup Division.

DEQ, 2004. DEQ Voluntary Agreement with the City of Tigard, September 3, 2004.

DEQ and EPA, 2005. Oregon Department of Environmental Quality and US Environmental Protection Agency, 2005, Portland Harbor Joint Source Control Strategy.

DEQ, 2011a. DEQ Proposed Remedial Action Staff Report, Tigard Library Property, ECSI# 4063. March 28, 2011.

DEQ, 2011b. DEQ Record of Decision Remedial Action Alternative, Tigard Library Property, ECSI# 4063. August 15, 2011.

DEQ, 2018. Background Levels for Metals in Soils for Cleanups. Last Updated January 25, 2018.

HAI, 2002. Hahn and Associates, Inc., *Phase II Environmental Site Assessment Report: 14.7 Acre Property, 13360 and 13560 SW Hall Boulevard, Tigard, Oregon*; prepared for Ramis, Crew, Corrigan, and Bachrach, LLP, 2002.

APEX Environmental, Inc., *Arsenic Contaminated Soils Removal Close Out Report/Work Plan Update;* prepared by City of Tigard, 2003.

HAI, 2006. Hahn and Associates, Inc., Supplemental Site Investigation Report, Tigard Library; prepared for City of Tigard, 2006.

GeoEngineers, 2007. GeoEngineers, Inc., April 2007 Soil Assessment, Tigard Library; prepared for City of Tigard, 2007.

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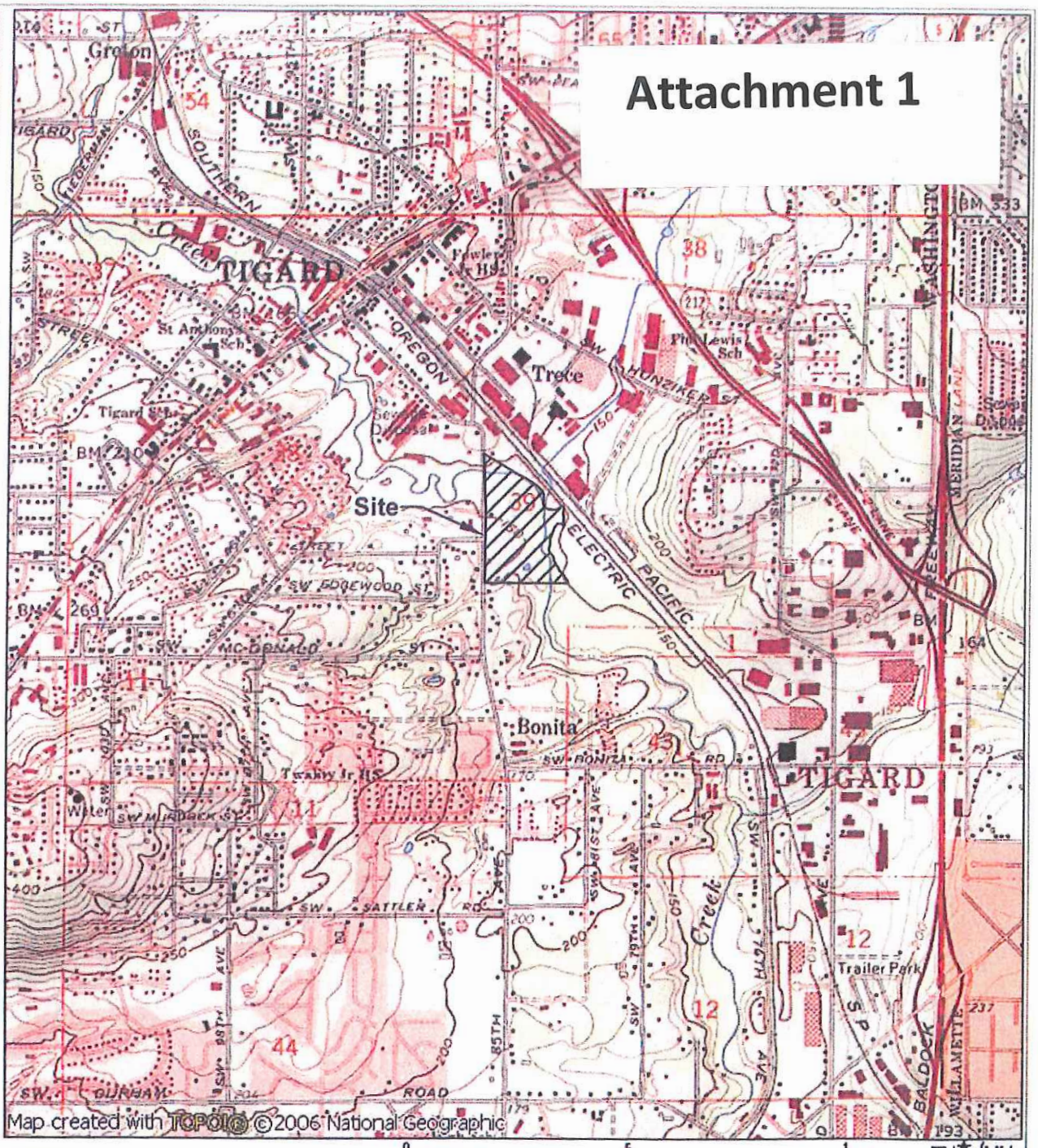
Attachment 1



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0 .5 1 MILES
1000 0 1000 2000 3000 4000 5000 FEET
1 .5 0 KILOMETERS 1
1000 0 METERS 1000

TN MN 17° 05/17/07

Vicinity Map

Tigard Library
Tigard, Oregon

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Figure 1

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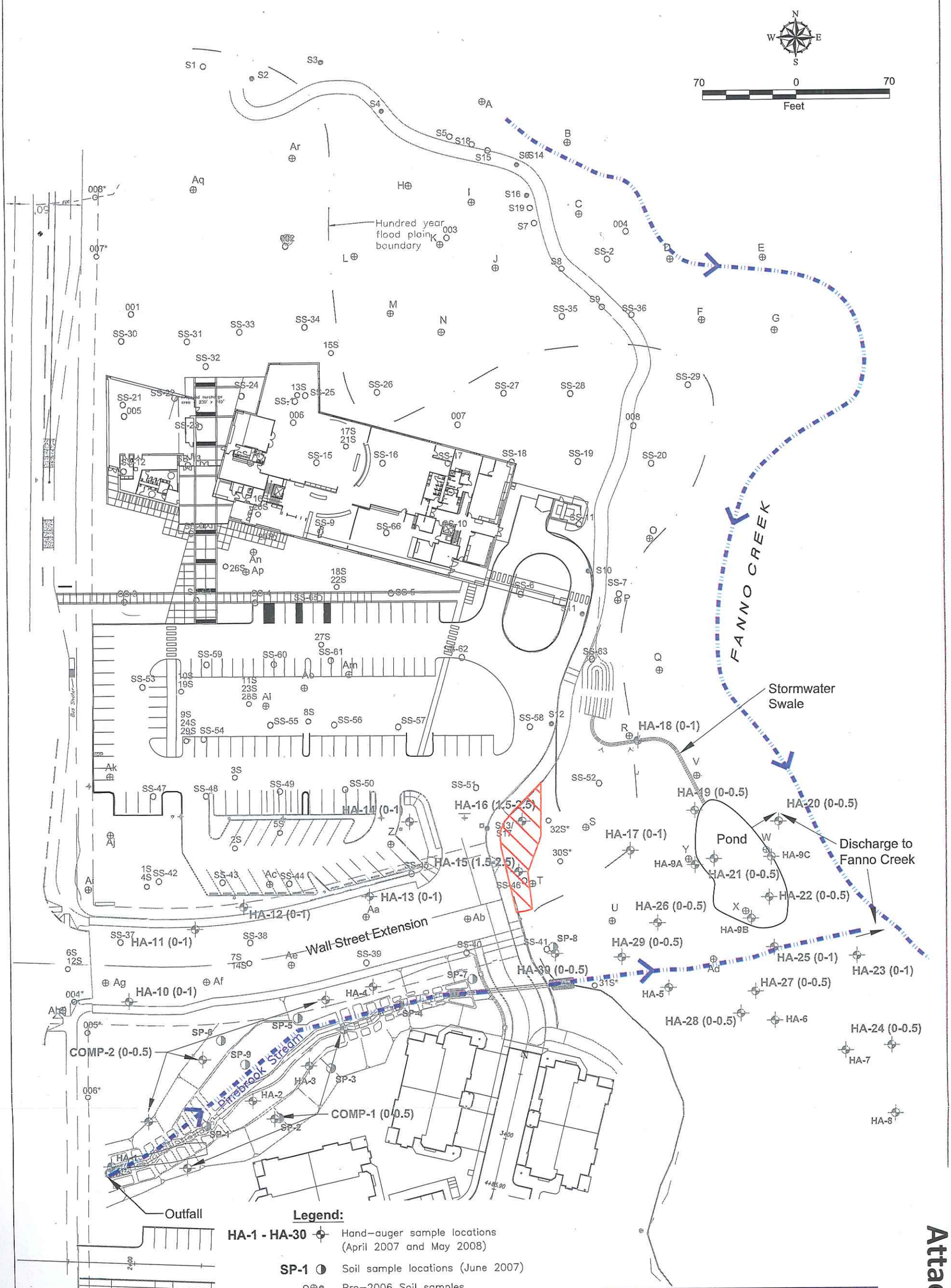

Legend:

- **HA-1 - HA-30** — Hand-auger sample locations (April 2007 and May 2008)
- **SP-1** — Soil sample locations (June 2007)
- Pre-2006 Soil samples
- Arsenic Contaminated Fill Area (Placed During Summer 2007 Hall/Wall Improvements)

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Base Drawing dated 10/2006, provided by Hahn and Associates.

Site Layout

Tigard Library
Tigard, Oregon

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Attachment 2

Attachment 3

SUMMARY OF SOIL ANALYTICAL DATA BY DEPTH[1]
TIGARD LIBRARY
13500 SW HALL BOULEVARD
TIGARD, OREGON

Sample Depth[2] (ft bgs)	Number of Samples	Number of Detections	Number of Samples Exceeding Background (7 mg/kg)[3]	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	Mean (Detections Only) (mg/kg)	Median (Detections Only) (mg/kg)
0 to <1	120	100	37	1.98	113	11.4	4.86
1 to <2	53	47	28	2.65	44	13.5	8.56
2 to <3	37	35	21	2.74	101	14.3	7.29
3 to <4	5	5	2	5.07	24.6	10.1	6.94
≥4	8	8	2	1.89	8.49	4.76	3.96

Notes:

[1]Sample depths categorized by the top of the sample depth interval, where applicable.

[2]Samples included are: 1) those that represent soil left in-place with no existing or proposed pavement, soil or mulch cap, and 2) those that represent soil left in-place with a soil cap less than 2 feet thick.

[3]Background value (7 mg/kg) is the default background concentration issued in DEQ's Memorandum from Toxicology Workgroup, October 28, 2002.

ft bgs = feet below ground surface

mg/kg = milligrams per kilogram

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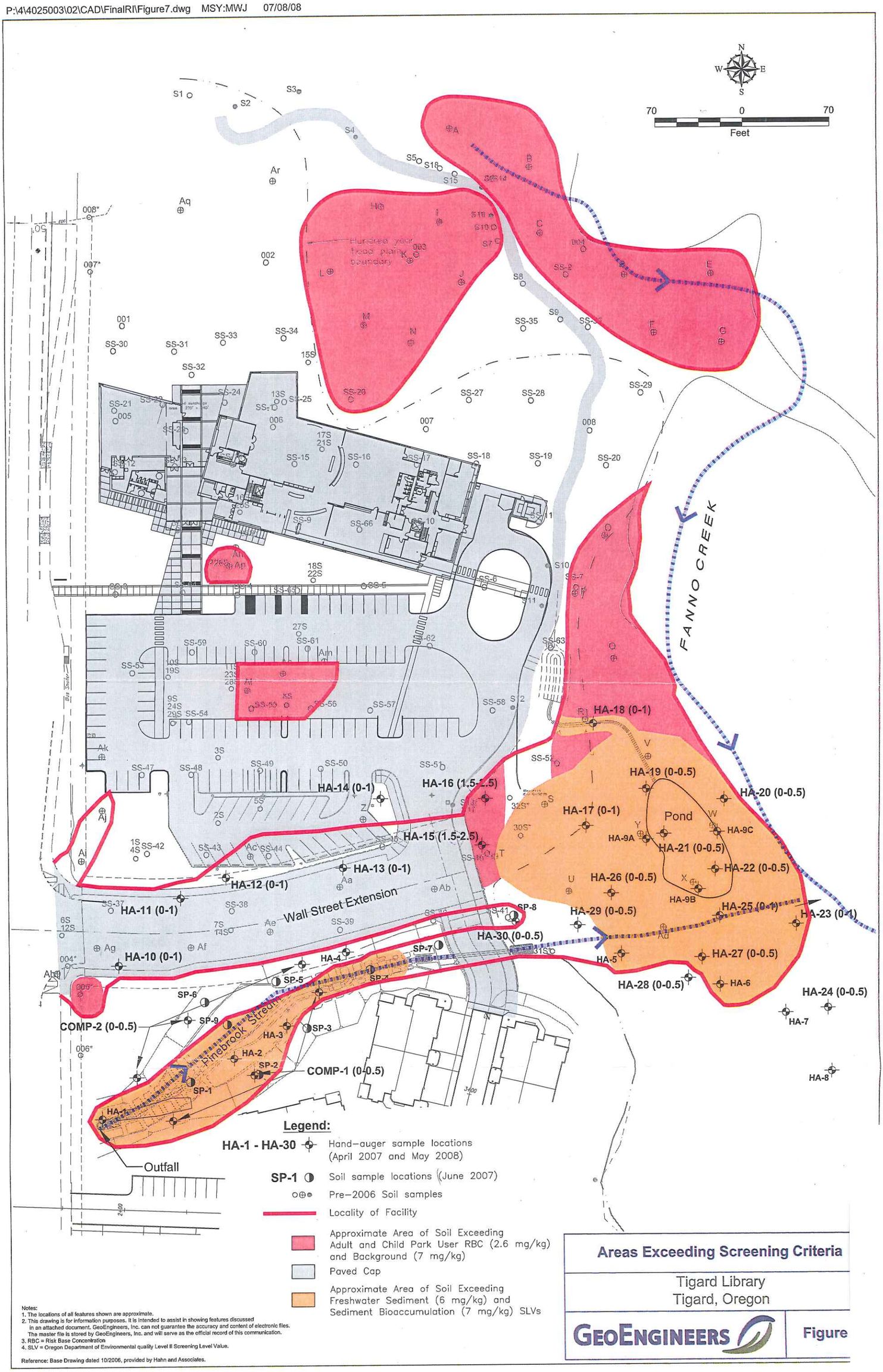

Attachment 4

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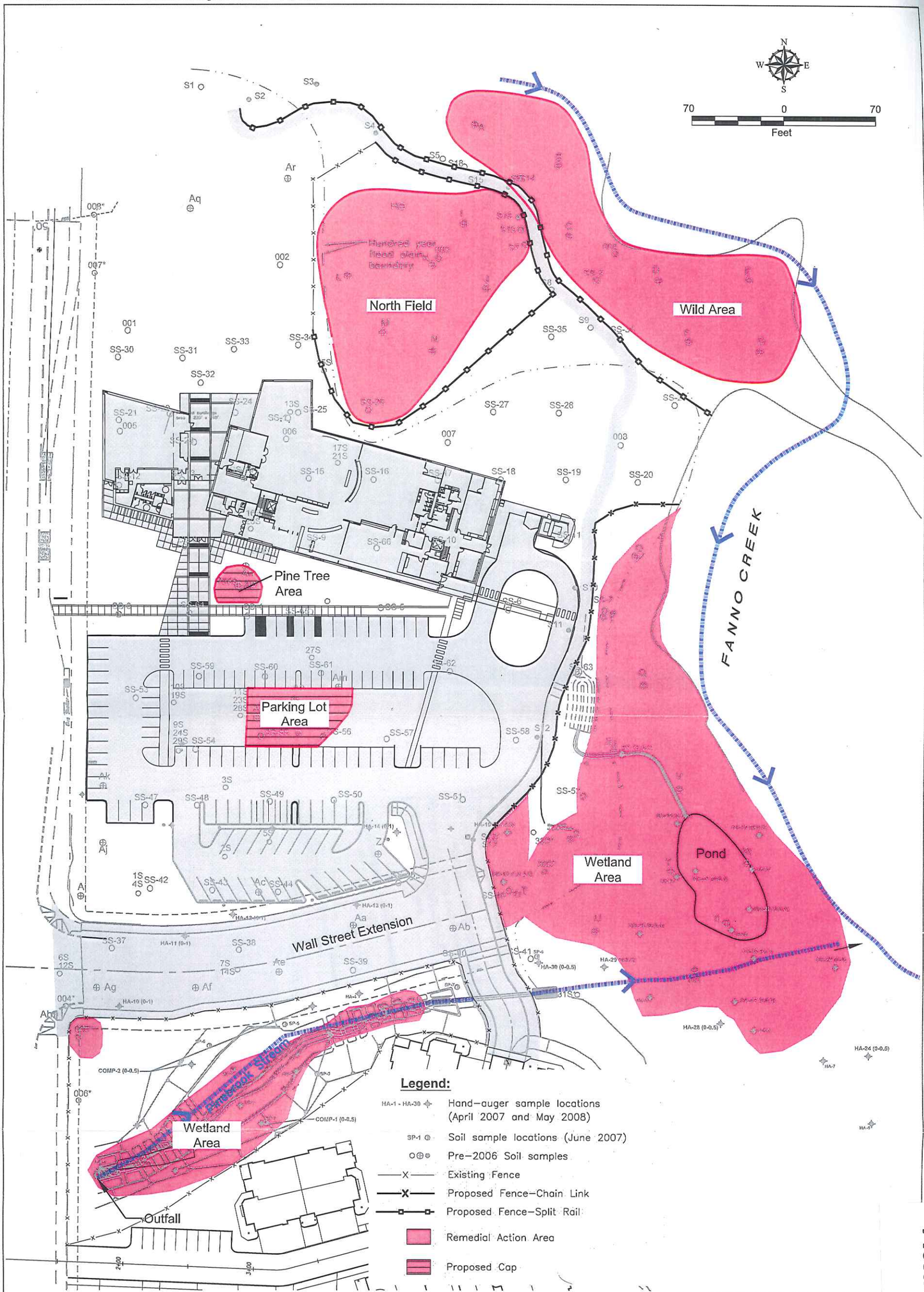

Proposed Remedial Action Areas

Tigard Library
Tigard, Oregon

GeoEngineers | Figure

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. RBC = Risk Base Concentration
4. SLV = Oregon Department of Environmental quality Level II Screening Level Value.

Reference: Base Drawing dated 10/2006, provided by Hahn and Associates.

Attachment 5

TABLE 1
COMPARATIVE ANALYSES OF REMEDIAL ALTERNATIVES
TIGARD LIBRARY
13500 SW HALL BOULEVARD
TIGARD, OREGON

Alternative	Able to Attain Remedial Action Objective (RAO)		Effectiveness		Long-Term Reliability		Implementability		Implementation Risk		Reasonableness of Cost		Overall Scoring	
	Comments	Score	Comments	Score	Comments	Score	Comments	Score	Comments	Score	Comments	Score	Score	Rank
Option 1 No Action	1) Does not achieve the RAO.	0	1) Not an effective means of treatment.	N/A	1) Alternative is not reliable.	N/A	1) No action is required for implementation.	N/A	1) Alternative does not remove risk, therefore it carries high implementation risk.	N/A	$0	N/A	0	4
Option 2 Capping and Institutional Controls	1) Achieves RAO through removal of exposure pathway. Does not remove COCs.	1	1) Adequate technology for achieving RAO, but deed restrictions required. 2) Time frame for achieving RAO: 6 months.	1	1) Technology widely demonstrated to provide reliable outcomes. 2) Minimal uncertainty with long-term reliability.	1	1) Equipment for alternative readily available. 2) Construction easily accomplished using common techniques. 3) Moderate disruption of commercial operations. 4) Effectiveness easily monitored. 5) Time frame for construction is less than other options.	1.5	1) Potential for contaminants to migrate. 2) Minimal worker risk.	1.5	$65,000	1.5	7.5	1
Option 3 Excavation to 3-feet	1) Achieves RAO through the removal of soil in the direct contact and ingestion pathway (0 to 3 feet). Does not remove COC below 3 feet.	1	1) Adequate technology for achieving RAO, but some contamination left on site. RCRA waiver may be required. 2) Time frame for achieving RAO: 6 months.	1	1) Technology widely demonstrated to provide reliable outcomes. 2) Minimal uncertainty with long-term reliability.	1	1) Equipment for alternative readily available. 2) Construction accomplished using common techniques. 3) Significant disturbance of wild areas. 4) Effectiveness easily monitored. 5) Time frame for construction is higher than other options.	0.75	1) Potential for contaminants to migrate. 2) Presence of earth-work equipment represents minor community risk. 3) Moderate worker risk. 4. Presence of earthwork equipment represents a moderate risk to Fanno Creek.	0.5	$520,000	0.5	4.75	3
Option 4 Capping and Institutional Controls and Excavation in North Field	1) Achieves RAO through Achieves RAO through removal of exposure pathway and removal of contaminated soil in North Field. Does not remove COC below one foot.	1	1) Adequate technology for achieving RAO, but some contamination left on site. RCRA waiver may be required. 2) Time frame for achieving RAO: 6 months.	1	1) Technology widely demonstrated to provide reliable outcomes. 2) Minimal uncertainty with long-term reliability.	1	1) Equipment for alternative readily available. 2) Construction accomplished using common techniques. 3) Moderate disruption of operations. 4) Effectiveness easily monitored. 5) Time frame for construction is higher than other options.	0.75	1) Potential for contaminants to migrate. 2) Presence of earth-work equipment represents minor community risk. 3) Moderate worker risk. 4. Presence of earthwork equipment represents a moderate risk to Fanno Creek.	1	$330,000	1	5.75	2

Notes:
RAO = Remedial Action Objective
COCs = Contaminants of Concern
* - Does not take into account hot spot analysis. See text for discussion

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