FINAL CLEANUP ACTION PLAN
BOTHELL RIVERSIDE TPH AREA
BOTHELL, WASHINGTON

City of Bothell

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1. INTRODUCTION

This draft cleanup action plan (dCAP) was prepared for the Bothell Riverside TPH site (Site) located in Bothell, Washington (Figures 1, 2). This dCAP was conducted under Agreed Order DE 6295, executed in 2009 and amended in April 2010 and in 2013, between the City of Bothell (City) and the Washington State Department of Ecology (Ecology) to address soil and ground water contamination related to historical releases of hazardous substances at the Site. Requirements under the Agreed Order include preparation of a remedial investigation (RI) Report followed by the development of a FS and dCAP.

RI and Interim Action activities were performed between December 2009 and April 2017 following Ecology's approval of the final RI/FS Work Plan (Ecology letter dated August 18, 2009) and in accordance with the Ecology-approved project work plans (Parametrix, 2009a; HWA, 2012; HWA, 2013). The RI report (HWA, 2015) documents the results of the RI and interim action soil and ground water cleanups conducted in 2010, 2013, 2014, and 2017 at the Riverside TPH Site.

Three interim action cleanups were conducted prior to the RI: 1) a soil excavation and removal cleanup conducted in 2010 (before roadway realignment) to address total petroleum hydrocarbon (TPH) impacts, and 2) a ground water pump-and-treat system installed in 2014 to address halogenated volatile organic (HVOC) impacts to ground water and surface water, and 3) a second soil excavation and removal cleanup conducted in 2017 to address residual TPH impacts.. These interim actions address different contaminants in different (not co-located) areas from two separate releases. These areas are referred to as the Riverside TPH Site and the Riverside HVOC Site. This FS is for the TPH site only.

The City owns the Riverside TPH site (Site), a portion of which accommodates the newly realigned State Route (SR) 522. The remnant portion of the former property north of the new roadway will be redeveloped as part of the City's overall Downtown Revitalization Plan; the portion of the former property south of the new roadway will be incorporated into the City's park system.

Interim action soil cleanups were conducted at the Riverside TPH site entailing soil excavation and removal cleanups conducted in 2010 (before roadway realignment) and 2017 (after roadway realignment), to address total TPH hydrocarbon (TPH) impacts.

Tasks performed to-date to fulfill the Agreed Order include:

1. Preparation and submittal of the *Remedial Investigation and Feasibility Study Work Plan* (HWA, 2009) to Ecology;
2. Remedial investigation (RI) activities in 2009;
3. Initiation of a feasibility study (FS) in 2009;
4. Preparation and submittal of the *Bothell Riverside Remedial Investigation/Feasibility Study,* and associated *Draft Cleanup Action Plan* which were not finalized or approved pending completion of interim actions and monitoring (Parametrix, 2009a, b);
5. Preparation and submittal to Ecology of the *Remedial Investigation Feasibility Study Final Work Plan, Bothell Landing Site Bothell, Washington*, September 19, 2011 (HWA, 2011) and Addendum 1 adopting the approved area-wide network (December 2011) including wells at the Riverside site
6. Completion of the 2010 initial phase of interim action petroleum soil cleanup and subsequent reporting (*Documentation of Interim Action at Bothell Riverside Site)* (HWA, 2011);
7. Preparation and submittal of a *Focused Feasibility Study* (HWA, 2012) and *Interim Action Work Plan* (HWA, 2013) to Ecology for HVOC impacts to ground water and surface water; and,
8. Installation of a ground water pump-and-treat system to address HVOC impacts to ground water and surface water in 2014.
9. Preparation of a draft Remedial Investigation report (HWA, August 8, 2015).
10. Completion of the 2017 interim action petroleum soil cleanup and subsequent reporting (*Riverside TPH Site Residual Soil Excavation Report, Bothell, Washington)* (HWA, 2017);
11. Preparation of a final Remedial Investigation report (HWA, May 18, 2017).

This dCAP is one of the two final deliverables required to fulfill the terms and conditions of the Agreed Order (Deliverable 7).

1.1 Site Location and Description

Per Section 1.1 of the final RI report, the Bothell Riverside Site was defined in the Agreed Order (prior to completion of the RI) as consisting of the extent of contamination caused by the release of hazardous substances at a location in the general vicinity of Woodinville Drive (SR 522) and NE 180th at a former two-acre property where petroleum hydrocarbon impacts were discovered. The two-acre parcel no longer exists in its original configuration, although the City currently owns that land, which includes public right-of-way for the newly constructed and re-aligned SR 522, and portions of newly formed parcels on the north and south sides of the new roadway. The remnant portions of the former two-acre property and vacated former SR 522 roadway have been conjugated into new City parcels and are being sold to private parties for redevelopment. The southern portion of the property will become a part of the City's park system (HWA, 2015).

Whereas the Site was originally defined as a two-acre property (which no longer exists due to re-platting of parcels and construction of the new roadway) the findings of the RI demonstrated that hazardous substances the Bothell Riverside Site have come to be located as shown in Figure 3. The Riverside Site includes two separate and distinct Sites: 1) the Riverside TPH Site, and 2) the Riverside HVOC Site.

1.2 SITE CONDITIONS

Site conditions (topography, geology, hydrogeology, aquifer and soil properties, surface water hydrology) and nature and extent of contamination (chemicals of concern for soil and ground water) are addressed in the Final RI report (HWA, October 9, 2015).

Per Section 2.1 of the RI, the Site area is generally flat with an elevation of approximately 35 feet above mean sea level. The surrounding land is generally flat or slopes to the south towards the Sammamish River. The Riverside TPH Site is now almost entirely under the new SR 522 roadway, and is around 100 feet north of the Sammamish River (HWA, 2015).

1.3 HISTORIC PROPERTY USE AND PREVIOUS SITE ASSESSMENTS

The City acquired the former two-acre Riverside property in May 1990. Details of historic property use and the several site assessments performed to date at the Site can be found in SEACOR (1990, 1991), RZA AGRA (1992), GTI (1993, 1994), ECOSS (2008), HWA (2008), Parametrix (2009a), and CDM (2009). The following is a summary of those assessments.

A "Flying A" gasoline service station operated between 1946 and the early 1960s. The service station had at least two 1,000 gallon underground storage tanks (USTs); one UST contained gasoline and the other diesel fuel. The service station building was demolished sometime after 1965. The two USTs were apparently removed before 1990. Investigative work in the early 1990s discovered residual soil and ground water contamination attributed to the service station operation. Debris including discarded containers of motor oil, anti-freeze, and transmission fluid were also found (RZA, 1992).

Approximately 4,700 cubic yards of petroleum impacted soil were excavated, treated on-site by bioremediation, and returned to the former excavation and surrounding ground surface in the early 1990s. In 2008 HWA conducted a Phase II environmental site assessment (ESA), a geophysical survey, and a geotechnical investigation. HWA's findings documented the presence of lube oil-range petroleum hydrocarbons in soil at concentrations greater than MTCA cleanup levels within and in the vicinity of the former soil excavation. The geophysical survey identified no USTs remaining at the Site (HWA, 2008).

Additional investigations (CDM, 2009; Parametrix, 2009a) confirmed the presence and extent of petroleum affected soil in the former excavation area.

1.4 Current and Planned Site Use

Prior to the soil cleanup, the original two-acre property was undeveloped and used for parking. After completion of the re-aligned SR 522 roadway in 2013, the remnant portion of the original two-acre property south of the new roadway is still undeveloped and used for parking. The portion north of the new roadway is currently vacant and hydro-seeded, and awaiting redevelopment as part of the City's overall Downtown Revitalization Plan.

1.5 Geology

Based on field observations during the RI, soils at the Site typically consist of approximately four to nine feet of silty sand to sandy silt fill with occasional debris, over alluvial soil consisting of inter-bedded silt, sandy silt, peat, and silty sand to a depth of up to 50 feet below ground surface (bgs). A buried soil horizon (paleosol) was observed at some locations at the fill-alluvium contact.

Most fill material appears to be derived from three sources: 1) circa 1940's property development on the north portion within the "former property boundary" along Woodinville Drive, 2) dredge and soil spoils placed on the southerly portion within the "former property boundary" after realignment of the Sammamish River in the 1960s, and 3) approximately 4,700 cubic yards of excavated fill material placed back into its former excavation in 1992 and 1993 along with 1,200 cubic yards of imported fill.

Below the fill is predominantly medium-dense to dense sand with variable gravel, silty sand, silt and peat to a depth of up to 50 feet bgs. Peat or silt beds with high organic content up to 2 feet thick are present within the alluvial soil, generally at depths greater than 10 feet bgs. These organic-rich beds appear to underlie most of the area but may not represent a contiguous layer.

Beneath these alluvial deposits is a stiff to hard clay or silt with a thickness of at least 14 feet. This unit is inferred to be a drift deposit of glacial-lacustrine origin.

1.6 Hydrogeology

Ground water occurs at both sites approximately 8 to 16 feet bgs, with a shallower depths occurring in the wet season. Based on ground water elevation surveys at and in the vicinity of the sites, ground water flow is inferred to be to the southeast, toward the Sammamish River.

The horizontal hydraulic conductivity for both sites was estimated using slug test data collected during the 2009 RI/FS. Based on evaluation of the results from the slug test, the estimated hydraulic conductivity for shallow, unconfined ground water beneath the sites ranged from 4.8 x 10-3 to 1.8 x 10-2 feet per minute (7 to 26 feet/day); the mean hydraulic conductivity determined from the slug test data is 13.1 feet/day.

HWA estimated the travel time of shallow ground water at both sites. Ground water particle velocity is described by the following relationship:

$V = K\,i / P$, where: V= particle velocity
K= hydraulic conductivity
i = hydraulic gradient
P = effective porosity

Based on estimates of horizontal hydraulic conductivity of around 7 to 26 feet/day, an assumed effective porosity of 0.25 (typical of sands), and measured gradients of 0.032 to 0.042 foot/foot, estimated horizontal ground water particle flow velocity may range from approximately 1 to 4 feet per day in the shallow aquifer.

Other physical characteristics of soil in the shallow, unconfined ground water zone include an estimated porosity (based on ex-situ analysis) ranging from 0.25 to 0.32, wet density ranging from 123.2 to 139.5 pounds per cubic foot, and dry density ranging from 107.2 to 127.4 pounds per cubic foot (Parametrix, 2009a).

1.7 Surface Water Hydrology

Surface water features in the vicinity include:

1) Horse Creek, which exits from a culvert beneath the adjacent Bothell Landing property to the west, and runs south along that boundary. It then flows under 180th street in a culvert and discharges to the Sammamish River. Flow to this drainage will be largely re-routed to a new drainage system (consisting of pipes and open channel segments) constructed some 300 feet west of the old Horse Creek channel, sometime in 2016.

2) The Sammamish River, which is located approximately 100 feet south of the Riverside TPH site.

1.8 Interim Action

Interim action cleanups were performed in 2010 (before the SR522 roadway realignment) and 2017 (after the SR522 roadway realignment), to address petroleum hydrocarbon impacts in soil. The interim actions for contaminated soil at the Riverside TPH Site included excavation and off-site disposal of impacted soils.

2010 - The City engaged a construction contractor, Hos Brothers Construction of Woodinville, Washington (Contractor), to perform the interim action in September 2010. Prior to soil cleanup, the Contractor fenced and grubbed the work area in preparation for the soil cleanup and subsequent construction of the SR 522 realignment. HWA, acting as environmental consultant for the City of Bothell, monitored the soil excavation and off-site transport, and sampled soil to confirm cleanup levels in soil were achieved.

2017 – In July 2016, the City informed Ecology that as part of their due diligence, a prospective developer represented by Farallon Consulting (Farallon) had encountered petroleum contaminated soils during a Limited Subsurface Investigation on the northern portion of the Riverside Site. The City subsequently met with Ecology and submitted a "Residual Soil Excavation Work Plan" (October 12, 2016), thereafter receiving Ecology's concurrence to implement the remediation work.

According to Farallon's report, soil samples collected from four borings indicated that residual petroleum impacted soils above MTCA Method A cleanup levels were present in one of the soil borings, FB-5 (Figures 4, 5). Based on the results of the Farallon FB-5 boring, a residual soil excavation interim action was conducted to address the remaining TPH contaminated soils at the Bothell Riverside TPH Site. This soil cleanup at the Site included excavation and off-site disposal of all accessible impacted soils.

The interim action for contaminated soil at the Riverside TPH Site included excavation and off-site disposal of impacted soils. The City engaged a construction contractor, Interwest Construction Inc. (ICI) of Burlington, Washington to perform the interim action soil cleanup during January 2017 excavation activities, and Kane Environmental Inc. (Kane) with subcontractor Spooner Contracting, LLC, to perform the interim action soil cleanup during the second round of cleanup in March/April 2017. HWA personnel monitored the cleanup activities and sampled soil to confirm successful cleanup.

1.8.1 Pre-Cleanup Characterization

2010 - Prior to large scale excavation activities at the Riverside TPH site, HWA personnel conducted test pit characterization (i.e., "pot holing") to delineate clean overburden soils, and to assess the lateral and vertical extent of TPH-impacted soils with respect to previous investigations.

Test pit characterization included collecting samples of TPH-impacted soil for analysis of petroleum hydrocarbon fractionation and other target compounds in order to calculate MTCA Method B risk-based soil cleanup levels for protection of human health and potable ground water. The results of the of the Method B risk analysis are included in Appendix C and summarized in Table 1.

Eleven test pits were excavated on September 22 and 23, 2010. Test pits were excavated to a maximum depth of 7 feet bgs. HWA collected 21 representative soil samples at various depths from the test pits and submitted 17 of the samples for chemical analysis. Test pit data indicated that an estimated 470 cubic yards (approximately 750 tons) of soil could be stockpiled on site for subsequent reuse.

2017 - Prior to the 2017 excavation activities at the Site, HWA personnel reviewed documentation of previous investigations and remedial excavations to assess the lateral and vertical extent of TPH-impacted soils in the vicinity of the Farallon FB-5 boring. HWA then marked the estimated excavation area and completed utility locates to identify all public and private underground utilities.

1.8.2 Soil Excavation

2010 - The Contractor excavated contaminated soil at the Riverside TPH Site on September 27 and 28, 2010. HWA personnel directed the cleanup based upon prior sampling, as well as field screening information such as soil color, odor, and photoionization detector readings. When the screening information indicated clean soil, HWA collected confirmation samples for laboratory analysis to document that the soils left in-place met Site cleanup levels.

Contaminated soil was excavated generally to depth of previous test pit and other exploration sampling which was found to meet the cleanup levels. The approximate limits of soil excavation are shown on Figure 2. The final excavation was approximately 100 by 70 feet in its maximum width and length. The depth of the excavation was approximately 4 feet below ground surface. This is consistent with descriptions of the 1992-1993 cleanup, in which clean imported fill was placed in the bottom of the (then) 8 to 9 foot-deep cleanup excavation, and pre-existing soils that were bio-treated were subsequently placed on top of the imported fill (RZA, 1992). Based on these finding, it appears the 1992 bio-treatment was not entirely successful in meeting cleanup levels.

The Contractor excavated and transported 971.65 tons of soil to the CEMEX USA (formerly Rinker) Inert Materials Landfill facility in Everett, Washington for thermal desorption treatment followed by permitted landfill disposal. Assuming a bulk density of 1.6 tons per bank cubic yard, the volume of soil excavated and transported to CEMEX was approximately 610 cubic yards.

2017 - During the first round of excavation activities, ICI excavated contaminated soil at the Site on January 10, 12, 13, and 18, 2017. During the second round, Kane/Spooner continued excavation activities at the Site on March 20, 23, 24, 27 through 31, and April 3, 2017. HWA personnel directed the cleanup based upon prior investigations and remedial excavation activities, as well as field screening information such as soil color, odor, and photoionization detector readings. When the screening information indicated clean soil, HWA collected confirmation samples for laboratory analysis to document that the soils left in place met the Site cleanup levels.

Contaminated soil was excavated generally to a depth ranging from 10 to 12.5 feet below ground surface (bgs), which was found to meet the cleanup levels for the bottom of the excavation. The approximate limits of soil excavation are shown on Figure 5. The final excavation was approximately 65 by 55 feet in its maximum width and length, respectively.

During the January cleanup, ICI excavated and transported 934.22 tons of soil to the CEMEX USA (formerly Rinker) Inert Materials Landfill facility in Everett, Washington for thermal desorption treatment followed by permitted landfill disposal.

During the March/April cleanup, 333.64 tons of soil were excavated and transported to CEMEX. An additional 613.41 tons were transported to a Waste Management transfer station in Woodinville, Washington, for transport and permitted disposal at the Waste Management landfill in Columbia Ridge, Oregon, for a total of approximately 947 tons excavated and disposed of properly during the March/April round of cleanup, and approximately 1,881 tons for all 2017 cleanup excavations.

1.8.3 Confirmation Sampling

2010 - HWA collected excavation sidewall and bottom samples to confirm soil cleanup. Chemical analysis results for soil samples from the Riverside TPH excavation indicate that the interim action achieved Site cleanup levels.

2017 - During the January 2017 excavation activities, HWA personnel collected a total of 21 excavation sidewall and 4 excavation bottom samples to confirm soil cleanup (Table 1). Of the 21 sidewall and 4 bottom samples, 7 of the sidewall and 2 of the bottom location samples were over-excavated due to laboratory results indicating contaminants of concern (COC)s were above the MTCA regulatory cleanup levels. In addition, three confirmation samples collected, one from the northwest sidewall (sample R-PEX-32-10) and two from the south (sample R-PEX-19-10) and southeast (sample R-PEX-28-10) sidewalls, exhibited gasoline concentrations of 39, 64 and 86 mg/kg, respectively, which is above the established MTCA Method A cleanup level of 30 mg/kg. Soils in these areas were temporarily left in place but were later over-excavated during the second round of excavating in March/April 2017.

During the March/April 2017 excavation activities, HWA personnel collected a total of 23 sidewall and 5 excavation bottom samples to confirm soil cleanup (Table 1). Of the 23 sidewall and 5 bottom samples, 5 of the sidewall and 1 of the bottom location samples were over-excavated and re-sampled due to cleanup level exceedances.

Figure 5 depicts confirmation sample locations. Table 1 includes laboratory data for the interim action residual soil cleanup conducted at the Site.

1.8.4 Ground Water Management

2010 - The excavation depth was approximately 4 feet below ground surface and did not encounter ground water. Nor did precipitation water accumulate in the open excavation in quantities requiring removal. Thus, the Contractor did not need to manage ground water during soil excavation. Instead, the Contractor graded the excavation to allow precipitation water to accumulate in a sump at the north end of the excavation where it infiltrated into the soil.

2017 - The excavation depth ranged from 10 to 12.5 feet bgs. Minimal perched ground water seepage was encountered at a depth of approximately 8 feet bgs in the excavation. In addition, precipitation that occurred during excavation activities accumulated in the excavation. During the January 2017 excavation activities, ICI managed the water accumulation by pumping water from the excavation into a Baker holding tank, allowing sediments to settle, and discharging of the water utilizing an existing King County Industrial Waste Division permit obtained by ICI for temporary discharge of water generated during dewatering activities. During the March/April 2017 excavation activities, Kane contracted Marine Vacuum Services, Inc. to remove any groundwater encountered and/or accumulated precipitation using a 2,500-gallon Vacuum truck to dewater the excavation prior to digging.

1.8.5 Riverside TPH Site Restoration

2010 - After excavation of contaminated soil and receipt of confirmation sample analytical results, the Contractor backfilled and compacted the excavation with a combination of clean, imported, structural fill soils meeting the requirements of Select Borrow, per WSDOT Standard Specification 2-03.3(14)K, and previously excavated soils from the Riverside TPH Site that were tested and found to meet cleanup levels. The imported select borrow was obtained from CEMEX, who mined the sandy soils from a quarry in Granite Falls, Washington (i.e. native quarry materials not excavated or reused from any developed property).

The select borrow and native soils were compacted to Method B of WSDOT Standard Specification 2-03.3(14)C (i.e. 90 percent of maximum dry density as determined using test method ASTM D 1557 [Modified Proctor]) below two feet bgs, and 95 percent of maximum dry density for the upper two feet. A portion of the remediation area was hydro-seeded for erosion control, while the remainder was graded with weather-resistant surfacing material.

2017 - Due to contaminated soils being temporarily left in place after the January cleanup on the northwest, south and southeast sidewalls of the January excavation, a layer of polyethylene sheeting (Visqueen) was placed along the sidewalls of the excavation as an indicator of the boundary between the contaminated soils and the clean backfill and in an effort to keep clean backfill soils from becoming adversely impacted. ICI then backfilled and compacted the excavation with clean imported structural fill soils meeting the requirements of Select Borrow, per WSDOT Standard Specification 2-03.3(14)K. The imported select borrow was obtained from

Wetlands Creations, who mined the soils from their facility in Monroe, Washington (i.e., native quarry materials not excavated or reused from any developed property).

During the March/April round of excavation and prior to backfilling and compaction activities, Kane imported and placed one to two feet of quarry spalls, obtained from CalPortland located in Kenmore, Washington, on the bottom of the excavation to approximately one foot above the ground water level. This was performed to ensure ground water did not mix with the structural fill soils, ultimately helping with compaction efforts. A filter fabric was placed on top of the layer of quarry spalls and the excavation was then backfilled and compacted with clean imported gravel borrow from CalPortland. Additionally, a layer of 5/8-inch minus crushed rock was placed and compacted in the top six inches of fill where the original paved driveway was located just off of State Route 522 leading into the Baskin Robbins and Gallo De Oro Mexican restaurant parking lot. This was to act as a temporary driveway until repaving could be completed at a later date.

During backfilling activities, the select and gravel borrow were compacted to Method B of WSDOT Standard Specification 2-03.3(14)C, i.e., 90 percent of maximum dry density as determined using test method ASTM D 1557 (Modified Proctor) below four bgs, and 95 percent of maximum dry density for the upper four feet. Due to softer soils (peat) encountered in the bottom of the excavation, the first two lifts of backfill were placed and spread in layers of approximately two-feet of uncompacted thickness. Subsequent backfill lifts were placed and spread in layers not more than 10 inches in uncompacted thickness.

2 DRAFT CLEANUP ACTION PLAN

This dCAP presents proposed remedial action to be conducted at the Site. Per MTCA, a dCAP includes the following elements, all of which are included in the RI and FS:

- Description of proposed cleanup
- Rationale for selecting the proposed alternative
- Other alternatives evaluated
- Cleanup standards
- Schedule for cleanup implementation, restoration time frame (if known)
- Institutional controls, if any
- Applicable state and federal laws
- A preliminary determination by Ecology that the proposed cleanup action will comply with threshold and other MTCA requirements in WAC 173-340-360
- For on-site containment, specification of the types, levels, and amounts of hazardous substances remaining on site and measures used to prevent migration and contact with those substances

2.1 DESCRIPTION OF PROPOSED CLEANUP

Based on the results of the remedial investigation and feasibility study conducted under MTCA and the application of the selection of remedy criteria, the preferred cleanup alternative for the Site (developed in accordance with WAC 173-340-350 through 173-340-390) is excavation and off-site disposal of soil, which has already been completed as an interim action.

The COCs at the TPH site are:

- Soil - Lube oil-range total petroleum hydrocarbons
- Ground water - None

The interim actions completed in 2010 and 2017 at the Riverside TPH Site included excavation and off-site disposal of impacted soils. Contaminated soil was excavated to depths of up to 12.5 feet below ground surfaceA total of 2,953 tons of sol were excavated and transported offsite for treatment and/or permitted landfill disposal.

HWA collected excavation sidewall and bottom samples to confirm soil cleanup. Confirmation sample locations are shown on Figures 4 and 5. Pre-excavation test pit samples collected at the limits of the excavation, and test pit samples collected beyond the limits of excavation are included in Table 1 as confirmation samples because the soils represented by those samples did not contain chemicals of potential concern at concentrations exceeding cleanup levels. Chemical analysis results for soil samples from the Riverside TPH excavation indicate that the interim action achieved Site cleanup levels.

2.2 RATIONALE FOR SELECTING THE PROPOSED ALTERNATIVE

Per Section 3 of the Feasibility Study (FS) for the Riverside TPH site (HWA, Feasibility Study Rev 2 February 5 2016), the proposed alternative was selected based on compliance with remedial action objectives and cleanup standards (i.e., achieving cleanup levels at the point of compliance). The proposed alternative also achieved compliance with threshold and other MTCA requirements. The cleanup alternative (excavation and off-site disposal of soil), which has already been completed as an interim action, was the most protective, fastest time frame alternative, and met all cleanup standards.

2.3 OTHER ALTERNATIVES EVALUATED

Per Section 3 of the FS, soil remediation technologies evaluted included:

- Natural Attenuation with Cap (In Situ Biological)
- Chemical Oxidation (In Situ Physical/Chemical)
- Chemical Reduction/Oxidation (Ex Situ Physical/Chemical)
- Excavation and Off-site Disposal (Containment)

2.4 CLEANUP STANDARDS

Cleanup standards consist of appropriate cleanup levels applied at a defined point of compliance that meet applicable state and federal laws (WAC 173-340-700). TPH Site cleanup levels are described below.

2.4.1 Soil

Soil remediation levels proposed in the *Interim Action Work Plan* (Parametrix, 2010) include:

- MTCA Method A Soil Cleanup Levels for Unrestricted Land Use (WAC 173-340, Table 740-1).
- MTCA Method B TPH Soil Cleanup Levels for direct contact and protection of ground water

An evaluation of Method B risk-based TPH soil cleanup levels for the Site was specified in Section 3.1.1.1 of the *Compliance Monitoring Quality Assurance Project Plan* (CMQAPP) appendix of the *Interim Action Work Plan* (Parametrix, 2010). The CMQAPP called for characterization of TPH-impacted soil via analysis of petroleum hydrocarbon fractionation and other target compounds in order to evaluate whether the standard MTCA Method A soil cleanup levels were appropriate for the Site compared to MTCA Method B risk-based soil TPH cleanup levels. The results of the petroleum hydrocarbon fractionation analyses (NWVPH/NWEPH analysis) were input into Ecology's MTCA TPH 11.1 spreadsheet model to determine TPH soil cleanup levels protective of human health via direct contact and via leaching to a source of potable ground water. HWA's evaluation of MTCA Method B risk-based cleanup levels for TPH-impacted soil at the Site is included in the RI report. Table 2 summarizes the results of the analysis. The calculated Method B cleanup levels for gasoline-range petroleum hydrocarbons at the Site range between 84 and 246 milligrams per kilogram (mg/kg) depending on the mixture of hydrocarbon fractions and specific compounds such as benzene. The Method B TPH cleanup level of 84 mg/kg is a calculated value for protection of potable ground water from contamination by benzene based upon Ecology's three-phase partitioning model (Equation 747-1 in WAC 173-340-747). The MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons with detectible benzene in soil is 30 mg/kg. The calculated Method B cleanup levels for diesel- and oil-range petroleum hydrocarbons at the Site range between 3,130 and 5,225 mg/kg depending on the mixture of hydrocarbon fractions and specific compounds.

The resulting soil remediation levels used (i.e., the more stringent of Method A or B) are extremely conservative, as much of the Site will be covered by roadway or buildings, eliminating the direct contact pathway, and reducing ground water recharge by precipitation. These remediation levels meet all the requirements of WAC 173-340-720 through 173-340-760 and should be considered the Site cleanup levels.

2.4.2 Ground Water

Appropriate levels of cleanup for ground water are determined by the highest beneficial use of that ground water. Shallow ground water present at the TPH Site is not currently used for drinking water, and no water wells are located downgradient of the Site. The appropriate ground water cleanup levels for the Site are MTCA Method A for ground water.

2.4.3 Terrestrial Ecological Evaluation

The TPH Site qualifies for an exclusion from a terrestrial ecological evaluation (TEE), due to the absence of more than 1.5 acres contiguous undeveloped land within 500 feet of the Site. The nearest undeveloped land to the Site is the 30 to 40 foot-wide strip of vegetated river bank adjoining the Site. The large, undeveloped, wooded portion of the Park at Bothell Landing is located some 800 feet southwest of the Site. Currently vacant land north of the Site is slated for development in the near future, and is currently covered by gravel and hydroseeding (i.e. no native vegetation or habitat potential).

2.5 Vapor Intrusion

Per the MTCA, RIs must include evaluation of vapor intrusion (VI) impacts to indoor air quality when volatile hazardous substances are present in the subsurface. The Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, 2009) provides a process for evaluating the VI pathway during an RI/FS (WAC 173-340-350) and subsurface media cleanup levels protective of indoor air quality. This process applies to buildings currently on a site, or future buildings, i.e., cleanup standards and actions must be protective of current and potential future site uses.

The guidance employs a tiered approach, starting with a preliminary assessment, and moving to Tier I and II assessments, if warranted. Initial screening steps in the preliminary assessment include the following:

- Are chemicals of sufficient volatility and toxicity known or reasonably suspected to be present?
- Are occupied buildings present (or could they be constructed in the future) above or near site contamination?

For the TPH Site, the first criterion is not met, as no ground water TPH impacts remain exceeding VI screening criteria, thus no further VI evaluation is necessary.

2.6 Point of Compliance

The point of compliance is the specific location(s) at which a particular cleanup level must be met in order to demonstrate compliance of a cleanup action. MTCA defines standard and conditional points of compliance. Proposed points of compliance are described below.

2.6.1 Soil

The standard soil point of compliance under MTCA (WAC 173-340-740 (6)(b)) is:

- For soil cleanup levels based on protection of ground water, the point of compliance shall be established throughout the Site
- For soil cleanup levels based on protection from vapors, the point of compliance shall be established throughout the Site from the ground surface to the uppermost ground water saturated zone
- For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance shall be established in the soils throughout the Site from the ground surface to 15 feet bgs.

MTCA recognizes that, for cleanup actions that involve containment or capping, cleanup levels may not be met at the standard point of compliance, but the cleanup action would be determined to comply with cleanup standards provided:

- The selected remedy is permanent to the maximum extent practicable
- The cleanup action is protective of human health and terrestrial ecological receptors
- Institutional controls are implemented to limit activities that could interfere with the long-term integrity of the containment system
- Compliance monitoring and periodic reviews are conducted
- The capped or contained COCs and measures to prevent migration and contact with them are specified in a CAP

The cleanup alternatives are evaluated based on standard soil point of compliance for removal and treatment alternatives (WAC 173-340-740(6)(a)-(e), and for containment remedies (WAC 173-340-740(6)(f)).

2.6.2 Ground Water

The standard ground water point of compliance under MTCA (WAC 173-340-720(8)(b)) is in ground water throughout the Site from the uppermost level of the saturated zone to the lowest depth which could potentially be affected. For properties near or adjoining surface water bodies, a conditional point of compliance off the property may be approved, as close as practicable to the source and not to exceed the point or points where the ground water flows into the surface water (typically at the ground water to surface water discharge area).

For this Site, the standard ground water point of compliance is proposed for TPH impacts, i.e., ground water throughout the Site.

2.7 SCHEDULE FOR CLEANUP IMPLEMENTATION, RESTORATION TIME FRAME

The interim action cleanups occurred in 2010 and 2017.

2.8 INSTITUTIONAL CONTROLS

Because the cleanup met all cleanup standards, no institutional controls are needed.

2.9 APPLICABLE STATE AND FEDERAL LAWS

Per Section 2.6 of the FS, the cleanup met all applicable or relevant and appropriate requirements (ARARs).

2.10 Preliminary Determination by the Department of Ecology

This dCAP recommends that the Department of Ecology determine that the selected remedy for contaminated soil at the site complies with WAC 173-340-360 because it was the most protective, fastest time frame alternative, and met all cleanup standards.

2.11 HAZARDOUS SUBSTANCES REMAINING ON SITE

The selected remedy does not include any containment so there is no need to comply with WAC 173-340-380(1)(ix), which states:

> (ix) Where the cleanup action involves on-site containment, specification of the types, levels, and amounts of hazardous substances remaining on site and the measures that will be used to prevent migration and contact with those substances.

3 SUMMARY & CONCLUSIONS

The Bothell Riverside TPH site boundary was discussed in the final RI report, HWA, October 2015 (Figure 3).

Petroleum contaminated soil was excavated and removed from the Site in an interim action in 2010. Site cleanup levels for soil are selected as the more stringent of MTCA Method A or Method B (see Table 2). Cleanup levels for ground water are selected as MTCA Method A. Points of compliance are as follows:

- Soil
  - Standard point of compliance (throughout the Site) based on protection of ground water
  - From the ground surface to 15 feet below ground surface based on direct contact exposure
- Ground water
  - The standard ground water point of compliance is proposed, i.e., ground water throughout the Site

The interim action complied with WAC 173-340-360 because it was the most protective, fastest time frame alternative, and met all cleanup standards. Based on the results of the remedial investigation and feasibility study conducted under MTCA and the application of the selection of remedy criteria, the preferred cleanup alternative at the Riverside TPH Site (developed in accordance with WAC 173-340-350 through 173-340-390) for contaminated soil and ground water is to adopt the completed interim actions as the final cleanup.

4 REFERENCES

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Washington State Department of Ecology, 2007, *Model Toxics Control Act Cleanup Regulation, Chapter 173-340 WAC*, Publication No. 94-06, dated October 12.

Washington Department of Ecology, 2009, *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*, Washington State Department of Ecology, Toxics Cleanup Program, Publication no. 09-09-047, Review DRAFT, October 2009.

TABLE 1
SOIL CLEANUP ANALYTICAL RESULTS
BOTHELL RIVERSIDE SITE
(all results in milligrams per kilogram (mg/kg))

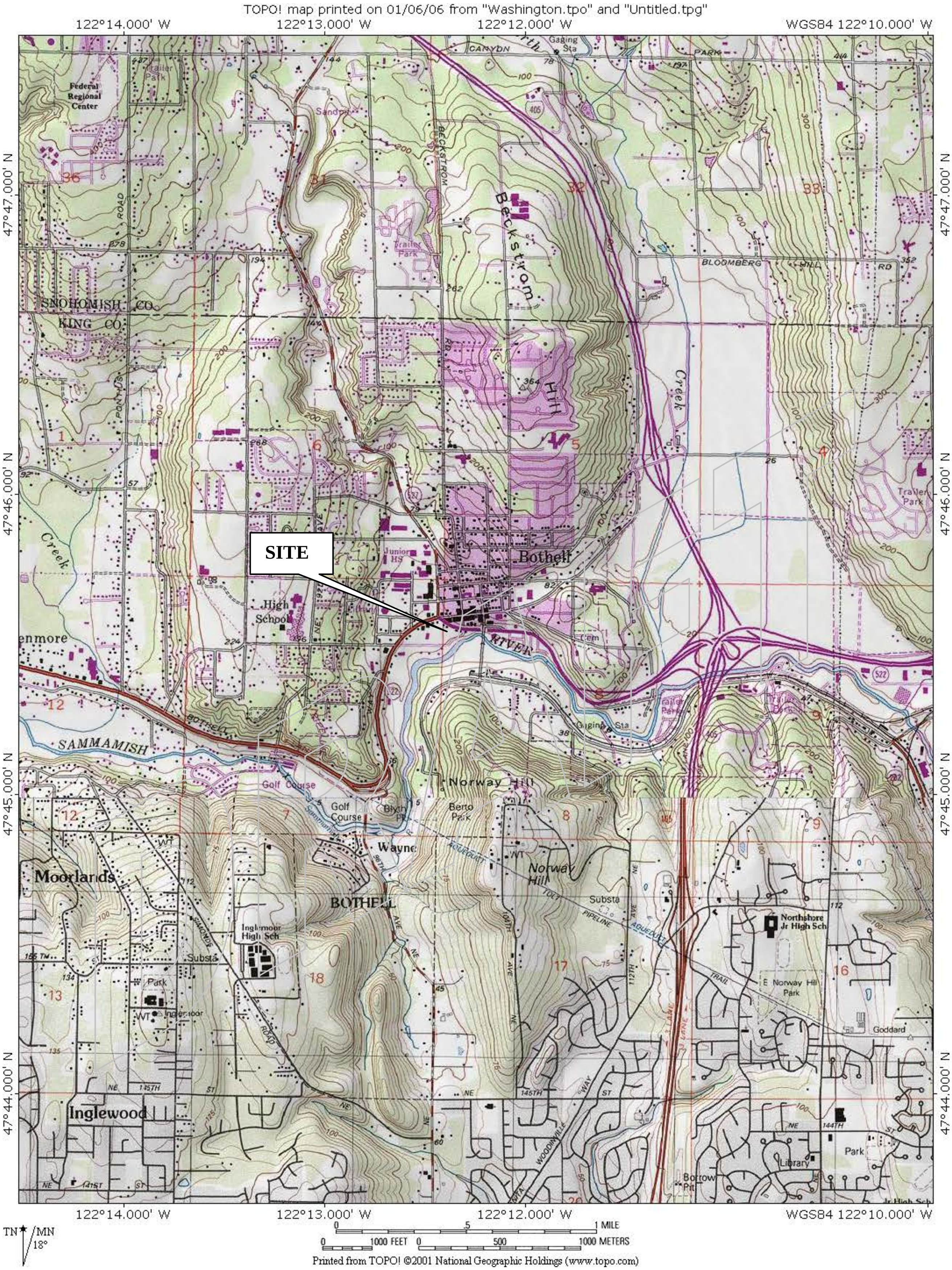
		Confirmation Sample[1]											
Sample Location	**Sample Depth ft bgs**	**Sidewall**	**Bottom**	**Diesel**	**Oil**	**Gasoline**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylenes**	**Total Naphthalenes[2]**	**cPAHs TEC[3]**	**NOTES**
R-TP-1-3	3			<140	**1100**						**0.017**	**0.016**	Excavated
R-TP-1-7	7			<79	**440**								Excavated
R-TP-2-3	3			**130**	**820**						**0.056**	**0.009**	Excavated
R-TP-3-3	3	X		<27	<54								
R-TP-4-4	4	X		<130	**840**								
R-TP-4-6	6												
R-TP-5-3	3	X		<110	**650**								
R-TP-6-2	2	X		<75	**490**								
R-TP-6-6	6			<37	**320**								
R-TP-7-3	3			<130	**750**						**0.040**	**0.001**	Excavated
R-TP-7-7	7			<28	**160**								Excavated
R-TP-8-3	3			<160	**940**						**0.045**	**0.010**	Excavated
R-TP-8-6	6			<40	**300**								Excavated
R-TP-9-2	2			<67	**550**						**0.1439**	**0.017**	Excavated
R-TP-9-7	7			<28	**220**								Excavated
R-TP-10-4	4	X		<110	**680**								
R-TP-11-3	3			**74**	**660**								
R-TP-11-5	5			<28	<57								
R-PEX-1-4	4		X	**72**	**720**								
R-PEX-2-4	4		X	**84**	**690**								
R-PEX-3-4	4		X	**52**	**530**								
R-PEX-4-2	2	X		<94	**640**								
R-PEX-5-2	2	X		**78**	**710**								
R-PEX-6-2	2	X		<140	**1800**								
R-PEX-7-4	4		X	**81**	**710**								
2017 Residual Soil Cleanup													
R-PEX-8-11	11		X	<110	**500**	**44**	<0.080	<0.40	<0.40	**1.1**			Excavated, Sample ID REX-B1-11 in Laboratory Report
R-PEX-9-11	11		X	<110	**760**	**150**	<0.080	<0.40	<0.40	**32.58**			Excavated, Sample ID REX-B2-11 in Laboratory Report
R-PEX-10-10	10	X		<87	**300**	**420**	**0.064**	**0.097**	**0.32**	**0.64**			Excavated, Sample ID REX-1-10 in Laboratory Report
R-PEX-11-10	10	X		<70	<60	**420**	**0.089**	**0.18**	**0.44**	**1.19**			Excavated, Sample ID REX-EW-10 in Laboratory Report
R-PEX-12-5	5	X		<27	**86**	**15**	<0.020	<0.056	<0.056	<0.056			Excavated, Sample ID REX-EW-5 in Laboratory Report
R-PEX-13-10	10	X		<73	**240**	**34**	<0.020	<0.063	<0.063	<0.063			Excavated, Sample ID REX-SW-10 in Laboratory Report
R-PEX-14-5	5	X		<460	**3500**	**18**	**0.04**	<0.060	<0.060	**0.08**			Excavated, Sample ID REX-SW-5 in Laboratory Report
R-PEX-15-10	10	X		<890	<57	**3200**	**1.6**	**1.5**	**1.7**	**6.5**			Excavated, Sample ID REX-WW-10 in Laboratory Report
R-PEX-16-5	5	X		<27	<54	<5.4	<0.020	<0.054	<0.054	<0.054			Excavated, Sample ID REX-WW-5 in Laboratory Report
R-PEX-17-10	10	X		<32	<64	**11**	<0.020	<0.068	<0.068	<0.068			Sample ID REX-NW-10 in Laboratory Report
R-PEX-18-5	5	X		<27	**70**	<5.4	<0.020	<0.054	<0.054	<0.054			Sample ID REX-NW-5 in Laboratory Report
R-PEX-19-10	10	X		<37	**190**	**64**	**0.021**	<0.061	**0.23**	**0.21**			Excavated
R-PEX-20-5	5	X		**89**	**690**	<5.6	<0.020	<0.056	<0.056	<0.056			
R-PEX-21-10	10	X		<30	<60	**8.7**	<0.020	<0.061	<0.061	<0.061			
R-PEX-22-5	5	X		<27	<54	<5.7	<0.020	<0.057	<0.057	<0.057			
R-PEX-23-12.5	12.5		X	<54	<110	<15	<0.029	<0.15	<0.15	**0.28**			
R-PEX-24-12.5	12.5		X	<110	**350**	<35	<0.071	<0.35	<0.35	<0.35			
R-PEX-25-5	5	X		<27	<54	<5.5	<0.020	<0.055	<0.055	<0.055			
R-PEX-26-10	10	X		<29	<57	**12**	<0.020	<0.049	<0.049	<0.049			
R-PEX-27-5	5	X		<26	<53	<5.5	<0.020	<0.055	<0.055	<0.055			
R-PEX-28-10	10	X		<60	**270**	**86**	<0.020	<0.069	<0.069	**0.17**			Excavated
R-PEX-29-5	5	X		**150**	**1100**	**22**	<0.020	<0.061	<0.061	<0.061			
R-PEX-30-10	10	X		**110**	**450**	<5.3	<0.020	<0.053	<0.053	<0.053			
R-PEX-31-5	5	X		<27	<55	<5.9	<0.020	<0.059	<0.059	<0.059			
R-PEX-32-10	10	X		<29	<58	**39**	<0.020	<0.059	<0.059	<0.059			Excavated
R-PEX-33-6	6	X		<630	**130**	**740**	**0.59**	<0.65	**4.5**	<1.3			Excavated
R-PEX-34-8	8	X		**110**	**620**	**130**	**0.33**	<0.47	**0.48**	<0.47			Excavated
R-PEX-35-10	10'	X		<310	**1200**	**380**	**0.46**	<0.42	**2.4**	**3.35**			Excavated
R-PEX-36-5	5'	X		<27	<54	<6.0	<0.020	<0.060	<0.060	<0.060			Excavated
R-PEX-37-9	9'	X		**520**	**140**	**1500**	**0.13**	<0.65	**8.1**	<2.6			Excavated
R-PEX-38-8	8'	X		<28	<58	<5.8	<0.020	<0.058	<0.058	<0.058			
R-PEX-39-11	11'	X		**140**	**470**	**81**	**0.02**	<0.064	**0.073**	<0.064			Excavated
R-PEX-40-5	5'	X		<27	<53	<5.4	<0.020	<0.054	<0.054	<0.054			
R-PEX-41-9	9'	X		<29	<57	<5.6	<0.020	<0.056	<0.056	<0.056			
R-PEX-42-10	10'		X	<90	**490**	<42	<0.085	<0.42	<0.42	**1.6**			
R-PEX-43-11	11'		X	<60	**230**	<23	<0.045	<0.23	<0.23	<0.23			
R-PEX-44-5	5'	X		<89	**310**	<40	<0.081	<0.40	<0.40	<0.40			
R-PEX-45-9	9'	X		<31	<62	<6.3	<0.020	<0.063	<0.063	<0.063			
R-PEX-46-11	11'		X	<52	**120**	<19	<0.037	<0.19	<0.19	<0.19			
R-PEX-47-5	5'	X		<32	<65	<7.2	<0.020	<0.072	<0.072	<0.072			
R-PEX-48-10	10'	X		<30	<61	<6.4	<0.020	<0.064	<0.064	<0.064			
R-PEX-49-5	5'	X		**69**	**1100**	<4.8	**0.025**	<0.048	<0.048	<0.048			
R-PEX-50-12	12'	X		<29	<58	<6.0	<0.20	<0.060	<0.060	<0.060			
R-PEX-51-5	5'	X		**120**	**970**	<6.4	**0.023**	<0.064	<0.064	<0.064			
R-PEX-52-11	11'	X		<28	<57	<6.0	<0.020	<0.060	<0.060	<0.060			
R-PEX-53-6	6'	X		**69**	**680**	<6.1	<0.020	<0.061	<0.061	<0.061			
R-PEX-54-10	10'	X		<31	**70**	<6.1	<0.020	<0.061	<0.061	<0.061			
R-PEX-55-5	5'	X		<31	<62	<7.2	<0.020	<0.072	<0.072	<0.072			
R-PEX-56-10	10'	X		<30	**64**	<6.1	<0.020	<0.061	<0.061	<0.061			
R-PEX-57	11'		X	<29	**76**	<5.6	<0.020	<0.056	<0.056	<0.056			
R-PEX-58-9	9'	X		<30	<59	<6.0	<0.020	<0.060	<0.060	<0.060			
R-PEX-59-9	9'	X		<31	<62	<6.3	<0.020	<0.063	<0.063	<0.063			
R-PEX-60-11	11'		X	<31	**120**	<6.7	<0.020	<0.067	<0.067	<0.067			
2017 Residual Soil Cleanup Backfill													
Backfill #1	NA	NA	NA	<27	**240**	<4.2	<0.020	<0.042	<0.042	<0.042			January 2017, Soil rejected, this backfill not used
Backfill #2	NA	NA	NA	<27	<55	<4.3	<0.020	<0.043	<0.043	<0.043			January 2017, second backfill source acecpted
Backfill #4	NA	NA	NA	<26	<53	<5.6	<0.020	<0.056	<0.056	<0.056			March 2017 backfill, accepted
Backfill #5	NA	NA	NA	<26	<53	<6.5	<0.020	<0.065	<0.065	<0.065			March 2017 backfill, accepted
Backfill #6	NA	NA	NA	<27	<53	<6.0	<0.020	<0.060	<0.060	<0.060			March 2017 backfill, accepted
Stockpile													
R-TP-1-3	3			<140	**1100**						**0.017**	**0.016**	
R-TP-2-3	3			**130**	**820**						**0.056**	**0.009**	
R-TP-5-3	3			<110	**650**								
R-TP-6-2	2			<75	**490**								
R-TP-7-3	3			<130	**750**						**0.040**	**0.001**	
R-TP-9-2	2			<67	**550**						**0.1439**	**0.017**	
MTCA Method A Cleanup Level[4]				2000		100/30[4]	0.03	7	6	9	5	0.100	
MTCA Method B Cleanup Level[5]				1824		84							

Notes:
< - Not detected at laboratory's reporting limit
Blank - Sample was not analyzed for this constituent
NA - Not applicable
Bold - Analyte Detected
Bold/Highligh - Analyte detected above MTCA Method A soil cleanup level
- Sample in area that was subsequently excavated
1 - Confirmation that soil remaining in place meets MTCA cleanup levels
2 - Sum of Naphthalene + 1-Methylnaphthalene + 2-Methylnaphthalene
3 - Toxic Equivalent Concentration of carcinogenic polynuclear aromatic hydrocarbons (cPAHs) per WAC 173-340-708(e)
4 - Washington Model Toxics Control Act Method A (Table 740-1) soil cleanup levels for unrestricted land use
5 - Method B TPH cleanup levels are site specific values calculated using MTCATPH1.1

Table 2
Summary of Method B Soil TPH Risk Calculations
Bothell Riverside Site

Release area	Former service station(s)				
TPH Type	**Lubricating oil**				
Sample	**R-TP-1-3**	**R-TP-2-3**	**R-TP-7-3**	**R-TP-8-3**	**R-TP-9-2**
Calculated Method B TPH cleanup level for direct skin contact (mg/Kg)	4,977	5,013	6,403	6,666	1,824
Most stringent soil risk criterion for direct skin contact	cPAHs mixture	Hazard Index	Hazard Index	cPAHs mixture	cPAHs mixture
Method B soil TPH concentration protective of ground water (mg/Kg)	100% NAPL[1]	100% NAPL	100% NAPL	100% NAPL	100% NAPL
Most stringent soil risk criterion for protection of ground water	Hazard Index Total risk 1E-5 cPAHs mixture	Hazard Index Total risk 1E-5 cPAHs mixture	Hazard Index Total risk 1E-5 cPAHs mixture	Hazard Index Total risk 1E-5 cPAHs mixture	Hazard Index Total risk 1E-5 cPAHs mixture
Method A soil cleanup levels (mg/Kg)	2000 (D) 2000 (O) 5 (Naphthalenes)[2] 0.10 (cPAHs TEC)[3]				

Notes:
1 - 100% NAPL means soil containing free product would not produce a TPH concentration $\geq$800 μg/L in ground water
2 - Sum of Naphthalene + 1-Methylnaphthalene + 2-Methylnaphthalene
3 - Toxic Equivalent Concentration of carcinogenic polynuclear aromatic hydrocarbons (cPAHs) per WAC 173-340-708(e)



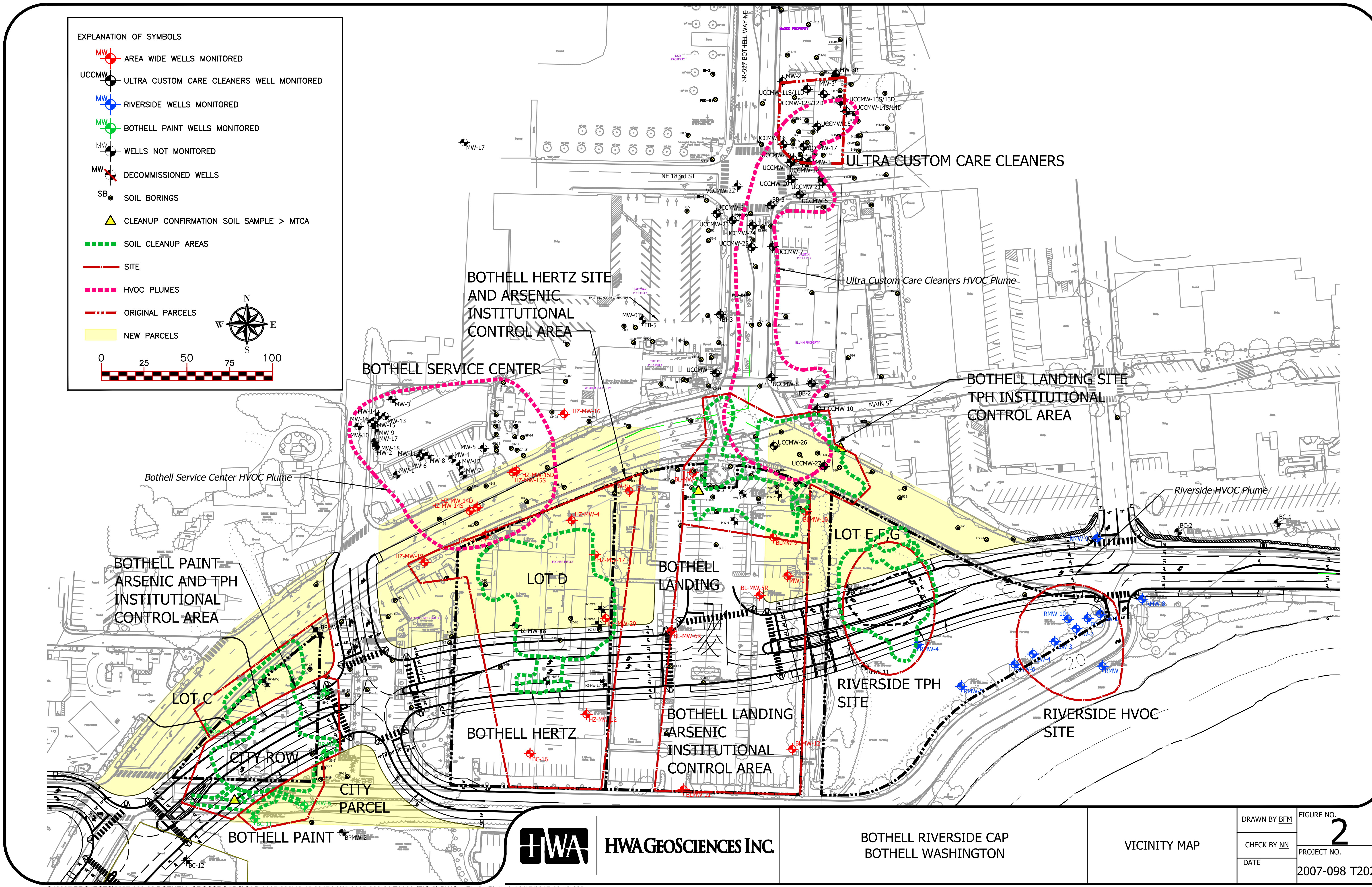
HWA GEOSCIENCES INC.

SITE VICINITY

BOTHELL RIVERSIDE TPH SITE
draft CLEANUP ACTION PLAN
BOTHELL, WASHINGTON

FIGURE NO.
1

PROJECT NO.
2007-098



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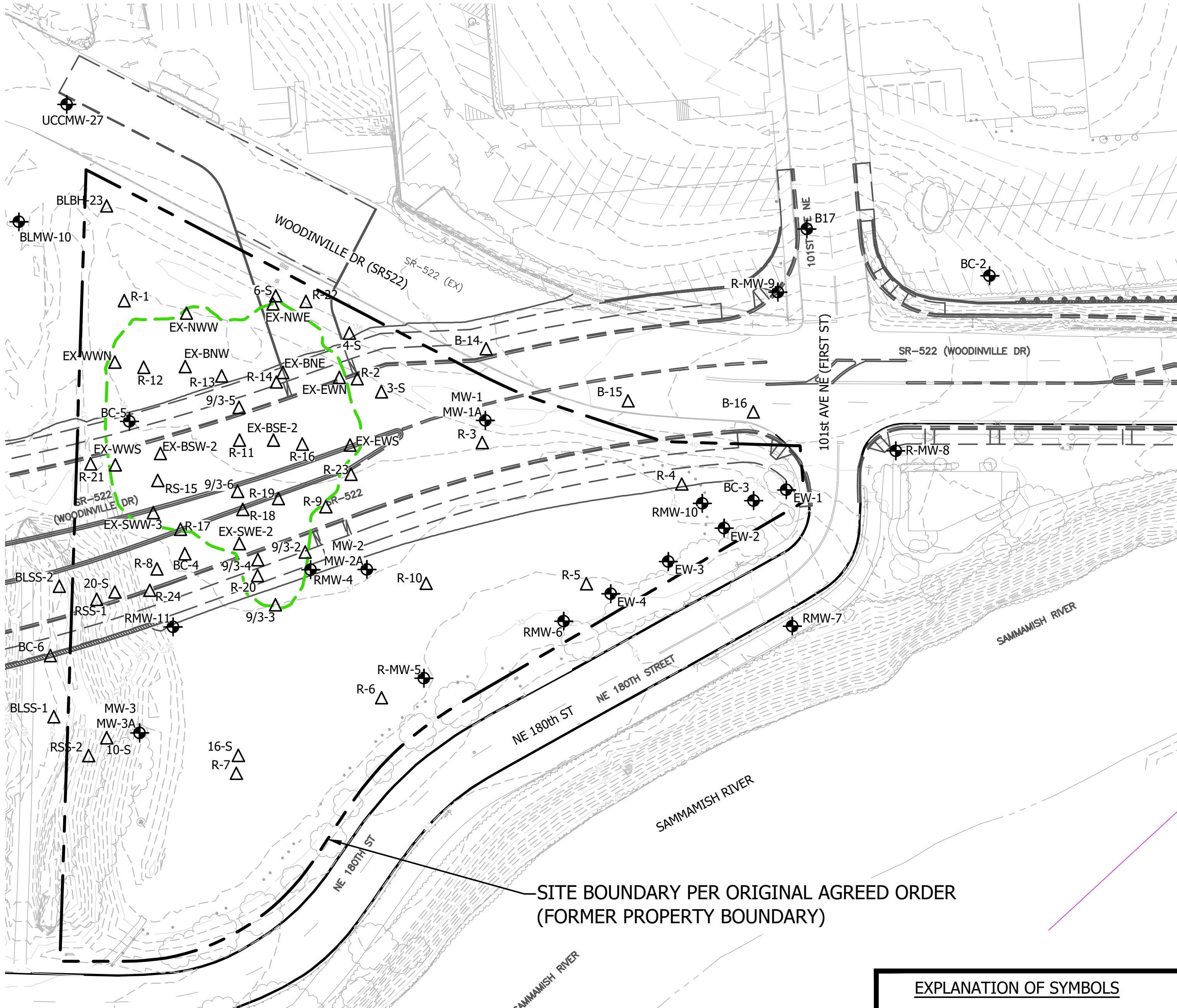
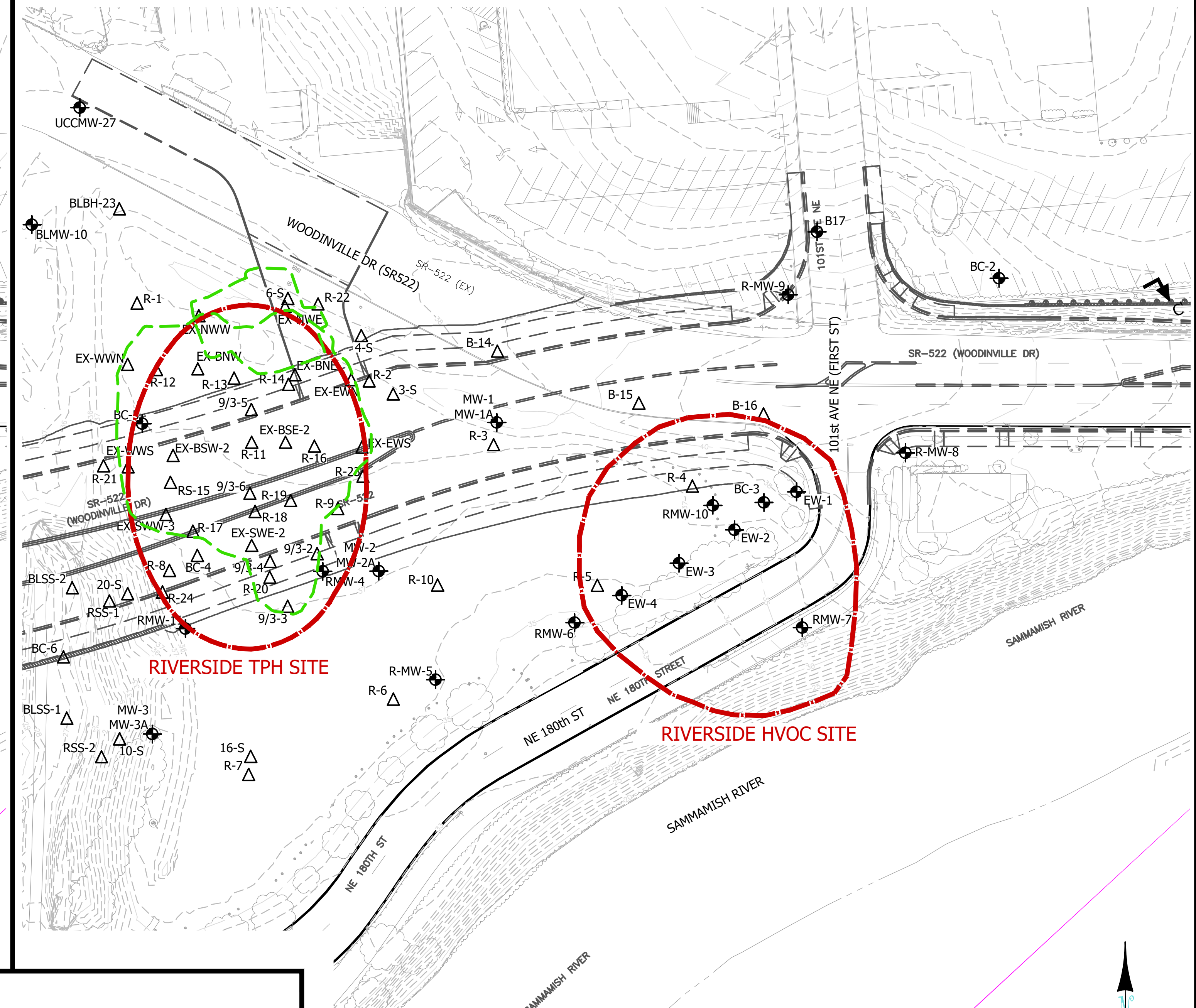


ORIGINAL SITE BOUNDARIES

(AS DEPICTED IN THE AGREED ORDER)



FINIAL SITE BOUNDARIES

(AS DEFINED IN THE RI REPORT)

EXPLANATION OF SYMBOLS

- APPROXIMATE EXTENT OF 2010-2017 CLEANUP EXCAVATION
- APPROXIMATE PROPERTY BOUNDARY
- SITE BOUNDARY
- R-8 △ SOIL BORING OR TEST PIT LOCATIONS
- R-MW-10 MONITORING WELL LOCATIONS

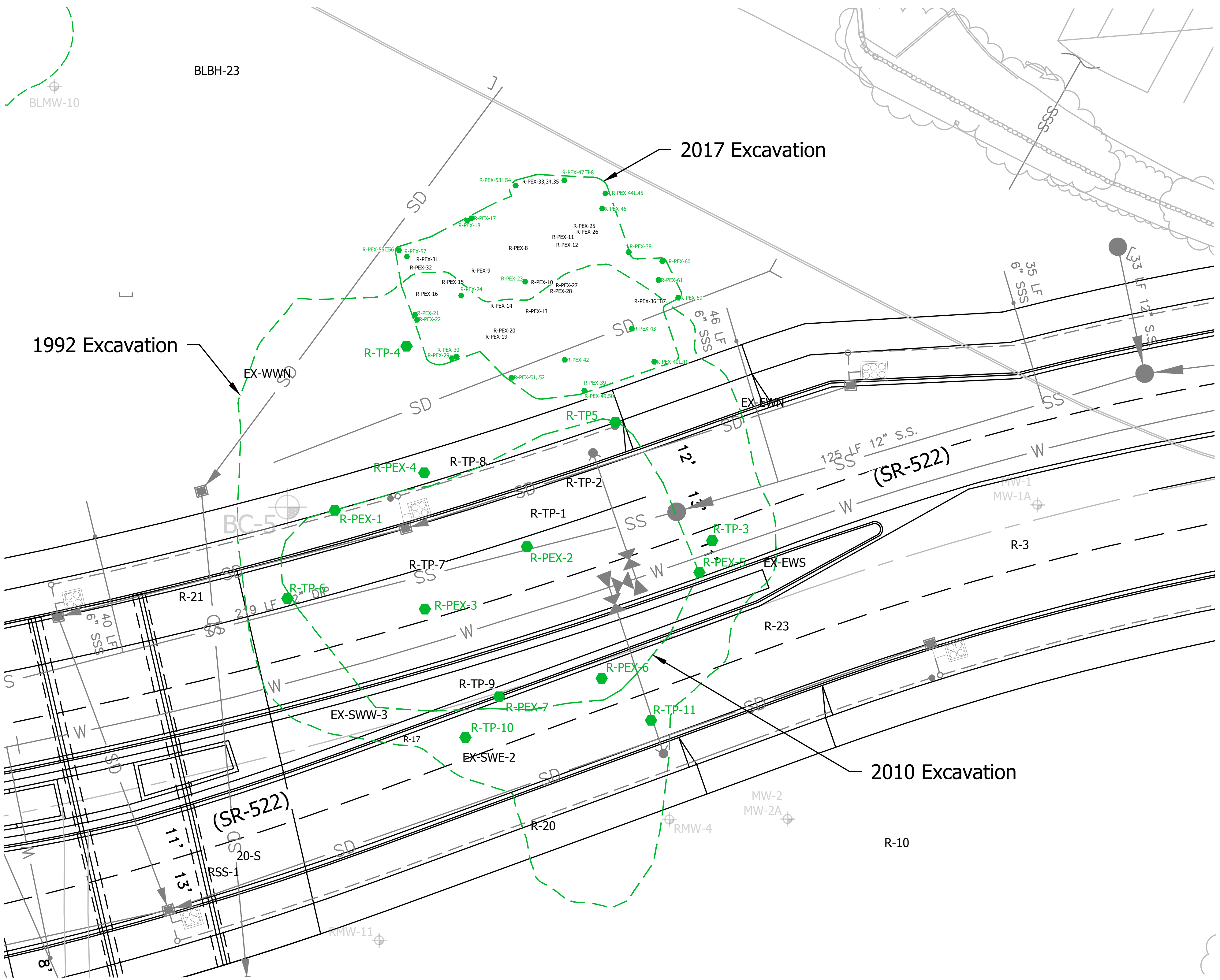
HWA GEOSCIENCES INC.

BOTHELL RIVERSIDE CAP
BOTHELL, WASHINGTON

SITE BOUNDARIES

DRAWN BY BFM	FIGURE NO. 3
CHECK BY AS	PROJECT NO.
DATE 09.23.15	2007-098 T2018

S:\2007 PROJECTS\2007-098-21 BOTHELL CROSSROADS\CAD 2007-098\12.15.2017\HWA 2007-098-21 T2018 (FIG 3A).DWG <Riverside HVOC Fig 3A> Plotted: 12/17/2017 12:32 PM



0' 15' 30' 60'

EXPLANATION OF SYMBOL

APPROXIMATE PROPERTY BOUNDARY

APPROXIMATE LIMITS OF CONTAMINATED SOIL EXCAVATION

R-PEX-9 APPROXIMATE LOCATION OF CONFIRMATION SOIL SAMPLE LEFT IN PLACE WITH CONCENTRATIONS □MTCA

R-PEX-8 APPROXIMATE LOCATION OF SOIL SAMPLE IN AREA THAT WAS SUBSE□UENTLY EXCAVATED

PRE-INTERIM ACTION SOIL SAMPLE MEETING MTCA CLEANUP LEVELS

R-TP-4 TEST PIT LOCATION WITH CONCENTRATIONS □MTCA

BASE MAP PROVIDED BY PARAMETRIX

HWA GEOSCIENCES INC.

BOTHELL RIVERSIDE SITE
RI/FS
BOTHELL, WASHINGTON

EXTENT OF INTERIM ACTION CLEANUP

DRAWN BY EFK	FIGURE NO. 4
CHECK BY AS NK, AY	PROJECT NO. 2007-098 T919
DATE 04.12.17	

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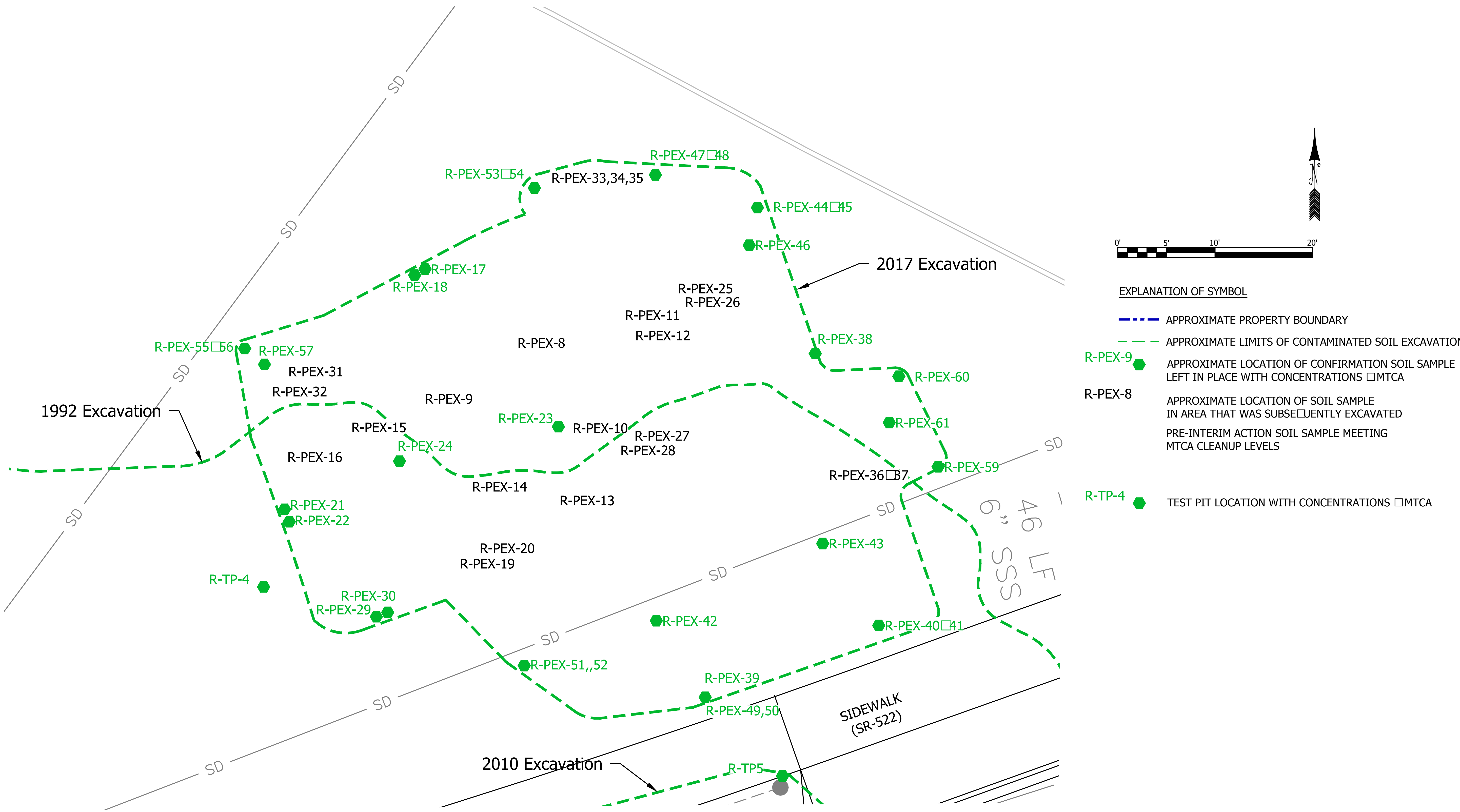

BASE MAP PROVIDED BY PARAMETRIX

HWA GEOSCIENCES INC.

RIVERSIDE SITE
BOTHELL, WASHINGTON

EXTENT OF 2017 INTERIM ACTION CLEANUP

DRAWN BY EFK	FIGURE NO. 5
CHECK BY AS/NK/AY	PROJECT NO.
DATE 04.12.17	2007-098 T2044

S:\2007 PROJECTS\2007-098-22 BOTHELL CROSSROADS\CAD 2007-098\HWA 2007-098-21 T20□□.DWG <20□□fig 2> Plotted: □/28/2017 5:09 AM