



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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June 28, 2018

Mr. Romeo Gonyea
17600 147th Street SE PMB 22
Monroe, Washington 98275

Re: Further Action at the following Site:

- **Name:** HERS Industrial Park
- **Address:** 4403-4480 Russell Road, Mukilteo, WA 98275
- **Facility/Site No.:** 127256
- **VCP No.:** NW1554
- **Cleanup Site ID No.:** 3971

Dear Mr. Gonyea:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of the **HERS Industrial Park** facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Issue Presented and Opinion

Is further remedial action necessary to clean up contamination at the Site?

YES. Ecology has determined that further remedial action is necessary to clean up contamination at the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA"). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following releases:

- Tetrachloroethene (PCE) and trichloroethene (TCE) with related degradation products; total petroleum hydrocarbons in the diesel (TPH-D) and heavy oil (TPH-O) ranges; toluene and arsenic in Soil;
- TPH-D, TPH-O, PCE, TCE, cis-1,2-dichloroethene (cis-DCE), vinyl chloride (VC), methylene chloride, and arsenic in Ground Water.

Enclosure A includes a detailed description and diagram of the Site, as currently known to Ecology.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcels associated with this Site are affected by other sites. Also, please note that the Site is not located within an area that would have been affected by the former Everett Smelter.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. Aspect Consulting, LLC (Aspect). 2018. *Groundwater Classification and Proposed Cleanup Standards, HERS Industrial Park Site, 4403 Russell Road, Mukilteo, Washington*. January 29.
2. Aspect, 2015. *Remedial Investigation/Feasibility Study, HERS Industrial Park, Mukilteo, Washington*. November 9.
3. The Riley Group, 2012. *Groundwater Sampling Event, 1st Quarter 2012, Russell Road Industrial Park (aka Hers Industrial Park), 4403 Russell Road, Mukilteo, Washington*. February 23.
4. The Riley Group, 2009. *Groundwater Sampling Event – Third Quarter 2009, Russell Road Industrial Park (aka Hers Industrial Park), 4403 Russell Road, Mukilteo, Washington*. October 2.
5. The Riley Group, 2009. *Groundwater Sampling Event – First Quarter 2009, Russell Road Industrial Park (aka Hers Industrial Park), 4403 Russell Road, Mukilteo, Washington*. March 26.
6. The Riley Group, 2008. *Groundwater Sampling Event – Second Quarter 2008, Russell Road Industrial Park (aka Hers Industrial Park), 4403 Russell Road, Mukilteo, Washington*. August 20.

7. The Riley Group, 2005. *Well Installation and Groundwater Sampling Event – Fourth Quarter 2005, HERS Industrial Park, 4403 Russell Road, Mukilteo, Washington.* December 27.
8. The Riley Group, 2005. *Supplemental Phase II Subsurface Investigation, Hers Industrial Park, 4403 Russell Road, Mukilteo, Washington.* June 22.
9. The Riley Group, 2005. *Phase I Environmental Site Assessment, Hers Industrial Park, 4403 Russell Road, Mukilteo, Washington.* June 20.
10. James P. Hurley Company, 1996. *Site Assessment Report, HERS Industrial Park, 4403 to 4493 Russell Road and 4424 to 4480 Chennault Beach Road, Mukilteo, Washington.* September 25.
11. James P. Hurley Company, 1995. *Phase II Environmental Site Assessment Report, 4403 to 4493 Russell Road and 4424 to 4480 Chennault Beach Road, Mukilteo, Washington.* August 3.
12. James P. Hurley Company, 1995. *Combined UST Removal and Petroleum Contaminated Soil Cleanup Summary Report, 4493 Russell Road, Mukilteo, Washington.* July 24.
13. ATC Environmental, Inc. 1994. *Phase I Environmental Site Assessment, Hers Industrial Park, Mukilteo, Washington.* October 25.

Those documents are kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only.

You can make an appointment by completing a Request for Public Record form (<https://www.ecology.wa.gov/About-us/Accountability-transparency/Public-records-requests>) and emailing it to: publicrecordsofficer@ecy.wa.gov, or contacting the Public Records Officer at (360) 407-6040. A number of these documents are accessible in electronic format from the Site web page (<https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=3971>).

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

Ecology recognizes that a significant amount of characterization and remedial actions have been undertaken at this Site in recent years. Ecology has concluded however that **further remedial**

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action is necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. Characterization of the Site.

Ecology has determined your characterization of the Site is sufficient to establish cleanup standards and select a cleanup action. The Site is described above and in **Enclosure A**.

The lateral and vertical extent of contamination on the Site has been characterized with 12 direct-push soil borings and 22 monitoring wells. Soil on the Site has been characterized for TPH-D and TPH-O. Minimal soil samples have been analyzed for chlorinated volatile organic compounds, but the area where the release occurred was identified and has been delineated. Soil and ground water contaminated with TCE above Method A have been encountered in a deep monitoring well (MW-16D) (installed within the Vashon till) but not in a deeper well (MW-2D) (screened in the Esperance sand). Therefore, the vertical extent of chlorinated volatile organic compounds has been tentatively delineated in ground water, based on sampling conducted in 2015. Ecology requires current data to determine the Site's compliance with MTCA.

Potential sources for PCE on the Site include the past operations of Intermec Corporation, King Machine, Absolute Cleaning Services, Coleman Machine Works and Adaptive Engineering Lab, which were all former tenants in what was then known as the HERS Industrial Park. These businesses all reportedly used chlorinated solvents, and thus are suspected of causing or contributing to the releases of PCE or other solvents that subsequently entered the storm water catch basins northeast and east of the building. The mechanisms for the release and migration into the storm water system have not been established. Breaches in the storm water conveyance system most likely resulted in infiltration of the contaminants into shallow ground water on the Property.

The source of TPH-D and TPH-O is a former 500-gallon heating oil tank that was removed in 1995. Concentrations of TPH-D and TPH-O in the diesel and oil ranges in ground water exceed Method A cleanup levels and so are considered contaminants of concern (COC) on this Site. Because these petroleum hydrocarbons and PCE and related degradation products have been detected in monitoring well MW-16D, they are considered to be part of a comingled plume that extends within the Vashon till. Additional ground water monitoring may demonstrate that the comingling is no longer occurring.

The source of arsenic in ground water on the Site above the Method A cleanup level is unknown; no arsenic has been detected in Site soil at concentrations above Method A. A statistical analysis of arsenic in Site ground water failed to consider the requirements in

WAC 173-340-720(e) which state that 1) no single detected concentration shall be no more than twice the ground water cleanup level; and 2) less than 10 percent of the sample concentrations shall exceed the ground water cleanup level. In order to determine if less than 10 percent of the sample concentrations exceed the ground water cleanup level, data from a minimum of 11 sampling rounds at each well are needed. As a result, since neither of the two above requirements were met, a statistical analysis is not feasible at this time.

Arsenic is considered a COC in ground water on the Site. Two ground water samples collected in monitoring well MW-16D contained arsenic at concentrations below the Method A cleanup level, as did the dissolved fraction of a sample collected in MW-2D. These results suggest that elevated levels of arsenic on the Site do not reflect background conditions.

2. Establishment of cleanup standards.

a. Soil.

Ecology has determined the cleanup levels and points of compliance you established for the Site **do not meet** the substantive requirements of MTCA.

Cleanup levels protective of terrestrial ecological receptors are not necessary because the Site meets the initial Terrestrial Ecological Evaluation (TEE) exclusion criteria (MTCAWAC 173-340-7491(1)(c)(i)). There are less than 1.5 acres of contiguous undeveloped land on or within 500 feet of any part of the Site. Land use at the Site and surrounding area makes substantial wildlife exposure unlikely.

The Site is located in a primarily commercial area; therefore, soil cleanup levels for unrestricted land use are appropriate. Ground water is present beneath the Property and soil cleanup levels protective of leaching to ground water are required.

The point of compliance for soil is based on the protection of ground water and is Site-wide throughout the soil profile, and may extend below the water table. This is the appropriate point of compliance for the Site.

b. Ground Water

The 2018 *Groundwater Classification and Proposed Cleanup Standards* report proposes that ground water on the Site be considered non-potable for purposes of

developing cleanup levels. Prior to the preparation of the above referenced report, Ecology had on two occasions in 2016 informed Aspect that obtaining a non-potability determination would be unlikely for this Site.

A part of MTCA's provision for determining non-potability of ground water allows a demonstration of well yield with less than 0.5 gallons per minute (gpm), indicating insufficient water can be obtained from the formation for drinking water purposes. This can be shown using a constant-rate pumping test. A step drawdown pumping test was conducted in 2017 using monitoring well MW-22, which is primarily screened in sandy silt. A 0.5 gpm pumping rate was not sustainable in MW-22; however, several other Site monitoring wells are screened in silty sand, which would have been more representative. Also, monitoring well MW-22 was not constructed in compliance with WAC 173-160, in accordance with WAC 173-340-720(2)(b)(i).

However, it is unlikely that ground water on the Site can be considered non-potable, based on the following factors:

- The physical and chemical characteristics of the known dense non-aqueous phase liquid (DNAPL) contaminant sources on the Site;
- Potential connectivity of aquifer zones, which has already been partially demonstrated (TCE concentrations above Method A were detected in soil to 65 feet below the ground surface and in ground water in monitoring well MW-16D screened within the Vashon till); and
- Other hydrogeological characteristics of the Site.

As noted in Ecology's previous opinion letter dated 11/08/16, detections of chlorinated compounds in soil and ground water within the Vashon till may be due to the natural downward migration of DNAPL and/or the monitoring well construction practices that lacked protective measures, such as installation of telescoping or conductor casing to prevent cross contamination. A second deeper monitoring well (MW-2D) was also not properly outfitted with conductor casing and is screened in the Esperance sand within the Advance outwash, a regional drinking water aquifer. This installation increases the likelihood that hazardous substances will be transported downward, connecting contaminated ground water on the Site to ground water that is a current or potential future source of drinking water (WAC 173-340-720(2)(c)). Based on the above reasons and ground water data provided in the RI, the leaching pathway is considered complete.

Monitoring well MW-2D was sampled once in August 2015, with non-detectable or below Method A concentrations of petroleum hydrocarbons, volatile organic

compounds and dissolved arsenic. Ecology requests that an additional sampling round be conducted in MW-2D in January 2019 to obtain current data and assess seasonal effects.

The point of compliance for ground water is throughout the Site, from the uppermost level of the saturated zone extending vertically to the lowest depth which could potentially be affected.

c. Air

The vapor intrusion pathway has not yet been evaluated and must be considered during the development of cleanup levels and cleanup actions for the Site. Table B-1 in the draft *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (October 2009) is outdated and should not be used. The draft Guidance was revised in February 2016 to reflect this change. This publication, which is No. 09-09-047 can be found at: <https://fortress.wa.gov/ecy/publications/SummaryPages/0909047.html>

The point of compliance for air is in ambient air throughout the Site.

3. Selection of cleanup action.

Ecology has determined the cleanup action you selected for the Site **does not meet** the substantive requirements of MTCA.

The 2018 *Groundwater Classification and Proposed Cleanup Standards* report states that some injection well seals were damaged previously due to high pressure injections and as a result, the injection wells should not be sampled.

In addition, injection well MW-13 is silted-in and injection well MW-14 is inaccessible. Because of this, it will be necessary to decommission and replace the damaged and unusable injection wells with representative monitoring wells within the concentrated plume area (Figures 6 through 8), in order to evaluate ground water compliance in this area of the Site.

4. Cleanup.

Ecology has determined the cleanup you performed **does not meet** any cleanup standards at the Site.

In March, April, and October 2006, three high-pressure chemical injection events consisting of hydrogen peroxide and ferrous sulfate (in solution with HCL or acetic acid) were conducted in monitoring wells MW-1, MW-7 and the seven injection wells (MW-9 through MW-15). Since the 2006 injections, concentrations of PCE and TCE in ground water samples collected in MW-1 have decreased, but are still above the previously detected levels and above Method A cleanup levels.

Limitations of the Opinion

1. Opinion does not settle liability with the state.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not constitute a determination of substantial equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you performed is substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

3. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

Contact Information

Thank you for choosing to clean up the Site under the Voluntary Cleanup Program (VCP). After you have addressed our concerns, you may request another review of your cleanup. Please do

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not hesitate to request additional services as your cleanup progresses. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me at (425) 649-7064 or heather.vick@ecy.wa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Heather Vick". The signature is fluid and cursive, with the first name "Heather" written in a larger, more prominent script than the last name "Vick".

Heather Vick, LHg
NWRO Toxics Cleanup Program

Enclosure (1): A – Description and Diagrams of the Site

cc: Jeremy Porter, Aspect Consulting LLC
Sonia Fernandez, VCP Coordinator, Ecology

Enclosure A

Description and Diagrams of the Site

Site Description

This section provides Ecology's understanding and interpretation of Site conditions, and is the basis for the opinions expressed in the body of the letter.

Site: The Site is defined as total petroleum hydrocarbons in the gasoline (TPH-G), diesel (TPH-D), and heavy oil (TPH-O) ranges, tetrachloroethene (PCE) and trichloroethene (TCE) with related degradation products, and arsenic released to soil at 4403, 4433, 4463 and 4493 Russell Road and 4351, 4424 and 4440 Chennault Beach Road in Mukilteo, Washington (Property). The Site is also defined as TPH-D, TPH-O, PCE, TCE, cis-1,2-dichloroethene (cis-DCE), vinyl chloride (VC), methylene chloride, and arsenic in ground water.

Area and Property Description: A portion of the HERS Industrial Park constitutes the Property, which is an 8.2-acre, irregularly shaped tract of land. The Property is comprised of eight Snohomish County tax parcels containing seven one-story buildings and one demised building pad (former 4493 Russell Road parcel). The Property corresponds to the following six addresses and Snohomish County tax parcel numbers:

Address	Snohomish County Tax Parcel Number	Owner/Taxpayer
4403 Russell Road	00441400004600	Russell Road Industrial Park
4433 Russell Road	00441400004502	Russell Road Industrial Park
4463 Russell Road	00441400004400	Russell Road Industrial Park
4493 Russell Road	00441400004300	Russell Road Industrial Park
4351 Chennault Beach Road	00441400004700	Russell Road Industrial Park
4440 Chennault Beach Road	00548700001600	Russell Road Industrial Park

In addition, the following two parcels are considered part of the Property and are owned by the International Church of Foursquare Gospel:

Address	Snohomish County Parcel Number	Owner/Taxpayer
4424 Chennault Beach Road	00548700001700	International Church of Foursquare Gospel
4424 Chennault Beach Road	00548700001701	International Church of Foursquare Gospel

The following two parcels are not currently considered part of the Property but are adjacent to the northwestern corner of the Property and are part of the HERS Industrial Park:

Address	Snohomish County Parcel Number	Owner/Taxpayer
4470 Chennault Beach Road	01031600000200	Gonyea Woodworking Inc.
4480 Chennault Beach Road	01031600000100	Himalayan Holdings Group LLC

The Property is surrounded by primarily commercial and industrial land uses including CR Enterprises NW (fabricated structural metal) to the north, Accurate Sheet Metal to the east, Production Plating Inc. to the south and RAM Technologies (engineered foam and fabric) to the west.

Property History and Current Use: The Property was undeveloped land until approximately 1953, when a single-family residence was constructed in the southeast portion of the Property. The six existing Site industrial park buildings were constructed in 1977 and 1978. Site buildings have been occupied by various commercial and light industrial tenants. A tabulated summary of the former and present building tenants, including building square footage (SF), is as follows (building numbers correspond to street numbers in above addresses):

Building No./Occupant	Operation Dates	Operations	Hazardous Materials Used/Disposed
Building 4403 (30,875 SF)			
Intermec Corporation	1978 to 1990	Electronics manufacturer	Chlorinated solvents
King Machine	1990 to late 1990s	Automotive repair and machine shop	Hydraulic oil; machine oil; machine coolants; solvents
Our Gang Motorcycle	1990 to late 1990s	Motorcycle parts, service and repair	Petroleum products; chlorinated solvents
Absolute Cleaning Services	Unknown	Restaurant kitchen exhaust cleaning	Washed PCE-soaked cleaning rags in annex; wash water was routed to sanitary sewer
Dansco Cabinetry	Unknown	Woodworking	Stains; glues; adhesives; lacquer thinner
Custom Commercial Cabinets	Unknown	Woodworking	Glues; adhesives; lacquer thinner
Custom Cabling	Unknown	Cable company offices	None
Production Plating	Unknown	Product and stock storage	ERTS 614337; Phase II; cadmium in soil

Building 4433 (15,000 SF)

Absolute Cleaning Services	Unknown	Restaurant kitchen exhaust cleaning	PCE; kerosene; Smoke-A-Way
Double Bluff Design	Unknown	Oak furniture manufacturer	Stains; glues; adhesives
Coleman Machine Works	Unknown	Machine shop in annex	Hydraulic oil; machine oil; machine coolant; solvents
Exotic Tool Welding, Inc.	Unknown	Welding and metalworking	Acetone; welding gases; propane
Buchanan Companies	Unknown	Offices and storage	None

Building 4463 (11,400 SF)

Coleman Machine Works	Unknown but space vacant in 2005	Machine shop	Hydraulic oil; machine oil; machine coolant; solvents; oil stains in building and large oil stain in asphalt parking lot
Pacific Planners	Unknown	Woodworking	Wood preservation products

Building 4493 (30,500 SF)

Adaptive Engineering Lab	Unknown	Manufacturer of hardware and accessories for the physically-challenged	Hydraulic oil; machine oil; machine coolant; adhesive; glues; solvents; deburring compounds; Abandoned 550-gallon heating oil UST on south side of building
Mr. Ed's Bingo & Casino Supply	Unknown	Gaming supply storage (paper products, tables and chairs)	None
Vacant space			

Building 4440 (42,253 SF)

Franz Bakery	1994 to present	Bakery delivery operations; truck and baked good storage	None
Fiber International	Unknown to present	Services truck fleet vehicles	Waste oil in AST; parts washer uses mineral spirits and 'naphtha'

Building 4470 (20,200 SF)			
Provet of Seattle	Unknown	Warehouse and distribution of pet and veterinary supplies	Veterinary chemicals
Buffalo Bobs	Unknown	Restaurant	Waste cooking oil and grease
Building 4480 (17,600 SF)			
City of Mukilteo	1992 to unknown	Police Department	Illegal drugs and related items in evidence storage room
Himalayan Corporation	Unknown to present	Dog snack manufacturer	None

The current use of the Property is for the HERS Industrial Park.

Sources of Contamination: An abandoned 550-gallon heating oil underground storage tank (UST) located on the south side of Building 4493 was removed in June 1995.

Former operations of Intermec Corporation and King Machine, which occupied tenant spaces in the north end of Building 4403, are suspected of causing the releases of PCE and TCE to storm water catch basins northeast and east of the building. The storm water system was identified as a possible point source for the contamination, having the potential to leak and allow unimpeded migration into the subsurface. The mechanism for the release and migration into the storm water system has not been established.

Absolute Cleaning Services (ACS) stored PCE in 5-gallon containers, and prepared solutions of PCE and kerosene in 55-gallon drums in the 4433 Russell Road building. These mixtures were used as solvents for cleaning restaurant exhaust systems. ACS laundered used cleaning rags in a large commercial washer and dryer in the 4403 Russell Road building. During a 1995 Phase II ESA, it was determined that the washing machine drained to a 2-inch diameter steel pipe connected to the sanitary sewer.

The Property has a private storm water system that locally impacts the hydraulic gradient of shallow ground water. The system is considered a potential release point for contamination generated on the Property and disposed in storm drains. A 1994 Phase I Environmental Site Assessment recommended that the private storm drains be tight-lined and connected to the City's storm water sewer system. The primary source of VOC contamination appears to have originated from former and existing storm drains D29 and D30, on the east side of the former Intermec lease space in the 4403 Russell Road building.

Physiographic Setting: The Puget Sound Lowland physiographic province consists of a broad, low-lying region situated between the Cascade Range to the east and the Olympic

Mountains and Willapa Hills to the west. Mukilteo is located on the eastern shore of Puget Sound.

Surface/Storm Water System: The closest surface water body to the Site is a wetland area approximately 1,000 feet to the east. The headwaters of an unnamed west-flowing creek are located about 3,500 feet to the south.

The Property is covered almost entirely with impervious surfaces and storm water is captured by 39 catch basins in the asphalt pavement. The system is reportedly a low-impact development, infiltration-type system in which a portion of all storm runoff percolates into the subsurface via leach fields or dry wells. The catch basins were reportedly not tight-lined to an existing sewer main, but allowed to discharge directly to the subsurface, either at the catch basin or via a series of infiltration galleries extending outward from the catch basin.

Storm Drain System Investigation: The private storm drain system on the Property was investigated in 1995 using test pit excavations in the vicinity of five representative catch basins. The storm drains were found to be connected to concrete or masonry catch basins that were connected to perforated polyvinyl chloride discharge pipes. The system was found to distribute storm water and potential contaminants to leach fields located beneath parking areas throughout the Site.

Catch basin #34, located on the east side of Building 4403, was found to be filled with oily sludge and showed signs of leakage of oily water into the underlying soil. In 1996, the remainder of the catch basins were investigated by the collection of soil samples in exploratory test pits, or in borings advanced through from the bottom of the catch basins. No indication of contamination exceeding Method A cleanup levels was found. Inlet filter tray inserts (sets of filters), designed to remove sediment and petroleum hydrocarbons from untreated surface run-off, were subsequently installed in most of the storm water catch basins.

Ecological Setting: The Property is located in an industrial area and is surrounded by commercial and light industrial land uses. Some undeveloped land is located on properties north and west of the Property; however, most of the area is covered by pavement and buildings.

Geology: The Property is mapped as being directly underlain by Vashon glacial till, a dense, poorly-sorted, non-stratified mixture of clay, silt, sand and gravel up to boulder size. According to borehole logs for monitoring wells MW-1 through MW-8, a fine- to medium-grained silty sand with trace gravel (interpreted as fill materials) extends to approximately 15 feet below the ground surface (bgs), which was the maximum depth explored.

Beneath the fill, Vashon glacial till is encountered which consists of a heterogeneous, non-sorted mixture of clay, silt, sand and gravel. A weathered till was encountered to approximately 15 feet bgs; at that depth the till became much more dense. Based on one boring, the Vashon till occurs to a depth of approximately 177 feet at the Property and is underlain by Advance glacial outwash deposits (Esperance sand member). The Esperance sand at the Property consists of moderately to well-sorted and well-stratified sand, and is estimated to be 120 to 160 feet thick based, on geological mapping of the area.

Ground Water: Ground water occurs as a perched zone above and within the dense glacial till which underlies the fill materials. Ground water in the till occurs at depths ranging from approximately 2 to 7 feet bgs based on water levels recorded in Site monitoring and injection wells. In 2012, the direction of shallow ground water flow at the Site was to northeast, with a shallow ground water mound observed consistently beneath the northeast portion of the Site. The occurrence of the ground water mound was approximately coincident with the estimated boundary of the PCE/TCE plume. Both the presence of the mound and the plume may be the result of discharge from storm water catch basins located at the north end of an infiltration drain line. Chlorinated solvent wastes were likely disposed in the storm water catch basins, where they then migrated into the subsurface; however, the exact release mechanism and time frame have not been established.

More recently in 2015, shallow ground water flow directions (in January, April and August) were not consistent among measurement events or with previous hydraulic gradients measured on the Site.

Ground water in the deep water-bearing zone is present in the Advance Outwash/Esperance sand beneath the Vashon till. Based on water levels measured in a monitoring well pair (wells screened in the perched and deep water bearing zones), a downward vertical hydraulic gradient occurs between the two zones. Ground water contaminated with TCE at concentrations exceeding Method A has been documented in the lower part of the Vashon till in monitoring well MW-16D.

Water Supply: Drinking water for the Property is supplied by the Mukilteo Water and Wastewater District. The City of Mukilteo's water supply is the Spada Reservoir, located approximately 30 miles east of Everett in the Sultan Basin watershed at the headwaters of the Sultan River. According to Ecology's well log database, there are no water supply wells located within 0.5 mile of the Site.

Release and Extent of Soil Contamination:

Intermec/King Machine Floor Drain. A floor drain located in the former Intermec/King Machine tenant space in Building 4403 had a system of trench drains feeding it which were subsequently filled with concrete. Inspection of the floor drain in

1995 indicated that it was connected to a 2-inch diameter steel pipe that appeared to be connected to the sanitary sewer system of the building. A soil sample collected in 1995 from beneath the floor drain at a depth of 1.5 feet bgs did not test positive for petroleum hydrocarbons; however, the sample was not analyzed for VOCs.

Exotic Metals Welding Floor Drain. A floor drain located in the former Exotic Metals Welding tenant space in Building 4433 was investigated in 1995. The drain was found to be connected to a 2-inch diameter steel pipe, which appeared to be connected to the storm drainage system on the north side of the building. The floor drain and pipe were determined to be in good condition with no indication of corrosive degradation. The concrete in the immediate vicinity of the drain was stained with what looked like motor oil and also appeared to be previously etched by corrosive chemicals. An oily staining pattern was identified in the upper 18 inches of soil below the drain and attributed to surface activities. A soil sample collected from beneath the drain contained 1 mg/kg of TPH-G.

2005 Phase II Investigation. A 2005 Phase II investigation advanced 10 direct-push borings (SP1 through SP10) to a maximum depth of 12 feet bgs. A total of 22 soil samples were collected from the 10 borings; however, based on field screening with a photo-ionization detector, only two samples were analyzed for TPH-G, TPH-D, TPH-O, benzene, toluene, ethylbenzene and xylenes (BTEX compounds). The soil sample from SP8 (7.5 to 8 feet bgs), drilled in the former heating oil UST location, contained TPH-D and TPH-O at concentrations below the Method A cleanup levels. The soil sample from SP10 (10 to 11 feet bgs) contained only toluene in a trace amount, below the Method A cleanup level. One soil sample from SP1 (7 to 8 feet bgs), analyzed for naphthalenes and carcinogenic polycyclic aromatic hydrocarbons (cPAHs), contained no detectable levels. One soil sample from SP10 (8 to 9 feet bgs) was analyzed for RCRA 5 metals and contained none that exceeded Method A cleanup levels.

Only one soil sample on the Site has been analyzed for VOCs, which was collected in test pit TP-4 excavated adjacent to near catch basin #34.

2015 Remedial Investigation. A Remedial Investigation (RI) conducted in 2015 included installation of shallow monitoring wells MW-16 through MW-22 and deep monitoring wells MW-2D and MW-16D, where soil samples were collected. Soil samples collected at depths of 55 and 190 feet bgs contained non-detectable levels of VOCs. A soil sample collected at a depth of 15.5 feet bgs in MW-16 contained PCE and TCE at concentrations exceeding Method A cleanup levels. In the boring drilled for MW-16D, soil samples collected to 65 feet bgs contained PCE and/or TCE at concentrations exceeding Method A cleanup levels. In the boring drilled for monitoring well MW-21, TCE was detected in soil at a concentration exceeding the Method A cleanup level at a depth of 9 feet bgs.

Release and Extent of Ground Water Contamination:

Eleven grab ground water samples were collected in the 10 probes advanced as part of the 2005 Phase II investigation. Ground water was encountered at depths of 4 to 7 feet bgs and a sample was collected from each of the 10 locations. The samples were analyzed for petroleum, BTEX and VOCs. Only one ground water sample, collected at SP10 near the catch basin, contained TPH-G, toluene, ethylbenzene and xylenes, which were all below the Method A cleanup levels.

Ground water samples from 3 of the probes contained detectable levels of PCE, trichloroethene (TCE) and related compounds and degradation products. The highest levels were in the ground water sample collected at SP10, drilled adjacent to the storm water catch basin north of catch basin #34 and east of Warehouse 4403. The sample contained PCE at a concentration of 300 µg/L and TCE at a concentration of 42,000 µg/L, both exceeding Method A cleanup levels.

Eight monitoring wells (MW-1 through MW-8), installed in 2005, were all screened from 5 to 15 feet bgs. Based on ground water samples from the 8 wells, a halogenated volatile organic compound (HVOC) plume in ground water was determined to be situated northeast and east of the 4403 Russell Road warehouse building. The plume was centered north of catch basin #29, where SP10 was sited and MW-7 had been installed. The initial ground water sample collected from MW-7 contained PCE at a concentration of 460 µg/L and TCE at a concentration of 7,000 µg/L, both above the Method A cleanup level.

Seven injection wells (MW-9 through MW-15) were installed between October 2005 and March 2006. Injections were conducted three times in 2006.

In 2015 during the RI, six (MW-16 through MW-22) and two deep (MW-2D and MW-16D) monitoring wells were installed in an effort to delineate the horizontal and vertical extent of contamination in ground water on the Site.

The two deep monitoring wells were paired with shallow monitoring wells MW-2 and MW-16 respectively. No telescoping or conductor casing was installed in either of the deep monitoring wells, to prevent vertical downward migration and cross-contamination of pure-phase or dissolved PCE between the water-bearing zones.

Monitoring well MW-2D was drilled through the Vashon till and into the top of the Advance outwash/Esperance sand, which was encountered at 177 feet bgs. MW-2D is screened from 176 to 196 feet bgs, with 3 feet of sand pack above the top of the screen and a bentonite seal to the ground surface.

Monitoring well MW-16D was drilled and installed in a permeable zone within the Vashon glacial till which was encountered at 177 feet bgs.

In the new shallow monitoring wells, PCE and TCE were detected at concentrations above Method A cleanup levels in MW16, MW-20 and MW-21.

Soil Remediation:

Former Heating Oil UST. Soil surrounding the former heating oil UST removed in 1995 was over-excavated. Confirmation soil samples collected from the excavation bottom and sidewalls contained TPH-D at levels below the Method A cleanup level. A total of 25 tons of petroleum-contaminated soil was excavated and removed from the Site. A 2005 soil sample, collected at a depth of 7.5 to 8 feet bgs in a direct-push boring advanced in the former UST location, contained toluene, TPH-D and TPH-O at concentrations below the Method A cleanup level. A grab ground water sample collected in the boring and analyzed for VOCs, petroleum hydrocarbons and BTEX compounds contained only toluene at a concentration well below the Method A cleanup level.

Exotic Tool Welding Floor Drain. In 1995, approximately 1 cubic yard of impacted soil was removed from the vicinity of the Exotic Tool Welding drain. Confirmation soil sampling indicated the hot spot of total petroleum hydrocarbons had been removed and remaining soil was in compliance with MTCA.

Catch Basin #34: In 1996, a soil sample from a test pit (TP-4) adjacent to catch basin #34 contained TPH-D and TPH-O above Method A cleanup levels, as well as detectable PAHs and VOCs. Approximately 25 tons (18 cubic yards) of petroleum-contaminated soil was subsequently removed from the catch basin area. The source of the contamination was attributed to oily water leaking from a gap between the bricks at the base of the catch basin. However, no confirmation soil samples were collected.

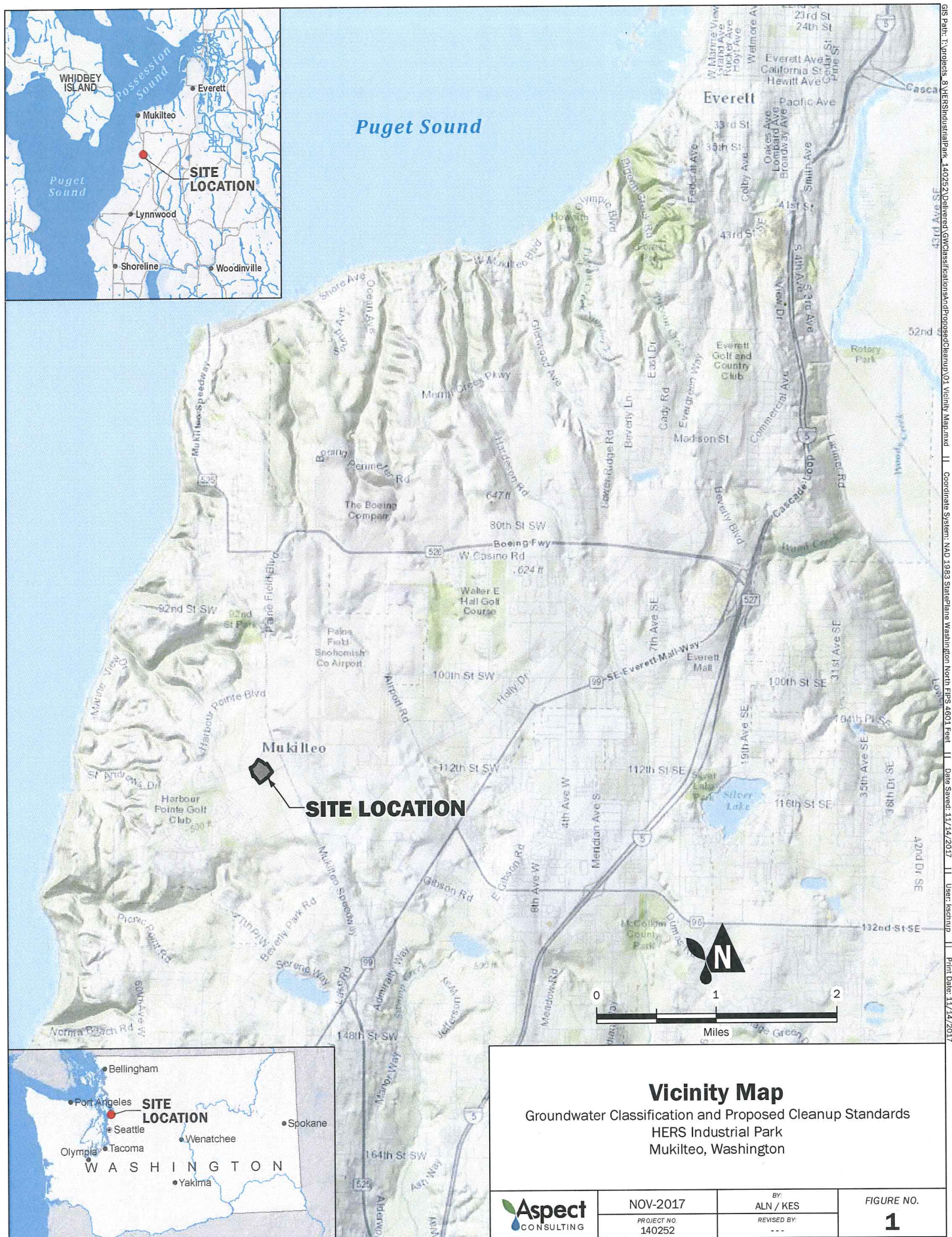
Ground Water Remediation:

In March, April and October 2006, three Fenton's Reagent chemical injection events consisting of hydrogen peroxide and ferrous sulfate (in solution with HCL or acetic acid) were conducted in monitoring wells MW-1 and MW-7, and in the seven injection wells (MW-9 through MW-15). The injection events, locations and volumes are provided in the table below:

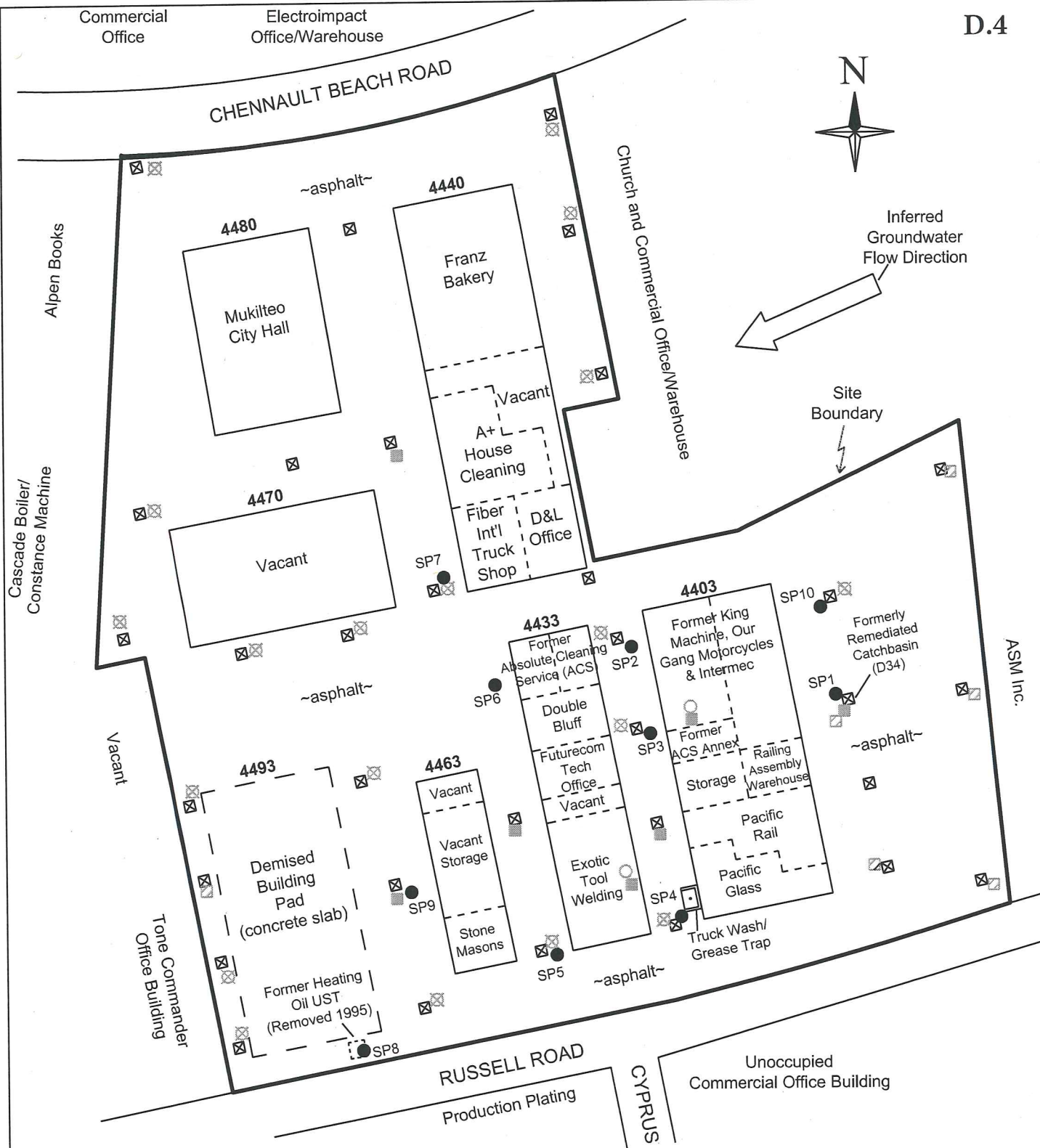
Well Number	Injections in March 2006	Injections in April 2006	Injections in October 2006
MW-1			50 gallons
MW-7	40 gallons	30 gallons	50 gallons
MW-9	40 gallons	20 gallons	
MW-10	30 gallons		
MW-11	30 gallons		
MW-12		30 gallons	50 gallons
MW-13		30 gallons	50 gallons

MW-14		30 gallons	
MW-15		30 gallons	50 gallons

In general, HVOC concentrations in seven of the nine accessible monitoring wells located within the ground water treatment area declined following the 2006 injections. However, in monitoring well MW-1, TCE concentrations increased following the injections and in January 2012, PCE was detected in MW-1 for the first time at a concentration of 15 µg/L, exceeding the Method A cleanup level. TCE was also detected in MW-1 at a concentration of 1,100 µg/L, two orders of magnitude above previous detections and exceeding the Method A cleanup level. Since then, concentrations of PCE and TCE in MW-1 have decreased, but are still above the previously detected levels and above Method A cleanup levels.



D.4



- Approximate Location of Strataprobe Boring Advanced by Riley (2005)
- Approximate Location of Soil Test Pits Excavated by JPHC (1995)
- Approximate Location of Suspect Drains
- ⊗ Approximate Location of Soil Borings Advanced by JPHC (1996)
- ⊠ Approximate Location of Soil Test Pits Excavated by JPHC (1996)
- ⊞ Approximate Location of Stormwater Catchbasin

Drawing is not to Scale



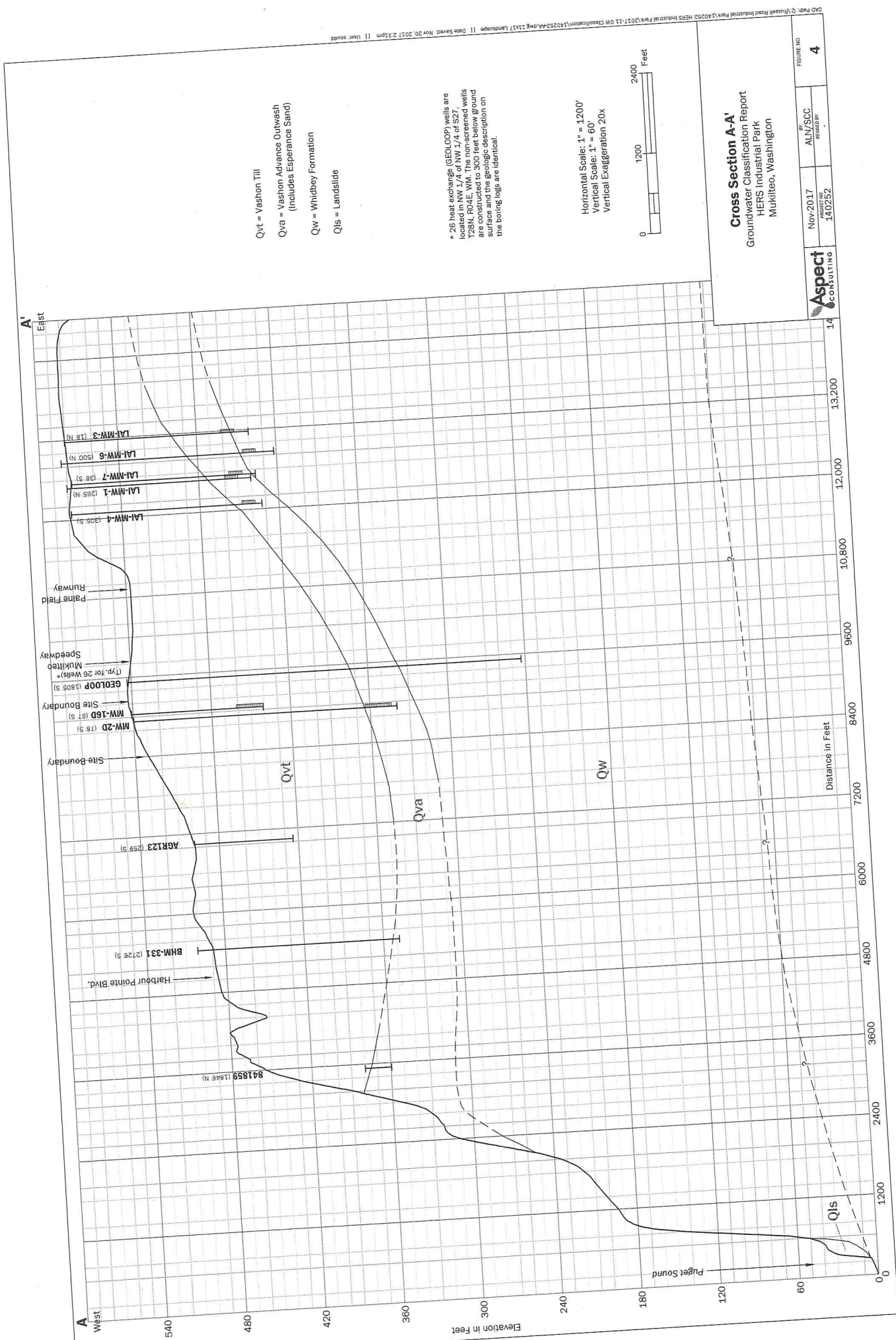
The Riley Group, Inc.
17522 BOTHELL WAY NE, SUITE A
BOTHELL, WASHINGTON 98011

Hers Industrial Park

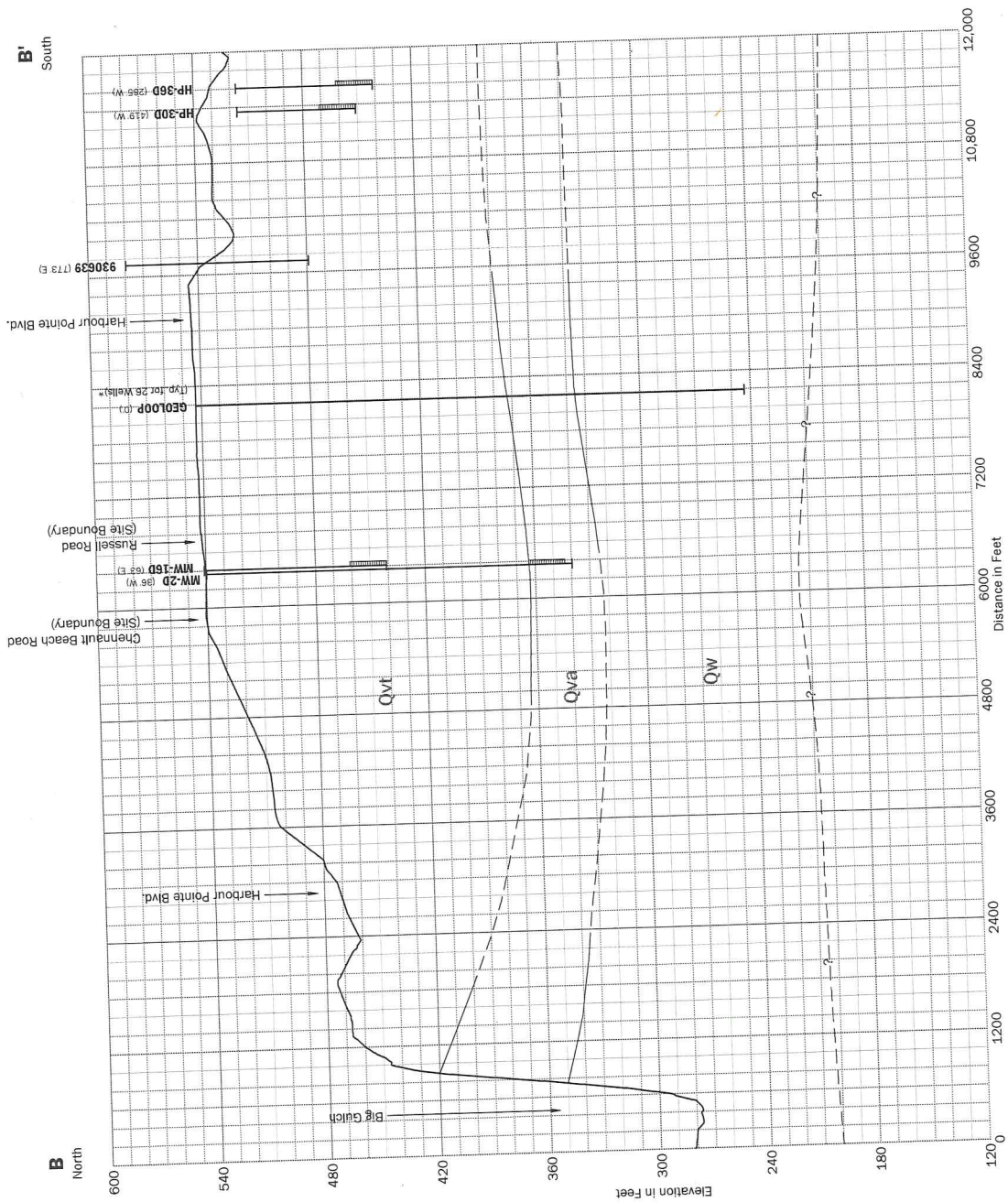
Project # 2005-087b

Site Plan

Figure 2



* 26 heat exchange (GEOL00P) wells are located in NW 1/4 of NW 1/4 of S21, T28N, R04E, WM. The non-screened wells are constructed to 300 feet below ground surface and the geologic description on the boring logs are identical.



Qvt = Vashon Till
 Qva = Vashon Advance Outwash
 (Includes Esperance Sand)
 Qw = Whidbey Formation

* 26 heat exchange (GEOLoop) wells are located in NW 1/4 of NW 1/4 of S27 T28N, R02E, N. 30' wide. The wells are located to 300 feet below ground surface and the geologic description on the boring logs are identical.

Horizontal Scale: 1" = 1200'
 Vertical Scale: 1" = 60'
 Vertical Exaggeration 20x



Cross Section B-B'

Groundwater Classification Report
 HERS Industrial Park
 Mukilteo, Washington



Nov-2017
 PROJECT NO.
 140292

ALN/SCC
 REVIEW BY

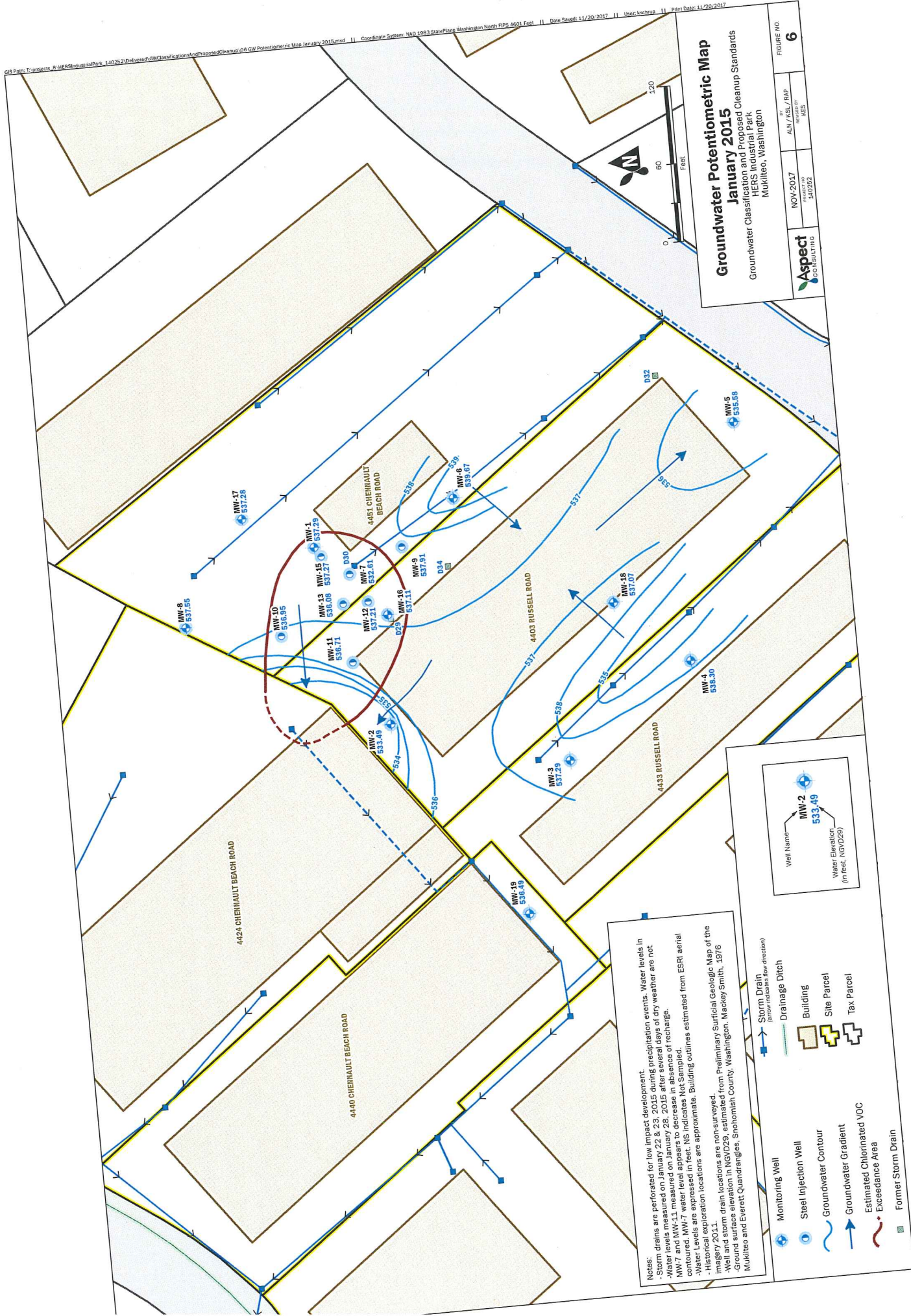
FIGURE NO.
 5

Groundwater Potentiometric Map

January 2015

Groundwater Classification and Proposed Cleanup Standards
HERS Industrial Park
Mukilteo, Washington

Aspect CONSULTING	NOV-2017	DATE	FIGURE NO
	140352	140352	6

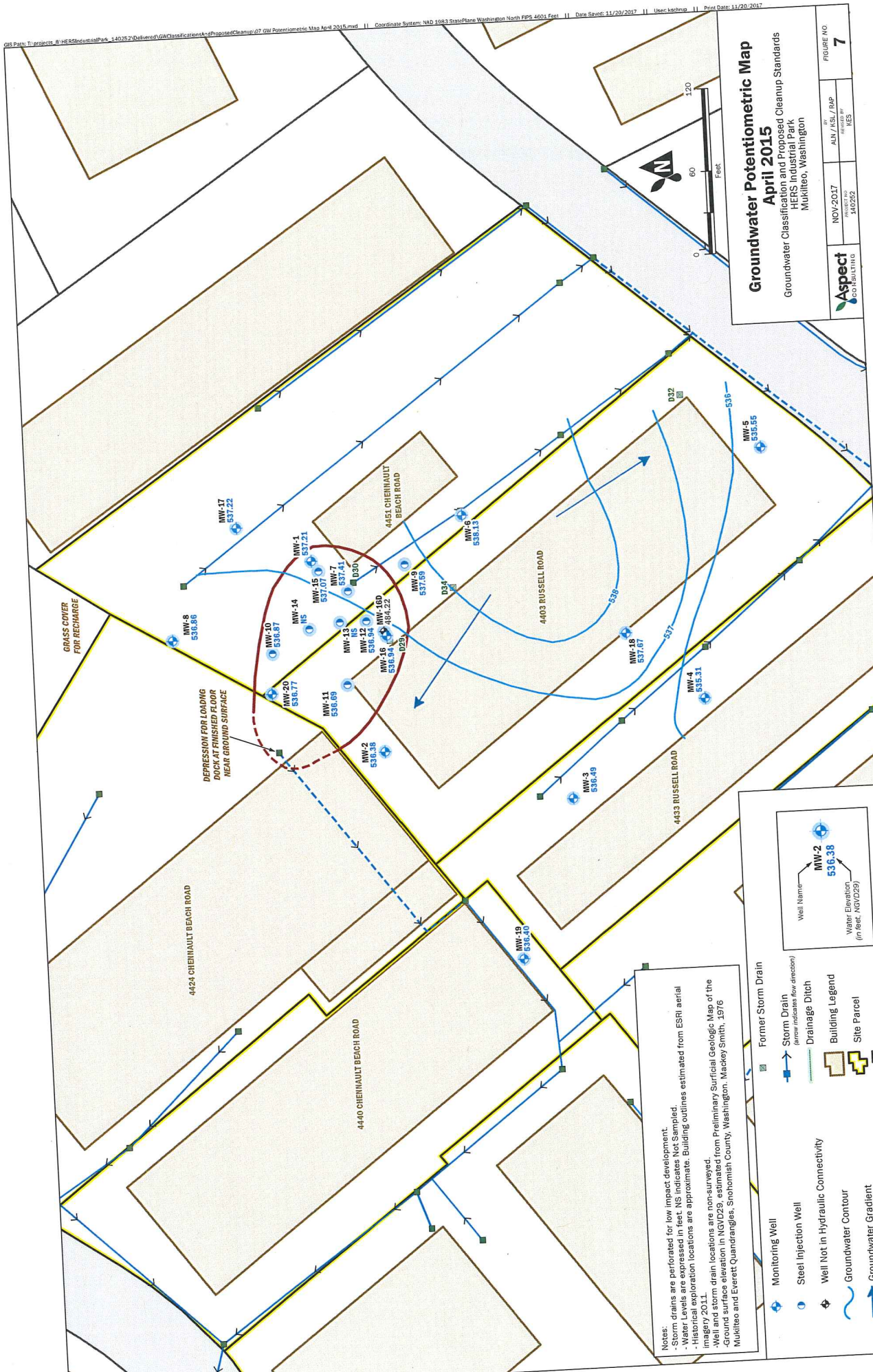


Groundwater Potentiometric Map

April 2015

Groundwater Classification and Proposed Cleanup Standards
HERS Industrial Park
Mukilteo, Washington

ASPECT Geo-Engineering	NOV-2017	REVISED BY JES	FIGURE NO. 7
	PROJECT NO. 240252	DATE 11/20/2017	



Notes:

- Storm drains are perforated for low impact development.
- Water levels are expressed in feet. NS indicates Not Sampled.
- Historical exploration locations are approximate. Building outlines estimated from ESRI aerial imagery 2011.
- Well and storm drain locations are non-surveyed.
- Ground surface elevation in NS/D29 estimated from Preliminary Surficial Geologic Map of the Mukilteo and Everett Quadrangles, Snohomish County, Washington, Mackey Smith, 1976

Legend

- Monitoring Well
- Steel Injection Well
- Well Not in Hydraulic Connectivity
- Groundwater Contour
- Groundwater Gradient
- Estimated Chlorinated VOC Exceedance Area
- Former Storm Drain
- Storm Drain (Arrow indicates flow direction)
- Drainage Ditch
- Building Legend
- Site Parcel
- Tax Parcel

Well Name
MW-2
536.38
Water Elevation (in feet, NS/D29)

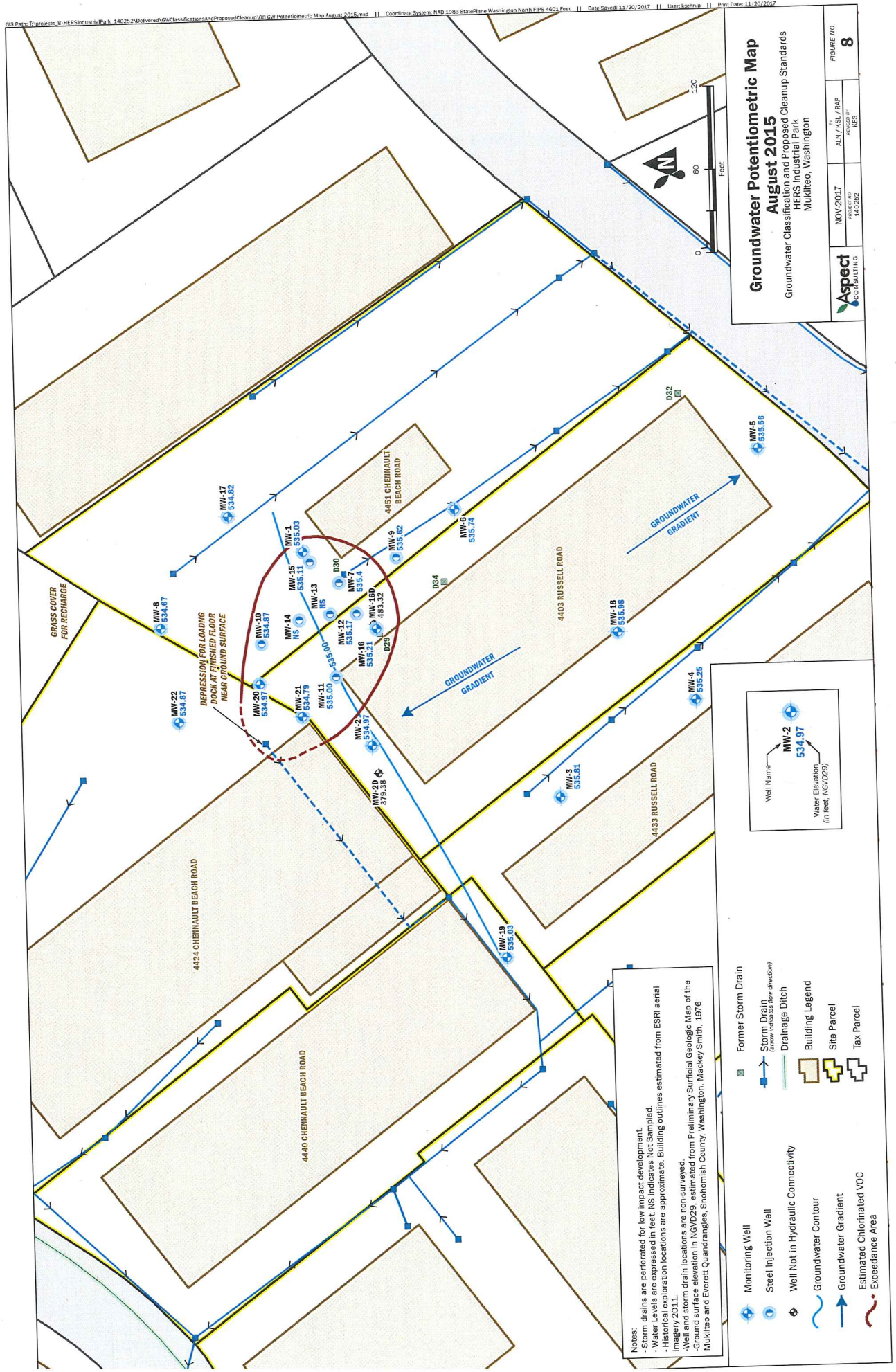
Groundwater Potentiometric Map **August 2015** Groundwater Classification and Proposed Cleanup Standards HERS Industrial Park Mukilteo, Washington

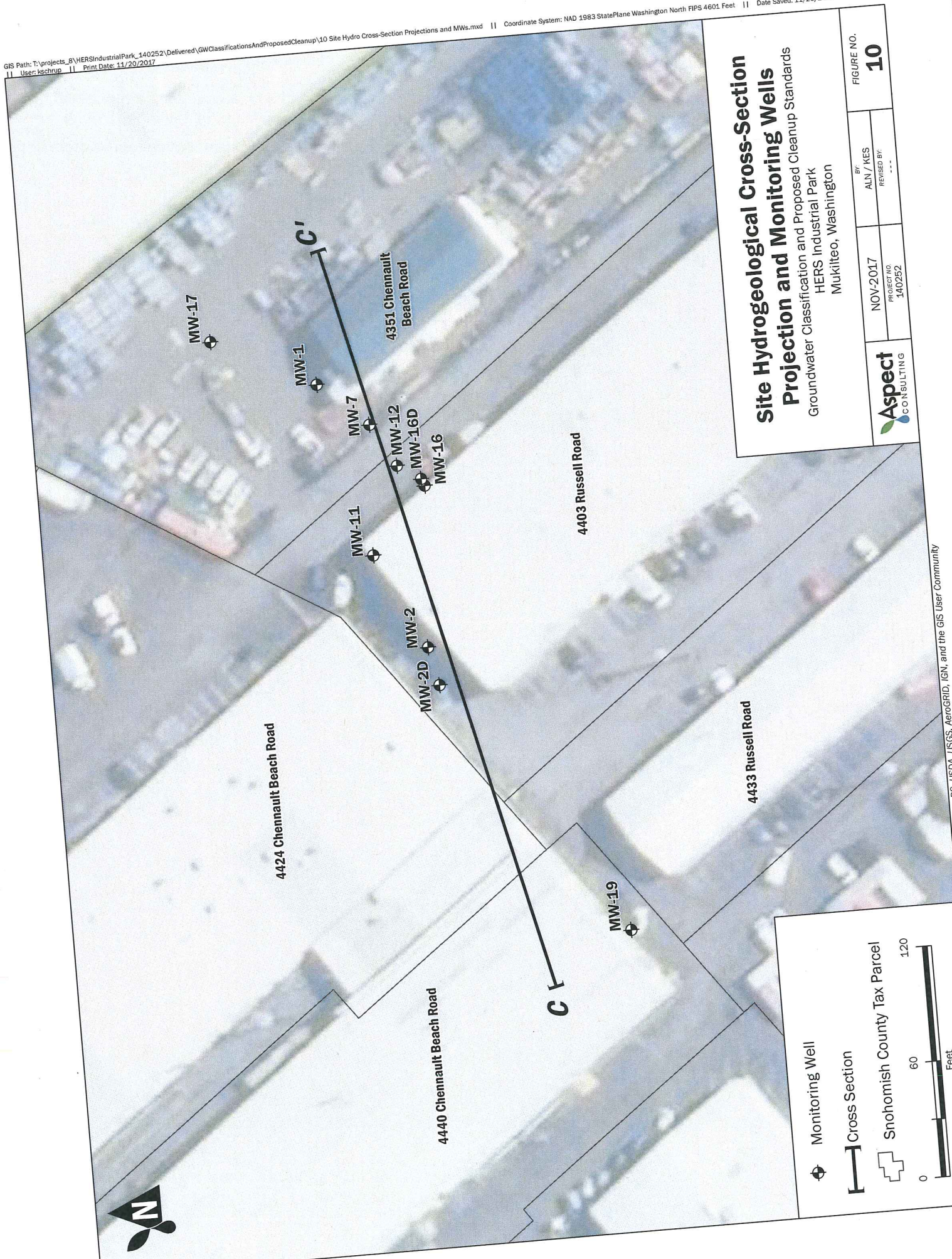
Aspect
 CONSULTING

NOV-2017
 PROJECT NO: 140252

AN / NS / RMP
 REVIEWED BY: NS

FIGURE NO
8





Site Hydrogeological Cross-Section Projection and Monitoring Wells Groundwater Classification and Proposed Cleanup Standards HERS Industrial Park Mukilteo, Washington



FIGURE NO. **10**

NOV-2017	BY: ALN / KES
PROJECT NO: 140252	REVISED BY: ---

Monitoring Well

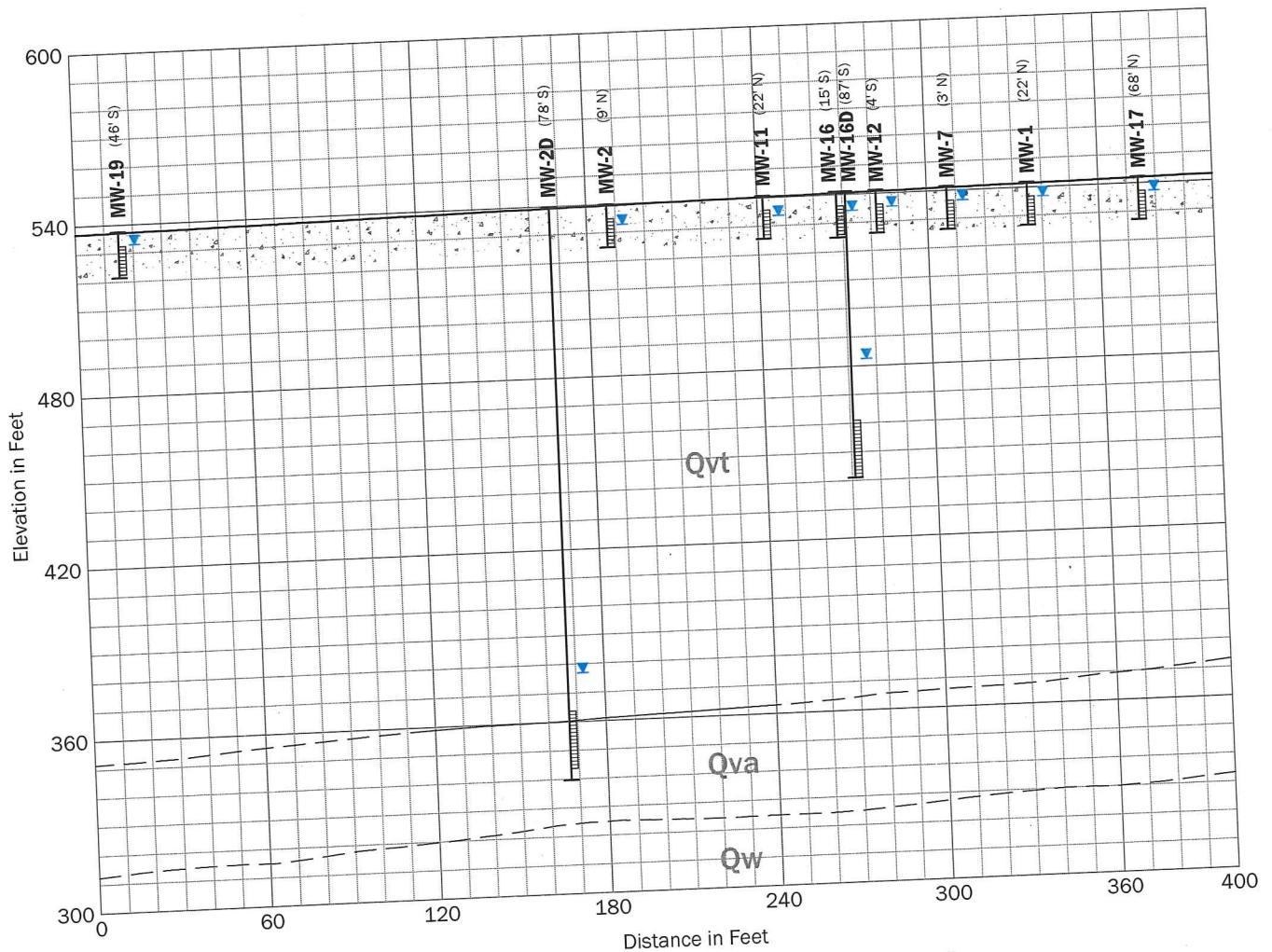
Cross Section

Snohomish County Tax Parcel

Source: Aerial Imagery, USGS, AeroGRID, IGN, and the GIS User Community

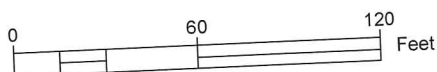
C
West

C'
East



- Qvt = Vashon Till
- Qva = Vashon Advance Outwash
(Includes Esperance Sand)
- Qw = Whidbey Formation
-  = Weathered Vashon Till

Horizontal Scale: 1" = 60'
Vertical Scale: 1" = 60'
No Vertical Exaggeration



Cross Section C-C'
Groundwater Classification Report
HERS Industrial Park
Mukilteo, Washington

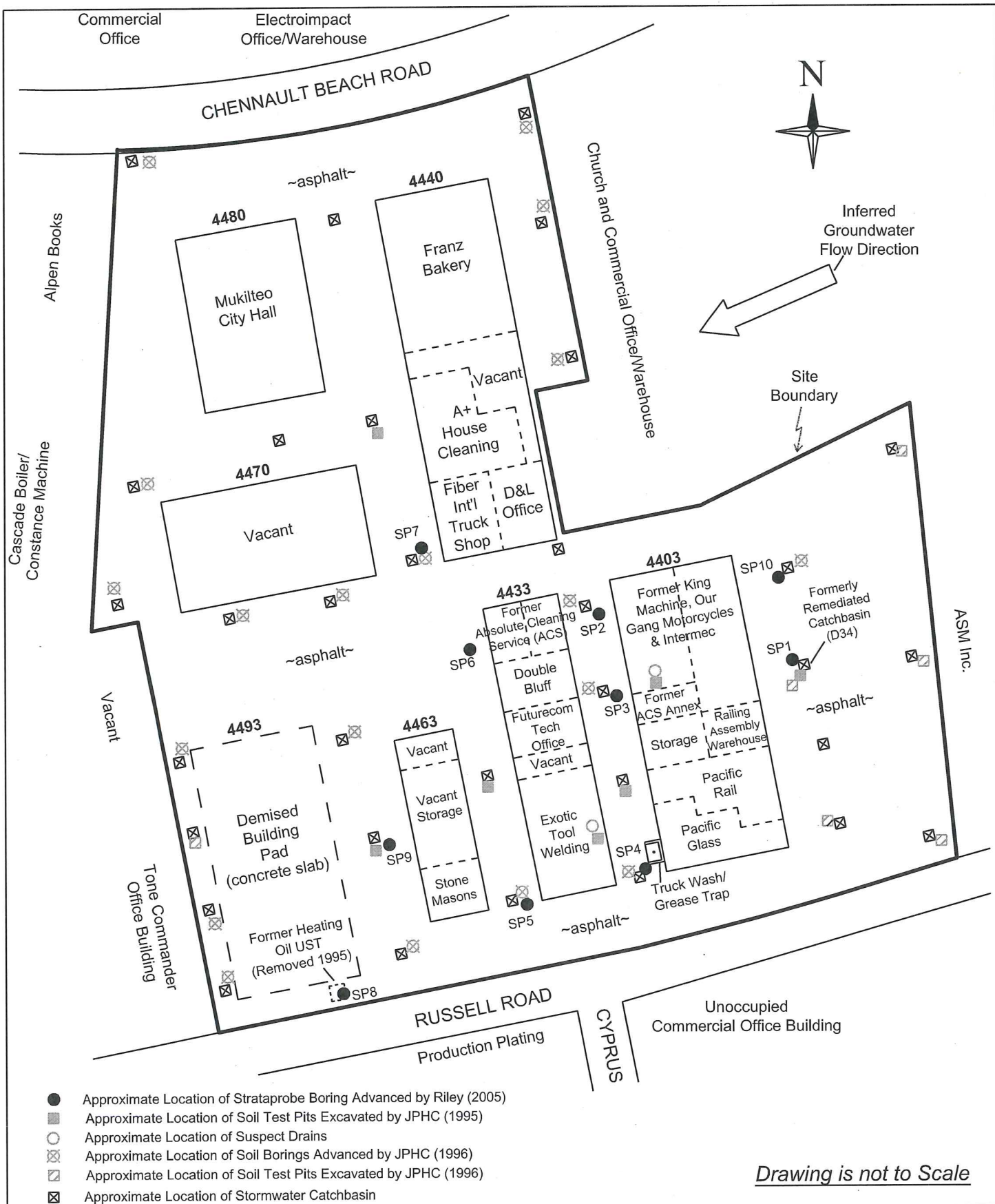
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Nov-2017
PROJECT NO.
140252

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REVISED BY:
-

FIGURE NO.

11



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BOTHELL, WASHINGTON 98011

Hers Industrial Park

Project # 2005-087b

Site Plan

Figure 2

Site Address: 4403 Russell Road, Mukilteo, Washington

