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May 25, 2017

Mr. Branislav Jurista
Farallon Consulting, LLC
975 5th Avenue Northwest, Ste 100
Issaquah, WA 98027

Re: Response to Comments for the Woodworth & Co. Lakeview Plant

Site Address: 2800 104th Street South, Tacoma, WA
Facility/Site No. 1372
Cleanup Site No. 165
VCP Project No. SW1012

Dear Mr. Jurista:

The Washington State Department of Ecology (Ecology) received the *Response to Ecology Comments and Corrections on Farallon Meeting Summary,* dated June 30, 2016 (the 2016 Farallon Response Document) and letter from Woodworth Capital, Inc. (Woodworth), dated July 4, 2016 (the July 2016 Woodworth Letter), regarding the Woodworth Lakeview Facility, located at 2800 104th Court South in Lakeview, Washington (the Site). The 2016 Farallon Response Document provided further Site characterization information and responses to Ecology's email titled *Ecology Comments and Corrections on Farallon Meeting* Summary, sent March 10, 2016 (the 2016 Ecology Meeting Summary Email). The July 2016 Woodworth Letter expressed concerns over recent reassignments of Ecology Site Managers and resulting "*changing interpretations of documents"* that had previously been approved by Ecology, including Site cleanup standards. This letter is intended to broadly address the responses presented in the 2016 Farallon Response Document and to present a proposed path forward for meaningful characterization and cleanup of the Site.

Ecology understands and appreciates the concern over costs incurred as a result of environmental investigation and cleanup activities performed at the Site. Ecology shares these same concerns and acknowledges the need to avoid costly redundancies and incremental returns on investment. It should be noted, however, that determinations of no further action (NFA) are not simply based upon completion of an approved remedial action, but is predicated upon final confirmation that the affected media no longer exhibits levels of contamination above established cleanup levels for that media.

We are providing these opinions, comments, and requests under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

The following opinions, comments, and requests are based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations contained in Washington Administrative Code (WAC) 173-340 (collectively "substantive requirements of MTCA").

Description of the Site

The comments provided herein apply only to the Site as defined by the nature and extent of contamination associated with impacts from petroleum hydrocarbons, trichloroethylene (TCE), and related volatile organic compounds (VOCs) to soil and groundwater and from arsenic and lead to groundwater beneath the Site.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcel(s) associated with this Site are affected by other sites.

Additional background information regarding the Site are provided in Enclosure A.

Basis for Comments

These comments are based on the information contained in the following documents:

1. Woodworth. Letter to Ecology regarding the Woodworth Lakeview Facility. July 5, 2016 (Woodworth 2016);
2. Farallon Consulting (Farallon). *Response to Letter Regarding Ecology Comments and Corrections on Farallon Meeting Summary.* June 30, 2016 (Farallon 2016);
3. Ecology. Email to Farallon regarding Ecology Comments and Corrections on Farallon Meeting Summary. March 10, 2016 (Ecology 2016);
4. Ecology. Letter to Farallon regarding Opinion on Proposed Cleanup for the Site. October 6, 2015 (Ecology 2015);
5. Ecology. Letter to Ransavage and Lewis regarding July 25, 2015 Compliance Inspection. August 25, 2015 (Ecology 2015b).
6. Farallon. *Focused Feasibility Study and Disproportionate Cost Analysis Report*. April 14, 2015 (Farallon 2015);
7. Farallon. *Soil Excavation Cleanup Action Report Completion Report.* March 28, 2011 (Farallon 2011);

8. USGS. *Hydrogeologic Framework, Groundwater Movement, and Water Budget in the Chambers–Clover Creek Watershed and Vicinity, Pierce County*. Scientific Investigations Report 2010–5055 (USGS 2010);
9. Farallon. Remedial Investigation/Feasibility Study Report. August 19. 2009. (Farallon 2009); and
10. EPA. *Central Pierce County, WA.* Updated March 15, 2017. Retrieved from https://yosemite.epa.gov/r10/water.nsf/Sole+Source+Aquifers/Central+Pierce

Those documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You can make an appointment by calling the SWRO resource contact at (360) 407-6365.

This opinions and commentary presented herein are void if any of the information contained in those documents is materially false or misleading.

Opinions, Comments, and Requests for Additional Site Information

AOCs 1, 2, and 3

Item 1: Well Screens for Monitoring Locations MW-11, MW-13, and MW-24

In the 2016 Ecology Meeting Summary Email, Ecology expressed concerns over well construction, specifically screened intervals, for monitoring locations MW-11, MW-13, and MW-24. Although the aforementioned monitoring wells are periodically submerged (Figure 1), Total Petroleum Hydrocarbon (TPH) concentrations in groundwater at these locations are low (MW-11) to non-detect (MW-13 and MW-24), it is unlikely that such conditions will adversely affect groundwater monitoring results in a significant manner. Therefore, Ecology is not requesting further action regarding these locations at this time; however, additional, monitoring data is requested (Item 15, below) to establish current water levels at these monitoring locations.

Item 2: Use of Silica-Gel Cleanup for Site Groundwater Sample Analyses

Ecology concurs with Farallon's proposal to forego the future use of silica-gel cleanup during analysis for TPH as diesel-range organics (DRO) and oil-range organics (ORO) in groundwater samples collected from the Site monitoring well network. Additionally, Ecology is no longer requesting that groundwater samples be re-sampled in association with this issue, though, as noted above, additional monitoring data is requested (Item 15, below) to assess the current nature and extent of TPH-DRO and -ORO impacts to groundwater beneath the Site.

Item 3: PAH/PCB Sampling, Delineation, and Designation as Constituents of Concern

While Ecology agrees that previous Opinion Letters did not explicitly designate polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) as Site Constituents of Concern (COCs), these contaminants cannot be excluded from further consideration until sufficient information is gathered from Site soil in those areas of greatest concern (i.e. AOC-3 [formerly used for stockpiling asphaltic concrete], AOC-4 [former location of the Washington State Department of Transportation (WSDOT) asphalt-testing laboratory area], and adjacent "asphalt plant", "tar tank", and hot mix plant areas). Because of the historic nature of this facility as an asphalt plant, the documented presence of PAHs and PCBs in hot mix asphalt, and reported presence of heavy-end petroleum hydrocarbon impacts at the Site, Ecology is requesting further soil testing of PCBs and PAHs in the areas described above in accordance with the petroleum testing criteria described in Table 830-1 of MTCA. Results of these proposed soil sampling activities will support whether further evaluation of these contaminants are warranted.

Further, Ecology was notified of a release of transformer fluid to the ground surface at the Site on February 23, 2017 by Tacoma-Pierce County Health Department. Ecology understands that recovery and response activities related to this incident have recently concluded and is anticipating additional information regarding confirmation soil sampling activities.

Item 4: Need for Additional Monitoring Wells within AOCs 1 through 3

At this time, Ecology is not requesting additional monitoring well locations within the shallow water-bearing zone within AOCs 1 through 3; the current monitoring well network is sufficient to monitor dissolved-phase COCs in groundwater beneath these areas of the Site.

It should be noted; however, that shallow groundwater in the northwestern portion of the Site (in the vicinity of monitoring locations MW-25 and MW-33) is not fully characterized and may warrant further investigation. Additional monitoring data is requested to establish the current nature and extent of all COCs, including PAHs and PCBs, in shallow groundwater beneath this area of the Site.

Additionally, no deeper-groundwater monitoring locations exist for the western portion of Site. The necessity of deeper-zone monitoring locations will be based on the presence and/or concentrations of COCs in shallow (i.e. MW-5 through MW-7 and MW-16) and deeper (SVE-2, SVE-5, SVE-7, and SVE-9) groundwater, to be established during subsequent groundwater monitoring events requested below.

Item 5: Sufficiency of Remedial Excavation Actions Conducted at AOCs 1 through 3

Ecology has further evaluated results of the *Soil Excavation Cleanup Action Report Completion Report* (Farallon 2011) and acknowledges that the majority of the excavated areas within AOCs 1 through 3 have been sufficiently characterized and have achieved remedial action goals; however, a limited number of confirmation soil borings are still needed to *fully* assess the sufficiency of the remedial excavations performed at AOCs 1 through 3. Ecology has identified the following areas, based on the soil maps provided in the 2016 Farallon Response Document, where limited, additional soil samples are needed to confirm the removal of residual hydrocarbons in shallow soil at AOCs 1 through 3:

- Within AOC-1; two soil samples, collected from approximately 9- and 11-ft below ground surface (bgs), in the immediate vicinity of former soil sample locations A1-7-040710-6 and A1-11-040810-3, respectively;
- Within AOC-2; one sample, collected from approximately 5-ft bgs in the immediate vicinity of former soil sample location A2-4-040710-3; and
- Within AOC-3; one sample collected from approximately 7.5-ft bgs in the immediate vicinity of former soil sample location A3-B2-P-100510-4.5.

It is anticipated that collection and analysis (TPH-DRO and TPH-ORO, only) of the above soil samples for will be sufficient to confirm that the remedial excavation cleanup objectives for shallow soil have been achieved throughout AOCs 1 through 3. Ecology recommends that these additional samples be collected concurrently with the PAH and PCB samples requested above.

AOC 4 (TCE)

Item 6: TCE Cleanup Levels (Applicability of Method A vs. Method B)

As stated in Ecology's October 6, 2015 Opinion Letter, "MTCA Method A CULs for both soil and groundwater have been adopted for the majority of the Site, with the exception of petroleum contaminated soil (PCS) in AOC 2 and AOC 3, where a Site specific MTCA Method B CUL was established;" therefore, the MTCA Method A Groundwater Cleanup Level of 5 µg/l is the appropriate cleanup level for TCE in groundwater beneath the Site.

Item 7: TCE Source-Area Delineation

In the 2016 Ecology Meeting Summary Email, Ecology expressed the need for further TCE source-area delineation in the vicinity of the former WSDOT asphalt testing facility. Despite Farallon's conclusion that "*there is sufficient information for the evaluation and selection of the final cleanup action for TCE in AOC-4*", Farallon proposed collection of additional soil and soil-vapor samples "*to further characterize the TCE source area at and in the vicinity of the presumed location of the former WSDOT mobile laboratory*" (Farallon 2016). Though Ecology concurs with these proposed activities, it is recommended that additional characterization focus on potential *soil* impacts, rather than soil-vapor, in the immediate vicinity of the former WSDOT testing facility (labelled as "Reported Location of Former WSDOT Testing Lab" on Figure 7 of the 2016 Farallon Response Document) at this time (see Item 12, below).

In addition to the above sampling activities, Ecology recommends further soil sampling in the vicinity of monitoring location MW-25 to laterally define the elevated concentrations of TCE reported from intermediate depths (18-feet bgs) beneath this area of the Site. It should be noted that all soil sampling should be conducted at regular and consistent depth intervals, where possible, to facilitate correlation and comparison between sampling locations.

Item 8: Designation of TCE-Affected Groundwater as "AOC-4"

Due to the mobile and widespread nature of TCE in groundwater beneath the Site, Ecology does not consider AOC designations appropriate for demarcating *free- or dissolved-phase impacts to groundwater*. Continued reference to TCE observed in shallow *soil* in the vicinity of the former WSDOT testing facility as "AOC-4" is acceptable to Ecology. Additionally, it should be noted that Ecology will not issue formal, AOC-specific NFA determinations for discrete areas of the Site.

Item 9: Evaluation of Natural Attenuation Processes of TCE in Site Groundwater

Geochemical indicator parameter data previously collected from Site groundwater (Farallon 2009) is insufficient to fully characterize the potential for natural attenuation processes to address chlorinated solvents in deeper groundwater. During February of 2009, Farallon collected groundwater samples from deeper-zone monitoring locations MW-9B, MW-14, MW-18, and MW-19 for analysis of a limited suite of geochemical parameters. Though relatively elevated dissolved oxygen (DO) and oxidation reduction potential (ORP) conditions (4.07 milligrams per liter [mg/L] and 162.7 millivolts [mV], respectively) were observed at TCE source-area monitoring location MW-14, dissolved methane in groundwater (3.3 micrograms per liter [µg/L]) at this location is consistent with reducing conditions beneath this area of the Site.

Similarly, the co-located, deeper-zoned monitoring well MW-14C exhibited depressed DO and ORP (0.50 mg/L and -95.6 mV, respectively) during the February 2009 monitoring event, consistent with the reducing groundwater conditions described above.

Further, the presence of the partial-breakdown products 1,1-dichloroethene (1,1-DCE) and 1,1-dichloroethane (1,1-DCA) observed at monitoring well MW-14 during the October 13, 2008 and February 12, 2009 groundwater monitoring events suggests the potential for biologically-mediated reductive dechlorination of chlorinated ethenes and ethanes in groundwater at this location. Similarly, TCE and the associated partial-breakdown product 1,1-DCE were also present in the groundwater samples collected from nearby deeper-zone wells MW-22, SVE-1, SVE-6, and SVE-12 during recent monitoring events in the immediate vicinity of the former WSDOT asphalt testing facility. Additional monitoring data will be needed, as discussed below, to further evaluate for conditions consistent with, and supportive of, natural attenuation of chlorinated solvents in deeper-zone groundwater beneath the Site.

Documenting Natural Attenuation Processes in Site Groundwater

As presented in EPA's *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water* (EPA/600/R-98/128; September 1998), three primary lines of evidence have been identified to support the documentation of natural attenuation of chlorinated solvents. These lines of evidence are 1) stable to decreasing contaminant concentration trends over time at appropriate locations; 2) geochemical indicator parameter data consistent with ongoing attenuation through either abiotic (e.g. advection, dilution, dispersion, and adsorption) or biological (i.e. biodegradation) processes and associated ability for Site groundwater to facilitate such processes (i.e. assimilative capacity); and 3) the direct demonstration of biologically-mediated attenuation processes under existing Site conditions (i.e. microcosm studies or environmental molecular diagnostic and related molecular biological tools).

Request for Statistical Trend Evaluation

Though Farallon noted the occurrence of decreasing dissolved-phase TCE concentration trends in the 2009 RI/FS Report and 2016 Farallon Response Document, a more comprehensive statistical evaluation of such trends was not provided. To further support the conclusion that natural attenuation processes are appropriate for addressing residual concentrations of TCE in Site groundwater, more robust statistical methods (i.e. linear regression or Mann-Kendall) of evaluating these trends are warranted. Such evaluations should also provide estimates (i.e. projections) of the anticipated timeframes to achieve appropriate TCE cleanups levels (5 µg/L) for Site groundwater and their associated attenuation rates.

Statistical evaluations should be performed at a 95% confidence limit value and for monitoring locations exhibiting TCE concentrations detected above the 5 µg/L Method A CUL during the past 5 years. It should be noted that such evaluations should be performed on a well by well basis and not collectively, as was previously presented in Chart 1 of the 2016 Farallon Response Document. Additionally, qualifications should be made for those monitoring locations where concentration trends may have been biased by the operation of the on-Site air-sparge (AS)/soil-vapor extraction (SVE) system.

Request for Further Geochemical Indicator Parameter Sampling

Though Ecology acknowledges Farallon's conclusion that the decreasing TCE concentration trends observed in Site groundwater are likely "attributable to adsorption, dilution, and dispersion rather than the process of biodegradation by reductive dechlorination", additional chemical constituent and geochemical indicator parameter data are needed to support this conclusion and further evaluate the presence or absence of ongoing biodegradation of chlorinated solvents in deeper-zone groundwater beneath the Site as discussed in Item 9. In addition to those geochemical indicator parameters evaluated as part of the 2009 RI/RF (DO, nitrite, nitrate, sulfate, ferrous iron, methane, ethane, and ethene), the analysis of the following additional parameters is requested:

- Alkalinity; used to demonstrate that groundwater samples are collected from same water-bearing unit and evaluate buffering capacity of the groundwater system;
- Total organic carbon; used to assess whether a sufficient supply of electron donors is present to facilitate cometabolic and reductive dechlorination processes. Microbially-mediated fermentation of organic carbon substrates can generate hydrogen which, in turn, may act as the primary electron donor in reductive dechlorination processes;
- Chloride; used to demonstrate that groundwater samples are collected from same water-bearing unit, also is the final end-product (complete mineralization) of chlorinated solvent reduction;
- Dissolved hydrogen; may assist in determining the dominant anaerobic terminal electron accepting process (TEAP; ex. denitrification, iron reduction, sulfate reduction, or methanogenesis) at a monitoring location, if present, and distribution of these processes. The presence of dissolved hydrogen may also indicate the occurrence of microbially-mediated fermentative processes in groundwater.

Additionally, those potential daughter products associated with the biodegradation of TCE (the dichloroethene [DCE] isomers 1,1-DCE, cis-1,2-DCE, and trans-1,2-DCE, as well as vinyl chloride) should be evaluated in concert with the above geochemical indicator parameters. These data should be collected from a sufficient number of monitoring points, at relevant locations along, and adjacent to, the observed dissolved-phase TCE plume flow-path.

Ecology recommends sampling the following deeper-groundwater locations for the above analyses:

- Upgradient monitoring locations **MW-19 and MW-28,** for purposes of establishing assimilative capacity and background redox conditions of upgradient groundwater and to evaluate flux of groundwater terminal electron acceptors (TEAs) and bioavailable natural organic carbon into the source area;
- Medial plume monitoring locations **MW-2, MW-14, MW-14C, MW-18, MW-20, MW-22, and MW-25,** to evaluate for current plume conditions and distribution of redox conditions within the plume;
- Downgradient monitoring locations **MW-16 and MW-23** to evaluate downgradient plume extents and potential utilization of TEAs along the plume flow-path.

Similarly, routine monitoring of chlorinated parent- and daughter-products should also be performed to evaluate plume stability, establish chemical concentration trends as noted above, and asses for potential dechlorination rates of these compounds, respectively.

Ecology also recommends sampling monitoring, AS, and SVE wells MW-15, MW-29, AS-1, AS-4, SVE-1, SVE-2, SVE-10, and SVE-11 for TCE and related constituents (using EPA Method 8260b) to evaluate current nature and extent of these compounds in deeper groundwater beneath the Site.

Finally, as stated in the 2016 Ecology Meeting Summary Email, longer-term groundwater monitoring data will be needed to confirm contaminant concentration trends, support future remedial decisions, determinations, and conclusions, or allow for subsequent maintenance of potential institutional controls previously discussed for the Site.

Direct Demonstration of Biologically-Mediated Attenuation Processes

Because geochemical parameters are primarily used as *indicators* of whether aquifer conditions are 1) *supportive* of natural attenuation processes and 2) consistent with the *inferred presence* of biodegradation, more direct means of evaluating for the occurrence and distribution of biodegradation in Site groundwater may also be considered.

Recently, advances in environmental diagnostic tools have made it possible to *directly determine* whether specific microbial communities are present in Site groundwater and actively degrading specific contaminants (e.g. quantitative polymerase chain reaction [qPCR] and phospholipid fatty acid analyses with stable isotope probing [PLFA-SIP]). If biological activity is indicated by these analyses, such diagnostic tools may also reveal the rates at which specific contaminants are being degraded (i.e. metabolized) by the active microbial communities.

These aforementioned diagnostic tools represent only some of the options available for directly evaluating the occurrence and nature of biodegradation at a given site. Ecology recommends that alternative methods to more directly evaluate for the presence of biologically-mediated natural attenuation be considered.

Item 10: Aquifer Interrelationship and Potential, Off-Site Supply-Well Impacts

The Site is located within the Chambers-Clover Creek watershed (USGS 2010). Surface soils are generally comprised of unconsolidated sands and gravels. Two water-bearing units have been identified beneath the Site; a shallow water-bearing unit, encountered from approximately 5- to 36-ft bgs and ranging in thickness from 8 to 20 ft (Farallon 2009). This shallow water-bearing interval likely correlates with the unit designated as the "A1" aquifer within the Chambers-Clover Creek watershed, composed of Vashon recessional outwash (Qvr; USGS 2010). A second, deeper unit has also been identified beneath the Site and is encountered from approximately 30- to 70-ft bgs. This deeper water-bearing unit is separated from the upper shallow water-bearing unit by a layer of silt and silty gravel and reportedly transitions from confined to unconfined conditions across the property (Farallon 2009). This second, deeper water-bearing unit likely correlates with the "A2" confining unit within the Chambers-Clover Creek watershed (UGSS 2010). The low-permeability A2 unit consists of various proportions of clay, silt, sand, and gravel, with locally occurring sand and gravel lenses capable of providing water for domestic use (USGS 2010). Groundwater flow within the Chambers-Clover Creek aquifer system is generally west-northwest toward Puget Sound (USGS 2010), consistent with deeper-zone flow gradients observed at the Site.

Ecology agrees with Farallon's conclusion that additional sampling of the on-Property industrial well should be performed to evaluate whether aquifer testing is warranted (Farallon 2016). Because studies of the Chambers-Clover Creek aquifer have already been performed (USGS 2010), additional field-aquifer testing of the Site monitoring well network are not necessary at this time. In the interim, Ecology is requesting additional information regarding the current use and yield of the on-Property industrial supply well and confirmation that this well is properly signed and designated for industrial water use only (i.e. "non-potable water source").

Additionally, an evaluation of groundwater elevation data should be performed to determine potential interrelationships within the groundwater monitoring network. Such evaluation of the Site groundwater well network should include plots of 1) all individual monitoring locations through time, depicting and correcting for non-aqueous phase hydrocarbons (NAPH), if present, and 2) all monitoring locations through time for each water-bearing interval (i.e. all deeper-zone wells and all shallow-zone wells) in an effort to correlate and compare hydraulic similarities or differences between monitoring locations.

The Chambers-Clover Creek Watershed (Figure 2) has been designated as a Sole-Source Aquifer for approximately 400,000 residents in the DuPont, Fircrest, Lakewood, Steilacoom, Tacoma and University Place areas. Approximately 60 percent of the drinking water for these areas is derived from the Chambers-Clover Creek aquifer (EPA 2017). Seven municipal water-supply wells, designated as Group A / B wells, are located within 1-mile of the Site (Table 1, Figure 3) and draw from the Chambers-Clover Creek aquifers ranging in depths from 100- to 600-ft bgs. Two supply wells are located northwest of, and downgradient from, the dissolved-phase TCE impacts documented at the Site; the Laurel Lane Mobile Home Park (Well #1 ACV533) and Majestic Oaks Water System (Well #1; Table 1). The Laurel Lane trailer park well is approximately 108 feet in depth, and is located approximately 2,000 feet to the northeast of the Site. The Majestic Oaks Water System Well is approximately 150 feet in depth, and is located approximately 2,200 feet to the northwest of the Site. Because of their proximity to the Site and associated depths of these supply wells, Ecology requests that water samples be collected from both the Laurel Lane and Majestic Oaks supply wells for analysis of VOCs (EPA 8260).

Item 11: Installation of Up-Gradient Monitoring Well to Evaluate Potential Off-Site TCE Sources

Ecology concurs with Farallon's statement that further evaluation of potential upgradient sources of TCE in groundwater is not warranted at this time (Farallon 2016); however, further dissolved-phase VOC data is needed from existing upgradient monitoring locations to evaluate for potential off-Property TCE sources and concentration trends in groundwater upgradient of the Site. Recommendations for additional monitoring are provided in subsequent sections of this transmittal.

VAPOR INTRUSION

Item 12: Need for Soil-Gas Survey in the Vicinity of the Former WSDOT Asphalt Testing Facility

Ecology acknowledges that the Site is presently zoned for and currently operates as an industrial facility and that no changes in its associated use are planned for the foreseeable future. Additionally, because the Site is subject to surface mining reclamation regulations, future redevelopment of the Site will likely necessitate placement of a significant volume (estimated at 30 vertical feet) of clean fill across the operational facility. Due to the current, relatively low concentrations of TCE in groundwater beneath the Site and anticipated vertical separation resulting from reclamation activities, future evaluations of soil-vapor intrusion should consider a post-reclamation scenario and be conducted at a time closer to reconstruction and redevelopment of the Site. In consideration of the above information, Ecology finds Farallon's proposal to revise the FFS/DCA to reflect industrial exposure scenario for the Site acceptable and that further evaluation of vapor-phase TCE in the vicinity of the former WSDOT asphalt testing facility is not requested at this time.

AOC 5 (ARSENIC AND LEAD)

Item 13: Delineation and Occurrence of Arsenic and Lead in Site Groundwater

Following a request from Ecology to further evaluate arsenic and lead in shallow groundwater beneath the northeastern area of the Site (Foundry Fill Area), Farallon installed two additional monitoring wells (MW-33 and MW-34) near the northern facility boundary. Laboratory analysis of the groundwater samples collected from monitoring locations MW-33 and MW-34 on January 29, 2016 did not reveal either total or dissolved arsenic and lead above their respective laboratory reporting limits. As a result of this information, Ecology is not requesting additional delineation of arsenic and lead in groundwater beneath this area of the Site at this time.

It should be noted; however, that elevated groundwater pH conditions have been observed at monitoring locations within and adjacent to the Foundry Fill Area (MW-12 [9.15 on 2/6/2009 and 8.74 on 1/27/2016] and MW-31 [11.44 on 1/27/2016]), where concentrations of total and dissolved arsenic and lead have previously been detected at levels above their respective MTCA Method A CULs. Ecology is concerned that the processing of recycled concrete aggregate (RCA) in the Foundry Fill Area may have resulted in the chemical reduction and subsequent mobilization of lead and arsenic in groundwater beneath this area of the Site. Additionally, a letter from Ecology to Miles Sand & Gravel, Inc. personnel, dated August 17, 2015, described a violation whereby "uncured concrete, slurry, and process water were observed being washed out…onto bare ground at the east portion of the facility", resulting in a violation of their associated Sand & Gravel Permit (WAG501290) conditions (Ecology 2015b). Ecology is requesting information regarding measures (i.e. best management practices [BMPs]), either proposed or undertaken, to address the violation and prevent further degradation of groundwater quality beneath the Site. Failure to implement such measures may not only result in further violations of the permit conditions noted above, but also result in exceedances of the applicable criteria outlined in the Water Quality Standards for Groundwater (WAC 173-200-040).

Because of these concerns, Ecology is requesting further evaluation of groundwater geochemistry, and potential, associated effects on the mobilization of arsenic and lead, beneath this area of the Site.

Further, based on the information presented above, Ecology concurs with Farallon's statement that "*filtered groundwater samples submitted for analysis for dissolved arsenic and lead to be representative of groundwater conditions in AOC 5*" (Farallon 2016) and that future groundwater samples collected from shallow-zone monitoring locations be evaluated using dissolved lead and arsenic (i.e. filtered) concentrations.

The objective of the above, proposed sampling is to assess the potential impacts of geochemical changes (i.e. reducing conditions) resulting from the processing of RCA at the Site and to evaluate concentration trends for these constituents through time.

Additional information that should be considered when evaluating arsenic in Site groundwater includes the current EPA drinking water standard of 10 ug/l for arsenic and regional, natural background conditions within the Puget Sound Basin of 8 ug/l (Ecology 2016b).

Consistent with the previous discussion regarding the use of AOC-designations related to groundwater impacts, Ecology will discontinue reference to AOC-5 when discussing arsenic and lead in Site groundwater in future transmittals.

GENERAL SITE COMMENTS AND REQUESTS

Item 14: Potability Designation of Site Groundwater

The 2016 Farallon Response Document documented Ecology's concerns over the designation of groundwater beneath the Site as non-potable and continued to imply that such a determination is appropriate. While Ecology acknowledges that Site groundwater within both the shallow and deeper water-bearing intervals is not currently used as a direct source of drinking water, this groundwater is part of the Chambers-Clover Creek aquifer system, designated as a Sole-Source Aquifer for approximately 400,000 residents in the surrounding communities. Additionally, though Ecology understands that "*a municipal water supply is available in the vicinity of the Lakeview Facility*" (Farallon 2016) and restricts use of further groundwater withdrawal for potable use within that community, the Lakewood municipal supply wells, along with other, nearby water-supply sources (see Item 10; Table 1) are likely screened within the same deeper-water bearing interval ("A2") of the Chambers-Clover Creek aquifer system that has been impacted by dissolved-phase TCE associated with the Site. As such, Ecology continues to consider groundwater beneath the Site as inseparable from potential sources of potable groundwater for the surrounding communities.

Item 15: Request for Comprehensive, Site-Wide Groundwater Monitoring Event

Because of the intermittent nature of historical groundwater sampling activities historically conducted at the Site, Ecology is requesting that a comprehensive, Site-wide groundwater sampling event be performed to evaluate the current nature and extent of Site COCs in both shallow and deeper water-bearing zones, including analysis for the following chemical constituents and geochemical indicator parameters:

- The petroleum hydrocarbons, related constituents, and fuel additives described in Table 830-1 of WAC 173-340-900 (at all shallow- and deeper-zoned monitoring locations);
- VOCs by EPA Method 8260, including all appropriate chlorinated solvent parent- and daughter-products (at all shallow- and deeper-zoned monitoring locations, including SVE wells);
- Total and dissolved lead and arsenic;
- The solvent stabilizer 1,4-dioxane (using either modified 8270 SIM or EPA 522 methods) at select shallow- and deeper-zoned monitoring locations within the TCE plume footprint; and
- The natural attenuation indicator parameters described in Item 9, above.

Presentation and discussion of data collected as a result of this proposed monitoring event should include, at a minimum, the following:

- Plots of groundwater elevations through time for 1) individual monitoring locations, depicting and correcting for NAPH, if present, and 2) all monitoring locations, in an effort to correlate and compare hydraulic similarities or differences between monitoring locations;
- Isoconcentration contour maps for each water-bearing interval present beneath the Site for all petroleum hydrocarbons or VOCs currently above their associated MTCA Method A CULs. Isoconcentration contour maps should include all data and include depictions of plume extents, delineated to the associated Method A CULs. Please apply appropriate and consistent scaling among all Site figures and include locations of all known or suspected source areas;
- Groundwater elevation contour maps for each water-bearing interval present beneath the Site. Groundwater elevations should include all data and be corrected for NAPH density and thickness, if present, and labelled accordingly;

- Tabulated, historical water-quality and well data available for the Site, including:
    1. Well IDs and groundwater-bearing zone being monitored;
    2. Surface and reference (e.g. top-of-casing elevation) elevations for each groundwater monitoring well;
    3. Top- and bottom-of-screen elevations for each groundwater monitoring well;
    4. Historical and current water-quality (i.e. chemical constituent and geochemical indicator parameter data) and groundwater elevation data for each monitoring location within the well network; and
    5. Field parameters appropriate for the documentation of groundwater stabilization during purging activities (e.g. temperature, specific conductance, pH, and dissolved oxygen [DO]);
- Discussion of activities and results associated with the monitoring event, including:
    1. Sampling methodology and reason for failure to conduct sampling at a given monitoring location, if needed;
    2. Whether the groundwater plume has been fully delineated for all COCs;
    3. Trends in COC concentrations and groundwater levels through time, as requested in Item 9;
    4. Data gaps and proposed activities to address those deficiencies; and
    5. Planned future monitoring or remediation activities; and
- All supporting documentation associated with the proposed monitoring event, including all analytical reports associated with the groundwater monitoring period, field and well-purging logs that document depth-to-water/product measurements and appropriate water-quality parameters and purging volumes, respectively.

Please note that, in accordance with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840 (Data Submittal Requirements), data generated for independent remedial actions shall be submitted simultaneously in both written and electronic formats. According to the policy, any reports containing sampling data that are submitted for Ecology review are considered incomplete until the electronic data has been entered. Please ensure that data generated during on-Site activities is submitted pursuant to this policy. For additional information regarding electronic format requirements, see the website http://www.ecy.wa.gov/eim.

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 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 by phone at (360) 407-0276 or e-mail at jeremy.hughes@ecy.wa.gov.

Sincerely,

Jeremy Hughes, LG
SWRO Toxics Cleanup Program

JJH: kb

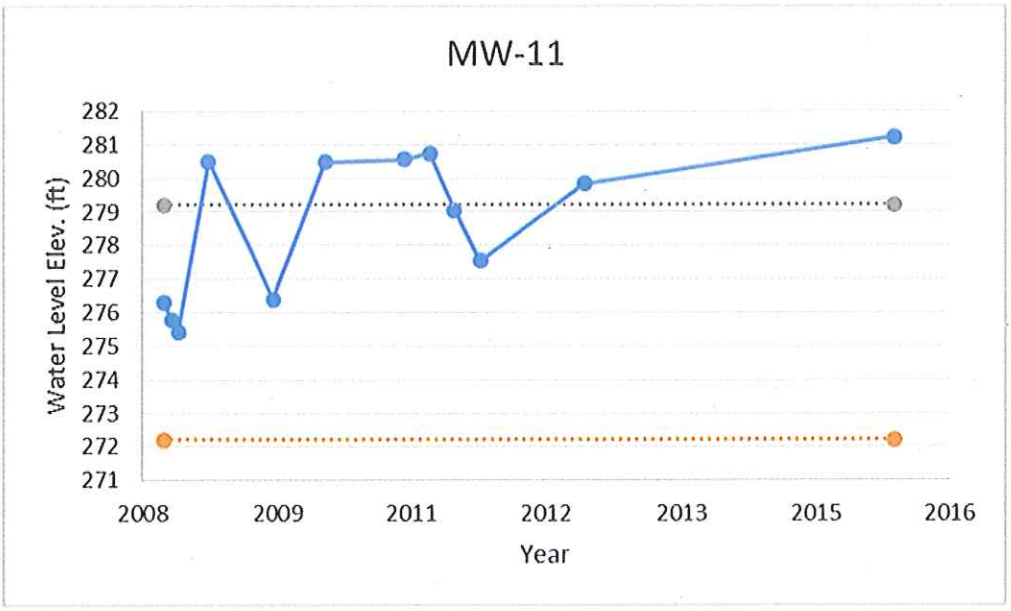
Enclosures (3): Site Tables and Figures

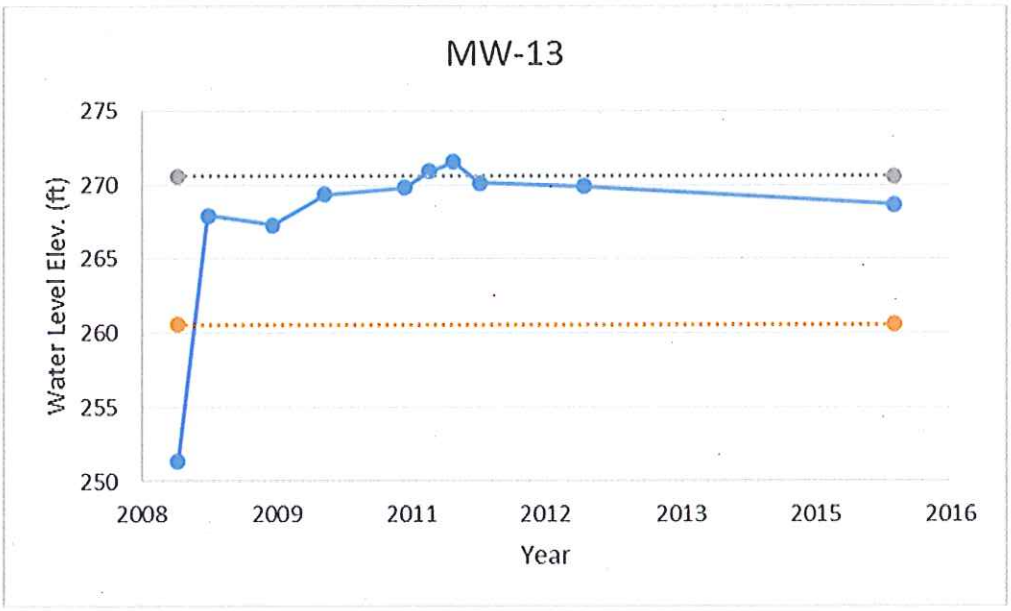
By Certified Mail: [91 7199 9991 7037 0287 2165]

cc: Jeff Woodworth, President, Woodworth Capital, Inc.
Nicholas M. Acklam, Ecology
Matthew Alexander, Ecology
Rebecca Lawson, Ecology

Enclosure A

Site Tables and Figures





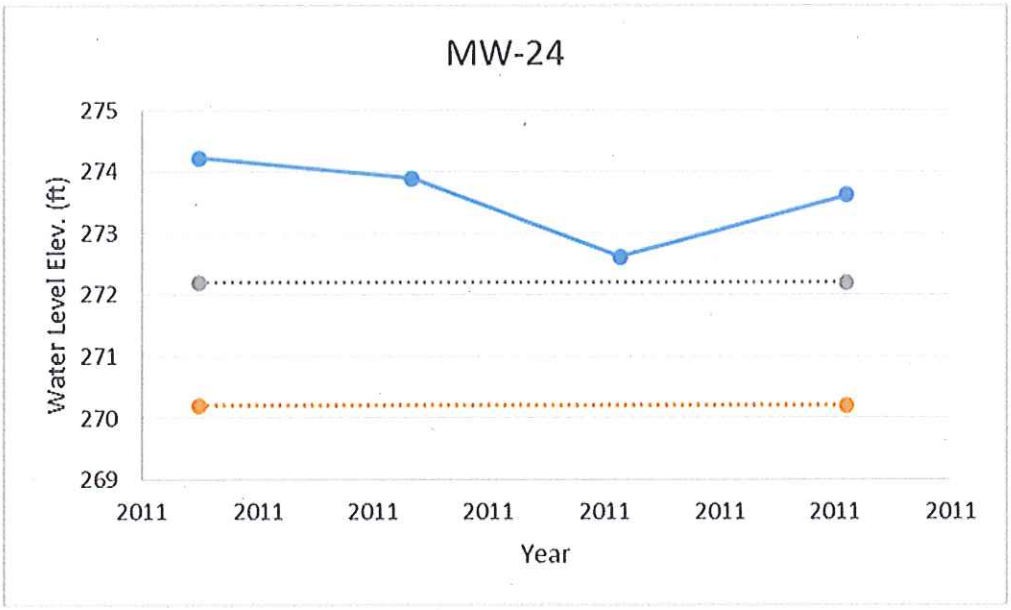


Figure 1 – Water levels through time depicting well screen elevations for MW-11, MW-13, and MW-24.

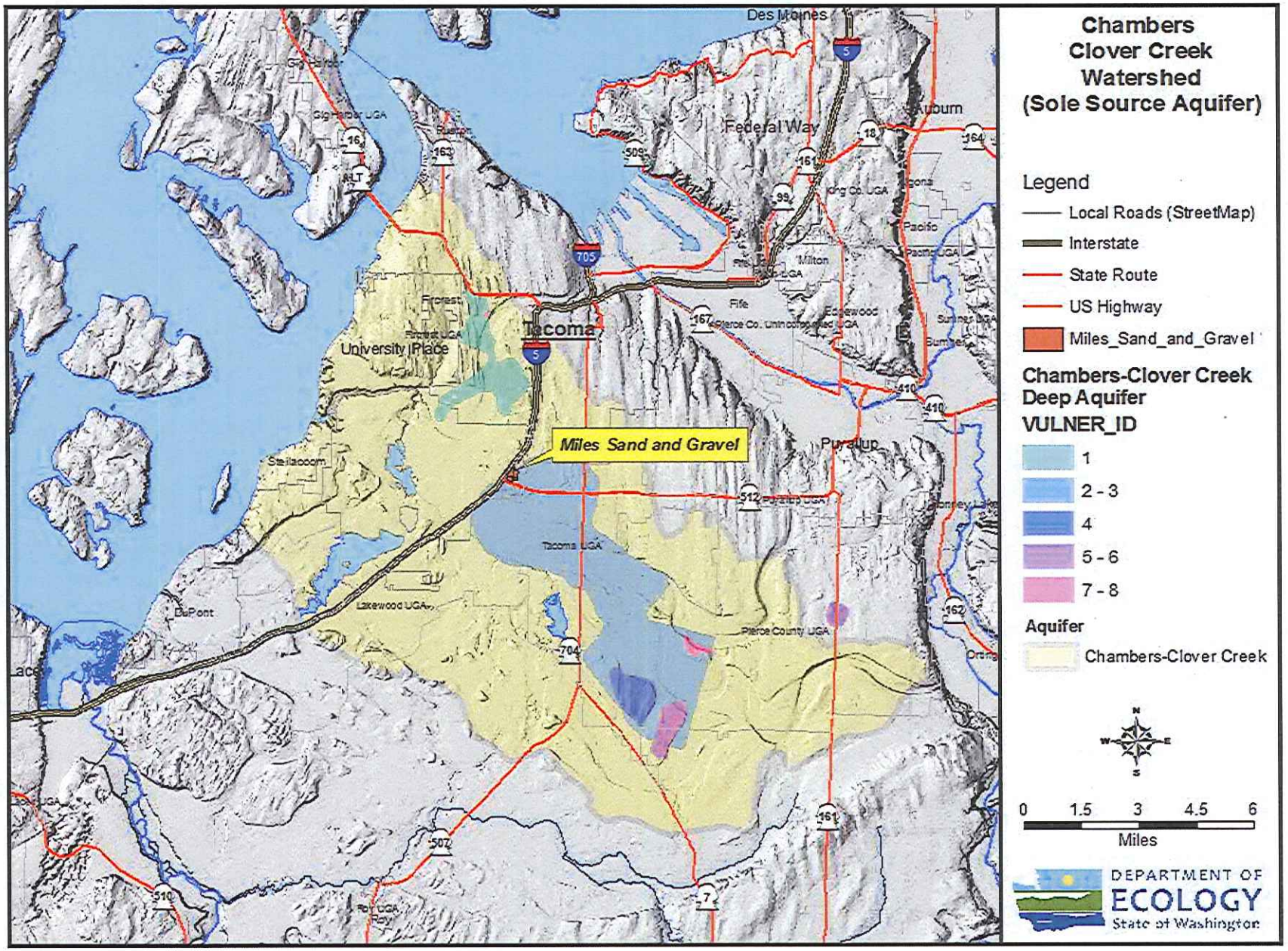


Figure 2 – Map of the Chambers-Clover Creek watershed.

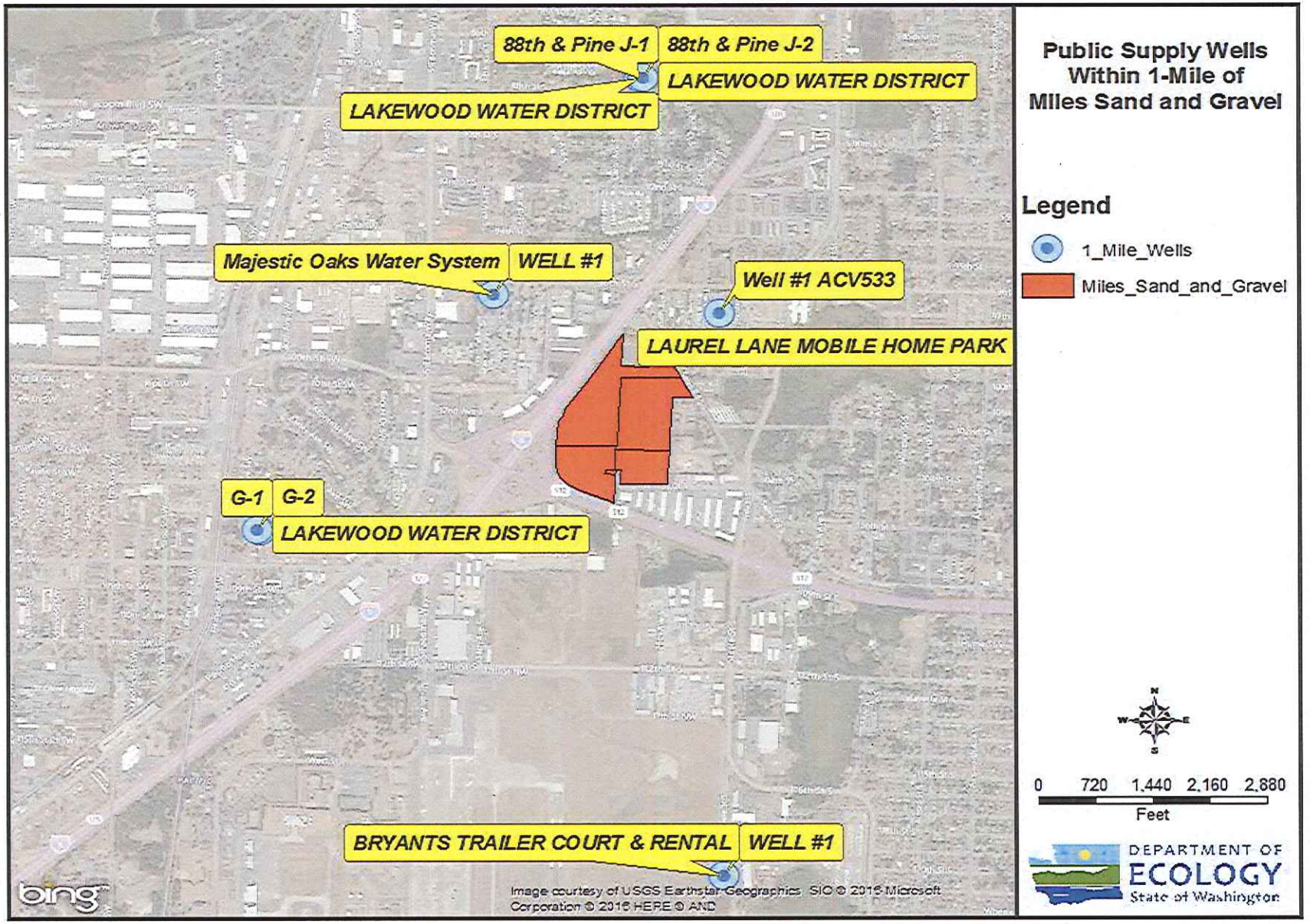


Figure 3 – Public Supply Wells Within 1-Mile of Miles Sand/Gravel.

Table 1 – Public Supply Wells Within 1-Mile of Miles Sand and Gravel.

SystemName	SrcName	SrcStatusI	SrcTypeDes	SrcWellDep_Ft
BRYANTS TRAILER COURT & RENTAL	WELL #1	Active	Ground Water - Well	130
LAKEWOOD WATER DISTRICT	88th & Pine J-1	Active	Ground Water - Well	156
LAKEWOOD WATER DISTRICT	88th & Pine J-2	Active	Ground Water - Well	629
LAKEWOOD WATER DISTRICT	G-1	Active	Ground Water - Well Field Well	180
LAKEWOOD WATER DISTRICT	G-2	Active	Ground Water - Well Field Well	180
LAUREL LANE MOBILE HOME PARK	Well #1 ACV533	Active	Ground Water - Well	108
Majestic Oaks Water System	WELL #1	Active	Ground Water - Well	150