STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, Washington 98504-7600 • 360-407-6300

January 23, 2024

Johnny Sweeney
NorthPoint Development
4825 NW 41st St, Ste 500
Riverside, MO 64150
jsweeney@northpointkc.com

Re: Opinion on Proposed Cleanup of the following Site:

Site Name:	Fruhling Sand & Topsoil
Site Address:	1010 228th St SW, Bothell, Snohomish County, WA 98021
Cleanup Site ID:	2800
Facility/Site ID:	2322475
VCP Project ID:	XN0005
Parcel No:	27043600200300

Dear Johnny Sweenie:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your proposed independent cleanup of the Fruhling Sand & Topsoil site (Site). This letter provides our opinion regarding the sufficiency of your independent cleanup. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA),[1] chapter 70A.305 Revised Code of Washington (RCW).[2]

Issue Presented and Opinion

Ecology has determined that upon completion of your proposed cleanup of the Site, and upon resolution of arsenic in sediment concerns within the wetlands located west of the Property (Snohomish County Parcel 27043600200300), no further remedial action will likely be necessary to clean up contamination at the Site.

[1] https://apps.ecology.wa.gov/publications/SummaryPages/9406.html
[2] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305

This no further action likely determination is dependent on yet-to-be determined factors such as:

- Ecology receipt of, and concurrence on, a Compliance Monitoring Plan (CMP) for continued monitoring of arsenic in groundwater at the Site.
- Ecology receipt of, and concurrence on, a Contaminated Media Management Plan (CMMP) in case unanticipated soil contamination conditions are discovered during Site development work.
- Snohomish County approvals on 90% Design of Methane Mitigation, Operations and Maintenance Plan, and Methane Monitoring Plan at the Site.
- Ecology concurrence on cleanup of the arsenic in sediment concern in the wetlands west of the Property.
- Recording of an environmental covenant signed by Ecology prohibiting drinking water use of groundwater on the Property. Additional restrictions anticipated to be required within the environmental covenant are discussed below.

These yet-to-be determined factors are further discussed below. Ecology bases this opinion on an analysis of whether the remedial action meets the substantive requirements of MTCA and its implementing regulations, which are specified in chapter 70A.305 RCW and chapter 173-340 WAC[3] (collectively called "MTCA").

Background

The Fruhling Sand & Topsoil Site is a former sand and gravel quarry that has been backfilled and is currently undergoing redevelopment. Ecology received a draft Remedial Investigation/ Feasibility Study (RI/FS) for the Site in October 2014, and provided feedback in an opinion letter dated January 14, 2015. Additional investigations were conducted between 2015 and 2022. A Draft Remedial Investigation Report was submitted to Ecology on October 6, 2022.

Ecology provided feedback on that report in an opinion letter dated December 7, 2022, which stated:

- *The petroleum and CPAHs in soil have been sufficiently characterized. Other than the preparation and implementation of a Contaminated Media Management Plan (CMMP) as a contingency (in case additional petroleum- or CPAH-contaminated soils are encountered during Site development), no further actions appear to be warranted with respect to petroleum and CPAHs in soil at the Site.*

[3] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-340

- *The arsenic in groundwater has been sufficiently characterized to identify cleanup levels and develop appropriate cleanup options.*

- *The arsenic in surface water and sediment has not been sufficiently characterized to identify cleanup levels and develop appropriate cleanup options. Data gaps are discussed below.*

- *The methane in soil gas has been sufficiently characterized to identify cleanup levels and develop appropriate cleanup options…*

Additional investigations took place in 2023, resulting in submittal of a Draft Focused Feasibility Study (FFS) report and a Data Gap Investigation Summary Report, both dated July 10, 2023. The Data Gaps Investigation Summary Report presented the results of investigations of surface water and sediments that were intended to address data gaps identified by Ecology in our December 7, 2022, letter. The Draft FFS presented remedial options for the arsenic in groundwater found at the Site.

Ecology provided feedback on the Data Gaps Investigation Summary Report in a letter dated July 27, 2023. That letter requested additional data to characterize sediments within the wetlands west of the Site and also stated:

> *Ecology cannot comment on the selection of a remedial alternative of the Site at this time since the information requested within this letter is needed for our review of the FFS prior to providing our concurrence or disagreement on the proposed alternative.*

Ecology received a Draft Supplemental Remedial Investigation/Focused Feasibility Study (RI/FFS) on December 21, 2023. Ecology has now concluded that sufficient information is available for the selection of a cleanup alternative for the arsenic in groundwater contamination at the Site, as discussed herein.

The December 21, 2023, RI/FFS identified an area with elevated concentrations of arsenic in sediments within the wetlands located west of the Property. This arsenic in sediments is associated with an iron precipitate that is likely due to groundwater under reducing geochemical conditions (due to woody materials within the backfill) discharging to surface water at the Site.

After the groundwater had been exposed to the atmosphere, oxidation resulted in precipitation of the iron and arsenic. Historical iron precipitation observations resulted in an Agreed Order with Ecology's Water Quality Program (Agreed Order 16479 as amended by Agreed Order 18098 on April 13, 2020).

A treatment swale was constructed in late 2021/early 2022 and has been in operation since that time. Based on continued monitoring results, the treatment swale is believed by Ecology's Toxics Cleanup Program (TCP) to be effectively preventing continued precipitation of iron and arsenic downstream in the wetlands area. The arsenic in sediments delineated in 2023 is believed by Ecology TCP to be attributable to discharges prior to the treatment swale installation. The arsenic in sediments concern in this area is further discussed below.

Site Description

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

- Arsenic into the groundwater, surface water, and sediment.
- Petroleum (diesel and heavy oil) into the soil.
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs) into the soil.

The petroleum and cPAHs in soil were discussed within Ecology's opinion letter dated December 7, 2022, which concluded that no further actions regarding petroleum and cPAHs in soil are warranted at this time other than prevention of exposure to potential ecological receptors, further discussed below.

In addition to the above contaminants, methane gas is present in soil gas and presents a concern at the Site. Methane is of concern at the Site due to explosivity rather than toxicity and is considered an Applicable or Relevant and Appropriate Requirement (ARAR) under WAC 173-340-700(6)(a). Methane mitigation is further discussed below.

Ecology has concluded that the arsenic in groundwater at the Site can be addressed independently of the arsenic in sediment concern. Hence, this letter focuses on the arsenic in groundwater at the Site. Ecology will be providing feedback regarding arsenic in sediments under separate cover.

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

Please note a parcel of real property can be affected by multiple sites. At this time, Ecology has no information that other sites affect the parcel associated with this Site.

Basis for the Opinion

Ecology bases this opinion on information in the documents listed in **Enclosure B**.

You can request these documents by filing a records request.[4] For help making a request, contact the Public Records Officer at publicrecordsofficer@ecy.wa.gov or call 360-407-6040. Before making a request, check whether the documents are available on Ecology's Cleanup Site Search web page.[5]

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

Analysis of the Cleanup

Ecology has concluded that, upon completion of your proposed cleanup, and upon resolution of arsenic in sediment concerns within the wetlands located west of the Property, no further remedial action will likely be necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

Characterizing 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.**

Arsenic in Groundwater Characterization

Arsenic in groundwater has been characterized at the Site through groundwater sampling conducted between 2007 and 2023. A total of 120 groundwater samples were collected from 17 locations. Dissolved arsenic in groundwater concentrations ranged from less than 3.0 micrograms per liter (µg/L) to 78 µg/L. The highest concentration was at location MW-103 in June 2014 (see Figure 5 in Enclosure A for locations).

In most recent sampling data, the highest dissolved arsenic concentration was 53 µg/L in MW-2 in July 2022. The extent of arsenic in groundwater contamination above the Puget Sound regional background concentration of 8.0 µg/L is generally limited to the Property; however, some exceedances may extend slightly beyond the Property boundary in the vicinity of MW-110 and MW-111. The most recent sampling results for these monitoring wells were 18 µg/L at MW-110 in August 2023 and 44 µg/L at MW-111 in July 2022. Well MW-111 was dry during two monitoring events in 2023.

[4] https://ecology.wa.gov/About-us/Accountability-transparency/Public-records-requests
[5] https://apps.ecology.wa.gov/gsp/Sitepage.aspx?csid=2800

Several monitoring wells had non-detected concentrations of dissolved arsenic during the most recent monitoring round. During this most recent monitoring round, care was reportedly taken to minimize turbidity in monitoring wells prior to sampling. Hence, the historical dissolved arsenic concentrations could potentially be affected by turbidity in monitoring wells, which would not be expected within a well-developed water supply well. Since the cleanup level for arsenic in groundwater is based on a drinking water pathway, assuming a water supply well has low turbidity is a reasonable assumption.

Based on the arsenic in groundwater monitoring data, Ecology has concluded that the arsenic in groundwater plume is stable or receding. The plume appears to be in a steady-state condition, where the limits of contamination above the background concentration of 8 µg/L do not expand due to native geochemical conditions. As geochemically reducing groundwater migrates, it encounters more aerobic groundwater, which likely induces precipitation of iron and arsenic. This phenomenon of a steady-state groundwater contamination plume is commonly observed with petroleum in groundwater.

Ecology has also concluded that drinking water use of groundwater with arsenic concentrations above the regional background concentration at the Site is unlikely, based on the following considerations:

- An environmental covenant on the Property recorded at Snohomish County will be required prior to Ecology issuance of a no further action (NFA) determination. This EC will include a prohibition of drinking water wells on the Property.

- The area downgradient of MW-110 is within the wetlands west of the Property. Development of this area, including installation of water supply wells is unlikely based on protections for these wetlands.

- The area in the vicinity of MW-111, includes single-family residential properties of approximately 0.15 acres. These residences are provided with municipal potable water supply, have insufficient room for installation of a water well, and reportedly have covenant restrictions that would prohibit water well installation.

Notwithstanding these considerations, MTCA provides for cleanup of groundwater with cleanup level exceedances to ensure that human health and the environment are protected in the future. Cleanup options for the arsenic in groundwater at the Site are discussed below.

Arsenic in Surface Water Characterization

Surface water was characterized by the collection of 87 samples from 14 locations between 2005 and October 2023. Three areas of potential concern for arsenic in surface water were identified by Ecology:

- Downgradient of the treatment swale in the center-west.
- Vicinity of MW-110 in the northwest.
- Pond located near the southeast Property corner.

Overall, Ecology has concluded that the groundwater-to-surface water pathway is incomplete at the Site, except for at the location where groundwater discharges into the treatment swale via piping that penetrates the above hillside. This discharge is considered a point source under the Clean Water Act and is currently being permitted under the National Pollution Discharge Elimination System (NPDES). Therefore, the groundwater-to-surface water pathway at this location is being managed by the appropriate Clean Water Act authority (Ecology Water Quality Program).

Further details regarding the characterization work conducted at the three areas of potential concern are provided as follows.

Downgradient of the Treatment Swale

The treatment swale has been operating since it was installed in late 2021/early 2022. The swale is treating groundwater from two pipes that collect groundwater from beneath the Site and discharge it to surface water at a manhole near the upper end of the swale. The treatment swale is based on oxidation of the reducing water, which results in precipitation of iron and arsenic prior to water discharging from the swale. Since the swale was installed, dissolved arsenic concentration have been less 3.0 µg/L for nine monitoring rounds. As discussed above, this discharge is being managed by the appropriate Clean Water Act authority.

Vicinity of MW-110

The vicinity of MW-110 was identified as a potential concern due to the proximity of the monitoring well and Crystal Creek. The monitoring well had 18 µg/L dissolved arsenic during the most recent sampling in August 2023. No surface water samples collected in this northern reach of Crystal Creek had any detectable arsenic (less than 3.0 ug/L) and no arsenic was detected in a sediment sample collected in Crystal Creek immediately downgradient of MW-110. Hence, Ecology had concluded that no groundwater-to-surface water/sediments concern has been identified for this area, and no additional investigation appears to be warranted. However, continued groundwater monitoring at MW-110 is requested.

Southeast Pond

Surface water from the Pond located near the southeast Property corner was sampled twice in 2005 and sediment was sampled from this pond in April 2023. No arsenic was detected in the surface water or sediment samples. No groundwater samples in the area upgradient of this pond had any elevated arsenic concentrations, though monitoring wells coverage in this area was limited. Ecology has concluded that there is no data indicating an arsenic in surface water concern in this area, an no further investigation appears to be warranted.

Arsenic in Sediments Characterization

As discussed above, an arsenic in sediments concern was identified in the wetlands located west of the treatment swale (see RI/FFS Figure 4 in Enclosure A). Arsenic was detected in a sediment sample at 280 milligrams per kilogram (mg/kg) in this area (location SS09-S-6). A total of eight sediment samples were collected in this area, with two other samples having detectable arsenic concentrations (120 mg/kg at SS08-S-6 and 25 mg/kg at SS-10-S-6). The extent of arsenic in sediments contamination appears to be sufficiently defined to identify appropriate cleanup levels and cleanup actions.

Setting Cleanup Standards

Ecology has determined the cleanup levels and points of compliance presented below meet the substantive requirements of MTCA.

Soil and Groundwater

The following Method A cleanup levels have been applied at the Site for soil and groundwater.

Table 1. Cleanup Levels for Soil and Groundwater

Contaminant	Method A Cleanup level for soil (mg/kg)	Method A Cleanup level for groundwater (µg/L)
Arsenic	20	5,8[a]
Cadmium	2	5
Diesel range organics (DRO)	2,000	500
Heavy oil range organics (HRO)	2,000	500
DRO + HRO	2,000	500
Total CPAHs	0.1/0.19[b]	0.1

[a] The Method A cleanup level for arsenic in groundwater is 5 µg/L, while the Puget Sound Basin regional background concentration for arsenic in groundwater is 8 µg/L. Cleanup below the regional background concentration is not required per WAC 173-340-720(7)(c).

[b] The 2022 RI Report uses Method A cleanup levels. However, the use of the Method B cleanup level for total CPAHs in soil of 0.19 mg/kg is proposed for the Site. Use of the Method B cleanup level for total CPAHs in soils is discussed in Ecology's letter dated December 7, 2022.

Surface Water

Because the groundwater to surface water pathway has been determined to be inactive, except for at the treatment swale discharge that is being managed by the appropriate Clean Water Act authority, no cleanup levels are presented herein for surface water.

Sediments

Table 4 presents sediment screening levels and cleanup levels from Sediment Management Standards (SMS), WAC 173-204:

Table 2. Cleanup Objectives Screening Levels for Sediments

Contaminant	Sediment Cleanup Screening Levels (mg/kg)[a]	Sediment Cleanup Objective (mg/kg)[a]
Arsenic	120	14

[a] CSLs and SCOs from Ecology's Sediment Cleanup User's Manual dated December 2021.

The following is language from the Sediment Cleanup User's Manual regarding Sediment Cleanup Objectives (SCOs) and Cleanup Screening Levels (CSLs).

> *The SCO is the long-term sediment quality goal. It is the lower end of the range of chemical concentrations or biological effects level used to establish a sediment cleanup level (WAC 173-204-560(3)).*
>
> *The CSL is used to identify sediment cleanup sites and is the maximum chemical concentration or biological effects level allowed as a sediment cleanup level (WAC 173-204-560(4)).*
>
> *The sediment cleanup level is initially established at the SCO but may be adjusted upwards to the CSL. This determination is based on the technical possibility and net adverse environmental impacts associated with meeting and maintaining the sediment cleanup level. See Section 7.2.3 for further detail.*

Points of Compliance

A standard point of compliance (throughout the Site) is anticipated to be applied for soil. For the direct contact soil pathway, this is from the ground surface to fifteen feet below the ground surface (ft bgs). Soil-protective-of groundwater cleanup levels apply to soil without respect to depth, unless an empirical demonstration can be made that shows a lack of impact to groundwater from soil under WAC 173-340-747(3)(f).

Ecology has concluded that the petroleum and cPAH soil contamination at the Site does not appear to present a risk to groundwater. Hence, cleanup of soils contaminated with petroleum or cPAHs should not be needed for soils deeper than 15 feet. Soil cleanup level exceedances are further discussed below.

Conditional points of compliance (CPOCs) are anticipated to be applied for the arsenic in groundwater found at the Site. Application of CPOCs at the Site is further discussed below.

Points of compliance for sediments may be more complex. "Sediment" is defined in the Sediment Cleanup User's Manual as:

> *"settled particulate matter located at or below the ordinary high water mark, where the water is present for a minimum of six consecutive weeks, to which biota (including benthic infauna) or humans may potentially be exposed, including that exposed by human activity (e.g., dredging)*." (WAC 173-204-505(22)).

Terrestrial Ecological Evaluation (TEE)-based concentrations apply to a depth of six ft bgs, which is the biologically active zone.[6]

Terrestrial Ecological Evaluation (TEE)

The Site is located in an area with significant potential for ecological receptors. Forested areas are found both on the Property and on adjacent properties to the west, south, and east. Forested areas are also located to the north, across 228th Street SW.

A TEE examines potential ecological concerns from soil contamination. The RI concluded with respect to TEE:

> *The Site will qualify for exclusion from a TEE due to the following conditions:*
>
> *Exclusion 1: All soil contaminated with hazardous substances is, or will be, located below the point of compliance established under WAC 173 340 7490(4).*

MTCA Table 749-3 has an indicator concentration of 200 mg/kg for diesel plus heavy oil in soil. Three soil samples had heavy oil concentrations exceeding this concentration (see Table 3 below).

Exceedances of the TEE concentration for heavy oil in soil at GB-5 and MW-6 must be addressed prior to Ecology concluding that the TEE pathway can be considered closed.

[6] WAC 173-340-7490(4)(a)

Ecology anticipates that closure of this concern can be achieved through a provision within a recorded environmental covenant providing for prevention of ecological exposure pathways at these two locations (see October 2022 RI Figure 2 for the locations of MW-6 and GB-2).

Table 3. TEE Soil Concentration Exceedances

Location	**Depth** (ft bgs)	**Heavy Range Oil concentration** (mg/kg)	**TEE Indicator Concentration** (mg/kg)
GB-5	3.5-5.0	3,100	200
SB-1	45.0[a]	250	200
MW-6	5.0	500	200

[a] The TEE concentration exceedance at SB-1 was below the TEE-based depth of six (6) ft bgs.

Selecting and implementing the cleanup action

Ecology has determined the cleanup you proposed for the Site is anticipated to meet substantive requirements of MTCA. The proposed cleanup action was presented in the RI/FFS report dated December 21, 2023.

Selecting the Cleanup Action – Arsenic in Groundwater

The following three cleanup alternatives were evaluated within the RI/FFS report to address the arsenic in groundwater contamination:

Table 4. Feasibility Study Alternatives

Alternative Number	**Alternative Description**	**Benefit Score**	**Estimated Cost** (Million Dollars)
1	Excavation and Offsite Disposal	7.2	$44.25
2	Groundwater Control and Treatment System, and Long-Term Compliance Monitoring	6.6	$12.63
3	Monitored Natural Attenuation with Long-Term Compliance Monitoring	7.0	$4.32

Ecology notes that Alternatives 2 and 3 also include methane mitigation within the alternative components and costs.

Ecology concurs with the results of the disproportionate cost analysis (DCA) and concurs with the selection of Alternative 3, Monitored Natural Attenuation (MNA) with Long-Term Compliance Monitoring, as the most permanent alternative that is not disproportionate in costs when compared to relative benefits.

Ecology has concluded that risks from the arsenic in groundwater can be effectively managed through MNA and long-term monitoring. Part of this approach will be use of CPOCs at off-Property locations where downgradient arsenic concentrations have been below the Puget Sound regional background concentration of 8 µg/L (as well below as the Method A cleanup level of 5 µg/L). As discussed above, cleanup of groundwater with contaminant concentrations below background is not required under MTCA.

Appropriate CPOCs are locations MW-105, MW-106, MW-107, and MW-109. Should dissolved arsenic in groundwater concentrations exceed the Method A cleanup level at these locations, then contingency measures are anticipated to be required. In addition, continued monitoring should show results indicating continuing attenuation is occurring, including at in-plume locations MW-2, MW-3, MW-8N, MW-101, MW-102, MW-103, MW-104R, and MW-110. Continued monitoring should also take place at upgradient monitoring well MW-4.

Ecology requests submittal of the Compliance Monitoring Plan for our review and comment. **Ecology requests that this plan include continued quarterly groundwater monitoring of both CPOC and in-plume monitoring wells at this time.** Ecology may approve a reduction in groundwater monitoring frequency after one year of quarterly monitoring. Monitoring should include both dissolved arsenic and field turbidity readings, as wells as field measurements of dissolved oxygen and oxidation-reduction potential (ORP). Groundwater monitoring is anticipated to take place both prior to and following an NFA determination by Ecology.

As previously discussed, an NFA determination will not take place until after the following activities have taken place:

- Ecology receipt of, and concurrence on, a Compliance Monitoring Plan for continued monitoring of arsenic in groundwater at the Site.
- Ecology receipt of, and concurrence on, a Contaminated Media Management Plan in case unanticipated soil contamination conditions are discovered during Site development work.
- Snohomish County approvals and Ecology concurrence on 90% Design of Methane Mitigation, Operations and Maintenance Plan, and Monitoring Plan at the Site.
- Ecology concurrence on cleanup of the arsenic in sediment concern.
- Recording of an environmental covenant signed by Ecology prohibiting drinking water use of groundwater on the Property and potential other restrictions.

Groundwater-to-Surface Water Pathway – Future Scenarios Analysis

Ecology had requested that two future scenarios be evaluated to assess the effects of Site activities on the groundwater system, specifically the groundwater-to-surface water pathway. These scenarios included 1) what would be the effect of removing/blocking the drainage pipes that lead into the treatment swale, and 2) how would Site development effect the overall hydrological balance and whether new seeps could develop.

These future scenarios were evaluated within two memoranda presented with Appendix D and E, respectively, of the December 2023 RI/FFS Report. The first memorandum concluded that it would be inadvisable to block the drainage piping since the results would be highly unpredictable. Ecology TCP concurs with this finding.

The second memorandum, titled "NP 228th Apartments Critical Aquifer Recharge Areas Report" concluded: "*Review of the preliminary grading plan by LDC indicates that planned excavation depths for the residential project would not extend below site groundwater elevations determined by Landau's monitoring in April 2022*." Ecology requested a more robust analysis of this question in an email dated December 27, 2023.

Prior to issuance of an NFA determination, Ecology requests submittal of an analysis that clearly demonstrates that new seeps will not be generated by Site development work.

Methane Mitigation

In our December 7, 2022, opinion letter, Ecology requested the following methane mitigation deliverables:

- *The Methane Mitigation 60% Design should have the design criteria and methods/procedures used for the design presented within a Basis of Design Report. A Basis of Design Report presents the thought processes and assumptions behind major design decisions being made to meet the system objectives.*

- *The design should include redundancy in equipment, such as pumps and blowers. Such redundancy was not evident from the design drawings. The Basis of Design Report should include an analysis of failure mechanisms and appropriate measures to respond to such failures, including equipment redundancies. The failure analysis should include a table identifying potential failure mechanisms, likelihood of such failure mechanisms, appropriate responses, and response timeframes.*

- *In addition to operations and maintenance of the system, post construction monitoring for methane is critical. The need for continued monitoring should be discussed within the Basis of Design Report.*

- *Prior to construction, a Final Design Report and Operations & Maintenance (O&M) Plan should be submitted to Ecology for review and comment. This document should reiterate the basis of design, and detail O&M procedures and continued monitoring requirements and should be stamped and signed by a licensed professional engineer with significant methane mitigation experience. The O&M Plan should include contingencies for system failures.*

- *Prior to issue of an NFA determination for the Site, Ecology will expect to receive a Remedial Action Completion Report that includes methane mitigation system as-built information and the final O&M Plan. In addition, an environmental covenant will be needed that would include the O&M Plan as an attachment. Such an environmental covenant will trigger periodic review by Ecology on a 5-year basis.*

Since the time of our December 7, 2022, letter, Ecology TCP has conducted a regulatory review and has concluded that Snohomish County should be the lead entity with respect to methane and methane mitigation. Methane is not a MTCA contaminant, but rather an ARAR. As an ARAR, Ecology TCP's role is to ensure that compliance with the appropriate regulatory entity, namely Snohomish County, is achieved. Hence, Ecology considers the Snohomish County approval of the Methane Mitigation 90% Design, Operations and Maintenance Plan (O&M Plan), and Monitoring Plan to be appropriate prior to an NFA determination.

Arsenic in Sediment Concern

Ecology will be assessing the area of arsenic in sediments within the wetlands area located west of the Property (shown in Figure 4 of the RI/FFS report in Enclosure A). This assessment will include a review of the data and cleanup alternatives proposed within the December 2023 RI/FFS report. A part of this assessment will include a review of net environmental benefits that compare the benefits of removal of arsenic-containing iron precipitate within this area with the likely harms to the native wetlands environment that would be expected using heavy equipment in this area. Ecology will provide feedback under separate cover with respect to requested next steps for the arsenic in sediments in this area.

Environmental Covenant

An Ecology-signed environmental covenant should be recorded at Snohomish County for the Property.

The environmental covenant is anticipated to include, but not be limited to, the following restrictions on the area of contamination:

- A prohibition on drinking water supply wells on the Property.
- A provision for protection of monitoring wells and a requirement to replace damaged or destroyed monitoring wells within the Compliance Monitoring Network.
- A provision requiring prevention of ecological exposure to residual petroleum-in-soil contamination at locations GB-5 and MW-6 (see October 2022 RI Figure 2 for locations).

Periodic Review

Following environmental covenant recording, Ecology will be performing periodic reviews on an approximate 5-year basis. Ecology's NFA letter will be stipulating reporting requirements for continued monitoring, including submitting a report for our 5-year periodic review, and submittal of any results of concern on a timely basis. Should any continued monitoring data or other information indicate that the selected remedy is not protective, then the NFA decision could be rescinded.

Next Steps

Ecology anticipates the following next steps at the Site, likely in this sequence:

1. Further (to be determined) actions on the arsenic in sediment concern.
2. Submittal of an analysis that clearly demonstrates that new seeps will not be generated by Site development work.
3. Submittal of a Compliance Monitoring Plan (for dissolved arsenic in groundwater) for Ecology review and comment and implementation of quarterly groundwater monitoring.
4. Submittal of a Contaminated Media Management Plan (CMMP) for Ecology review and comment. The CMMP will detail handling procedures for potentially contaminated soils identified during Site development activities and provide for contingency measures in case of encountering unexpected conditions.

5. Preparation and recording of an Ecology-signed environmental covenant at Snohomish County.

6. Providing Ecology with approvals by Snohomish County for the methane mitigation system 90% design, Operations and Maintenance Manual, and Monitoring Plan.

7. Ecology issuance of an NFA determination letter.

8. Continued groundwater monitoring and reporting for Ecology's periodic review (and more frequently if any concerns are identified).

Limitations of the Opinion

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 70A.305.040(4).[7]

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 70A.305.080[8] and WAC 173-340-545.[9]

Opinion is limited to proposed cleanup.

This letter does not provide an opinion on whether further remedial action will actually be necessary at the Site upon completion of your proposed cleanup. To obtain such an opinion, you must submit a report to Ecology upon completion of your cleanup and request an opinion under the Voluntary Cleanup Program (VCP).

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 70A.305.170(6).[10]

[7] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305.040
[8] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305.080
[9] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-545
[10] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305.170

Questions

Thank you for choosing to clean up the Site under the VCP. As you conduct your cleanup, please do not hesitate to request additional services. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our webpage.[11] If you have any questions about this opinion, please contact me at frank.winslow@ecy.wa.gov or 509-454-7835.

Sincerely,

Frank P. Winslow, LHG
Toxics Cleanup Program
Headquarters Section

FPW/tam

Enclosures (2): A – Site Description and Diagrams
B – Document List

cc by email: Dave Johnson, Cascadia, djohnson@cascadia-sci-eng.com
Jeremy Davis, Puget Sound Environmental, jd@psoundenv.com
Erik Snyder, Ecology, erik.snyder@ecy.wa.gov
Treasure Mitchell, Ecology, treasure.mitchell@ecy.wa.gov
Ecology Site File

[11] https://www.ecy.wa.gov/vcp

Enclosure A

Site Description and Diagrams

Site Description

Site

The Site is defined by petroleum hydrocarbons (diesel and heavy oil range) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in soil, arsenic in groundwater, and methane in soil gas. The Site contamination is associated with previous mining and subsequent backfilling operations at 1010 228th Street SW in Bothell, Washington (the Property).

Area and Property Description

The Property is in unincorporated Snohomish County and corresponds to parcel number 27043600200300, which is approximately 26.02 acres in size. The Property is located in the northwest quarter of Section 36, Township 27 north, Range 4 east. The land surface elevation of the Property ranges from approximately 210 to 390 feet above mean sea level. The Property is bordered to the north by 228th Street SW and beyond, forested lands and the Kenmore Shooting Range. The Property is bordered to the east by forested lands and Canyon Ridge, a multifamily housing complex. The Property is bordered to the south by a forested area and single-family housing. To the west of the Property are more single-family housing and two narrow forest corridors (one in the northwest and one in the southwest) where tributaries of Crystal Creek flow to the west to southwest. The Property is divided into three tiers with most of the former pit operations reportedly occurring on the lowermost level tier.

Property History and Current Use

The Property was a sand and gravel mining pit that operated from 1952 until 1965, when mining activities diminished due to dwindling aggregate reserves. The former mining pit has been backfilled with fill materials since approximately 1992. The Property was used by the Fruhling Sand & Topsoil (Fruhling) facility which recycled asphalt, concrete, soil, and land-clearing debris. The facility operations included grinding, washing, and sorting concrete for resale. These operations also included the importing of soil. No contaminated soil or hazardous materials were reportedly accepted.

A portion of the upper tier of the Property was reportedly leased by Asplundh, a tree maintenance company, for storage of trucks and wood chipping equipment. A cell phone tower is present at the northeast comer of the Property. The Property was purchased from Fruhling by the current Property Owner in 2021 for development of residential housing. Sales operations by Fruhling reportedly ceased by October 2022.

Sources of Contamination

The suspected source of petroleum hydrocarbons (heavy oil range) at location GB-5 in soil is leaks from mechanical equipment operated at the facility. One soil sample contained heavy oil at a concentration above the Method A cleanup level.

The source of cPAHs in soil is likely backfill materials that were imported and deposited on the Property. cPAHs are commonly associated with asphalt materials in soils and asphalt was historically imported onto the Property. Three soil samples contained cPAHs at concentrations above the Method A cleanup level.

The source of the arsenic in groundwater on the Site has been attributed to reducing conditions caused by the degradation of organic fill materials. Organic materials were noted in boring logs from many of the borings drilled on-Site. Specific organic materials noted on these boring logs included wood debris, cuttings, roots, mulch, wood chips, peat, hog fuel, and organic-rich layers (hereinafter referred to as wood debris or mulch). The wood debris was reportedly placed during the backfilling of the gravel pit for erosion control purposes between soil lifts.

The arsenic in groundwater is believed to originate from naturally occurring arsenic in soils at the Site. No arsenic has been detected in soil at concentrations exceeding the MTCA Method A cleanup level. Iron and manganese are also elevated in Site groundwater due to the reducing conditions of groundwater. The methane and hydrogen sulfide in soil gas is also attributable to the organic matter within the fill soils.

Physiographic Setting

The Site is located within the Puget Sound Lowland Physiographic Province, a north-south trending structural and topographic depression bordered to the east by the Cascade Mountain foothills and to the west by the Olympic Mountains. The Puget Sound Lowland is underlain by Tertiary-age volcanic and sedimentary bedrock which was overridden and filled to the present-day land surface with Pleistocene glacial and nonglacial sediments. The Site is situated on the Bothell Upland, an elevated plain between the channels formed by Swamp Creek and North Creek.

Surface Water

The Property slopes to the west, south, and southeast. The Site is within an area that drains into Crystal Creek which in turn drains into Swamp Creek approximately 5,000 feet south-southeast of the Site. Crystal Creek in an intermittent stream that flows to the south in the vicinity of the Site. It appears to originate on an approximately 39-acre forested property located north of and adjacent to 228th Street SW, then flows to the southwest and south, crossing 228th Street SW near the northwest corner of the Property. Crystal Creek then flows to the south, west of the Property and enters a wetland complex.

Ecology notes that the drainages shown on the topographic coverage for the area appear to represent pre-development conditions in the area, and not current conditions. The topographic coverage shows a tributary to Crystal Creek crossing the southern part of the Property; however, this tributary appears to flow around the southeast and southern Property boundary.

Stormwater System

On the Property, stormwater has been managed with a complex system of ponds and drains which is further discussed below.

The following discussion regarding stormwater is from the October 2022 RI Report:

> *The Property currently operates under the Sand and Gravel General Permit-National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge Permit No. WAG-503168 (Sand and Gravel NPDES Permit) for management of stormwater and groundwater discharge into surface water from the groundwater interceptor pipes discussed in the section above. A new individual NPDES permit application has been submitted to Ecology by the current Property Owner. The permit is pending issuance at the time of this RI report.*
>
> *In general, stormwater is routed to the west/southwest border of the Property to a series of stormwater settling ponds, referenced in prior reports as North Pond and West Pond. The stormwater ponds are used to provide stormwater treatment via settling prior to discharge into the adjacent Crystal Creek wetland and tributary area. Site stormwater from the highest elevation tier is routed along the southeastern Property boundary to an additional stormwater infiltration pond at the southeastern Property corner. The current surface water monitoring network is shown on Figure 5 and Figure 6.*
>
> *As the Property transitions from mine reclamation into the planned residential development, the new Property Owner is currently working on re-designing the surface water drainage features to be compliant with current state and local redevelopment requirements. The current conceptual plan is to route stormwater to a large subsurface detention and treatment vault located in the northwestern portion of the Property. Following the initial detention settling, stormwater will be routed to an enhanced treatment media vault, and subsequently discharged offsite via an energy dissipation flow splitter device.*

In general, there appears to be three main stormwater drainage areas under existing conditions at the Site.

Northwest Area – Stormwater from the majority of the Property is routed to settling ponds (Pond North, then Pond West), then discharges via drainage ditch to reach Crystal Creek to the west.

West-Central Area – Limited stormwater from the westernmost slope of the Property may reach the treatment swale, which receives groundwater from two pipes. This swale was constructed for treatment of the daylighting groundwater prior to discharge to Crystal Creek under Ecology Water Quality Program Agreed Order 16479. The discharge leaving the treatment swale flows to the north within a ditch, then curves west to enter a small wetland, then crosses 9th Place West via culvert to reach Crystal Creek and the larger wetland complex to the west.

Eastern Area – Stormwater on the eastern quarter of the Property flows to the south to discharge to the pond at the southeast corner of the Property, and then via drainage to the west to Crystal Creek. At the time of this letter, the property owner is changing the on-Site stormwater management system.

Ecological Setting

The Property is in a semi-rural area and is partially undeveloped such that forested areas and terrestrial habitat exists on and around the Property. There are undeveloped lands within 500 feet of the Property boundaries in all directions.

Geology

Beneath fill deposits, the Property is directly underlain by advance outwash deposits of Fraser glaciations. The Property is located on a west sloping hillside where advance outwash deposits are exposed. These materials were subsequently mined during operation of the sand and gravel pit. Vashon glacial till partially covers undisturbed glacial outwash on the eastern edge of the Property.

Groundwater

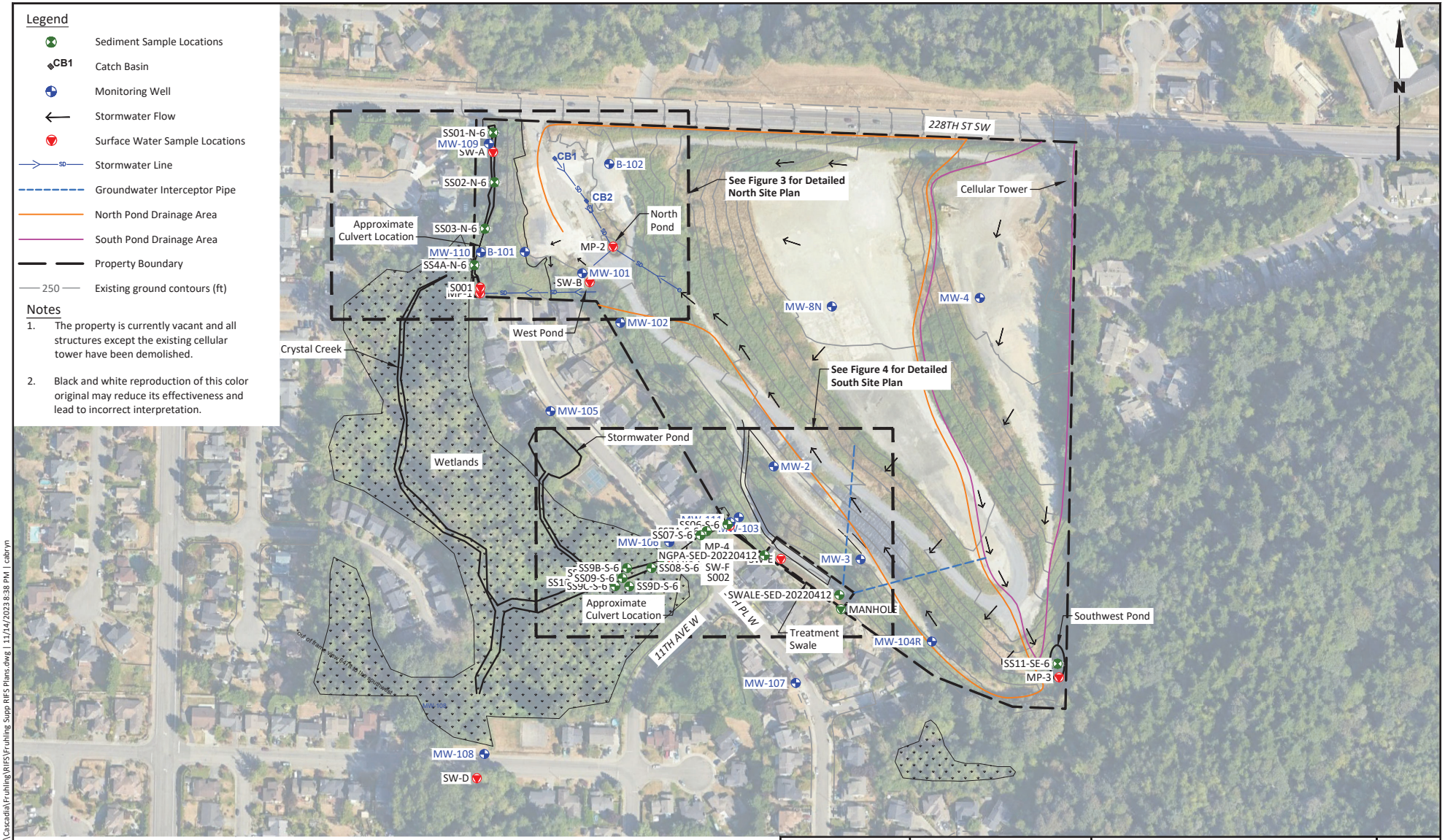
Groundwater occurs within the advance outwash deposits and Vashon till at variable depths on the sloped Property, ranging from approximately 50 to 135 feet below ground surface (ft bgs). Ground water flows to the west-southwest, subparallel to topographic slope direction.

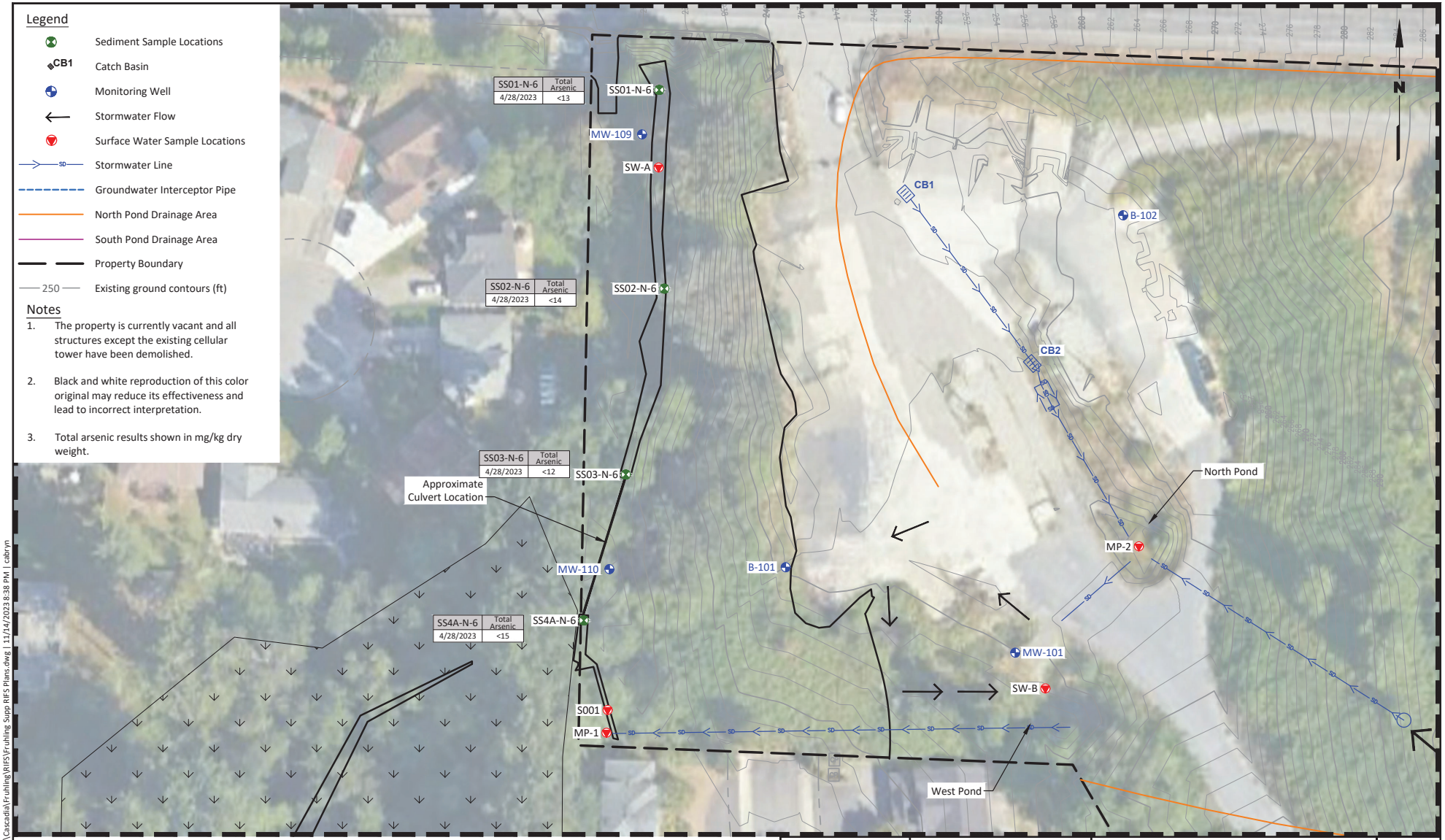
Water Supply

Bothell's drinking water is obtained primarily from the South Fork Tolt River Watershed. There are no private drinking water wells within 1 mile of the Property.

Site Diagrams

(From December 2023 RI/FFS Report)


Legend
Sediment Sample Locations
CB1 Catch Basin
Monitoring Well
Stormwater Flow
Surface Water Sample Locations
SD Stormwater Line
Groundwater Interceptor Pipe
North Pond Drainage Area
South Pond Drainage Area
Property Boundary
250 Existing ground contours (ft)
Notes
1. The property is currently vacant and all structures except the existing cellular tower have been demolished.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
N
228TH ST SW
See Figure 3 for Detailed North Site Plan
See Figure 4 for Detailed South Site Plan
Cellular Tower
North Pond
West Pond
Stormwater Pond
Southwest Pond
Treatment Swale
Approximate Culvert Location
Approximate Culvert Location
Crystal Creek
Wetlands
11TH AVE W
11TH PL W
MANHOLE
SS01-N-6
MW-109
SW-A
SS02-N-6
SS03-N-6
MW-110
B-101
SS4A-N-6
S001
CB1
B-102
CB2
MP-2
MW-101
SW-B
MW-102
MW-105
MW-8N
MW-4
MW-2
MW-103
SS07-S-6
MP-4
NGPA-SED-20220412
MW-3
SS9B-S-6
SS08-S-6
SW-F
S002
SS09-S-6
SS9D-S-6
SWALE-SED-20220412
MW-104R
SS11-SE-6
MP-3
MW-107
MW-108
SW-D
DRAFT
Aerial image: Google Earth Imagery, 8-24-2022
Source: CAD BASEMAP PROVIDED BY NORTHPOINT AND LDC DATED 9-17-2021
0 200 400
Scale in Feet
Cascadia Science and Engineering LLC
Supplemental FFS Fruhling Sand and Topsoil Bothell, Washington
Site Plan
Figure 2
File: D:_Projects\Cascadia\Fruhling\RIFS\Fruhling Supp RIFS Plans.dwg | 11/14/2023 8:38 PM | cabryn



DRAFT

Aerial image: Google Earth Imagery, 8-24-2022

Source: CAD BASEMAP PROVIDED BY NORTHPOINT AND LDC DATED 9-17-2021

0 50 100

Scale in Feet

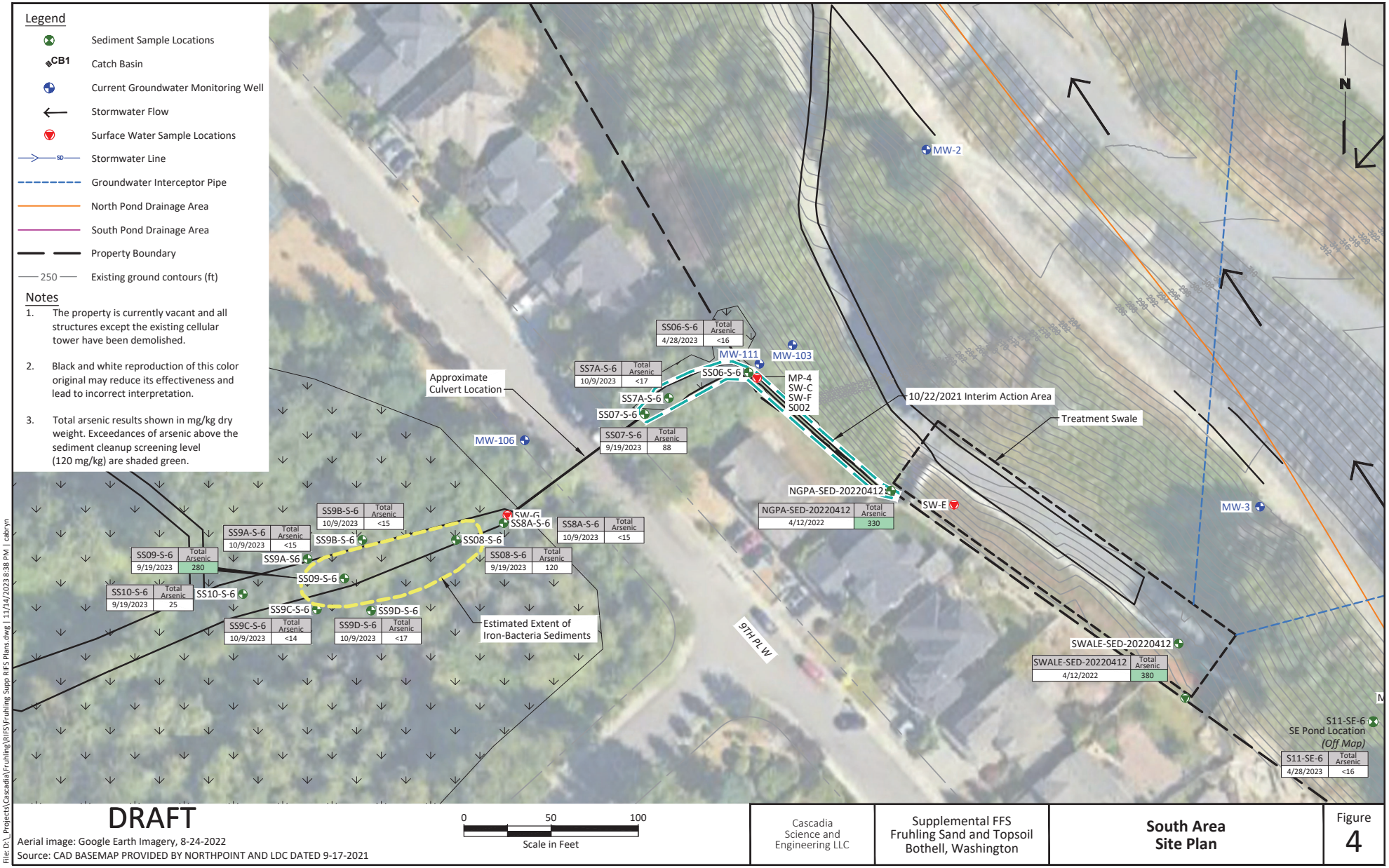
Cascadia Science and Engineering LLC

Supplemental FFS
Fruhling Sand and Topsoil
Bothell, Washington

North Area Site Plan

Figure 3

File: D:_Projects\Cascadia\Fruhling\RIFS\Fruhling Supp RIFS Plans.dwg | 11/14/2023 8:38 PM | cabryn



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Aerial image: Google Earth Imagery, 8-24-2022

Source: CAD BASEMAP PROVIDED BY NORTHPOINT AND LDC DATED 9-17-2021

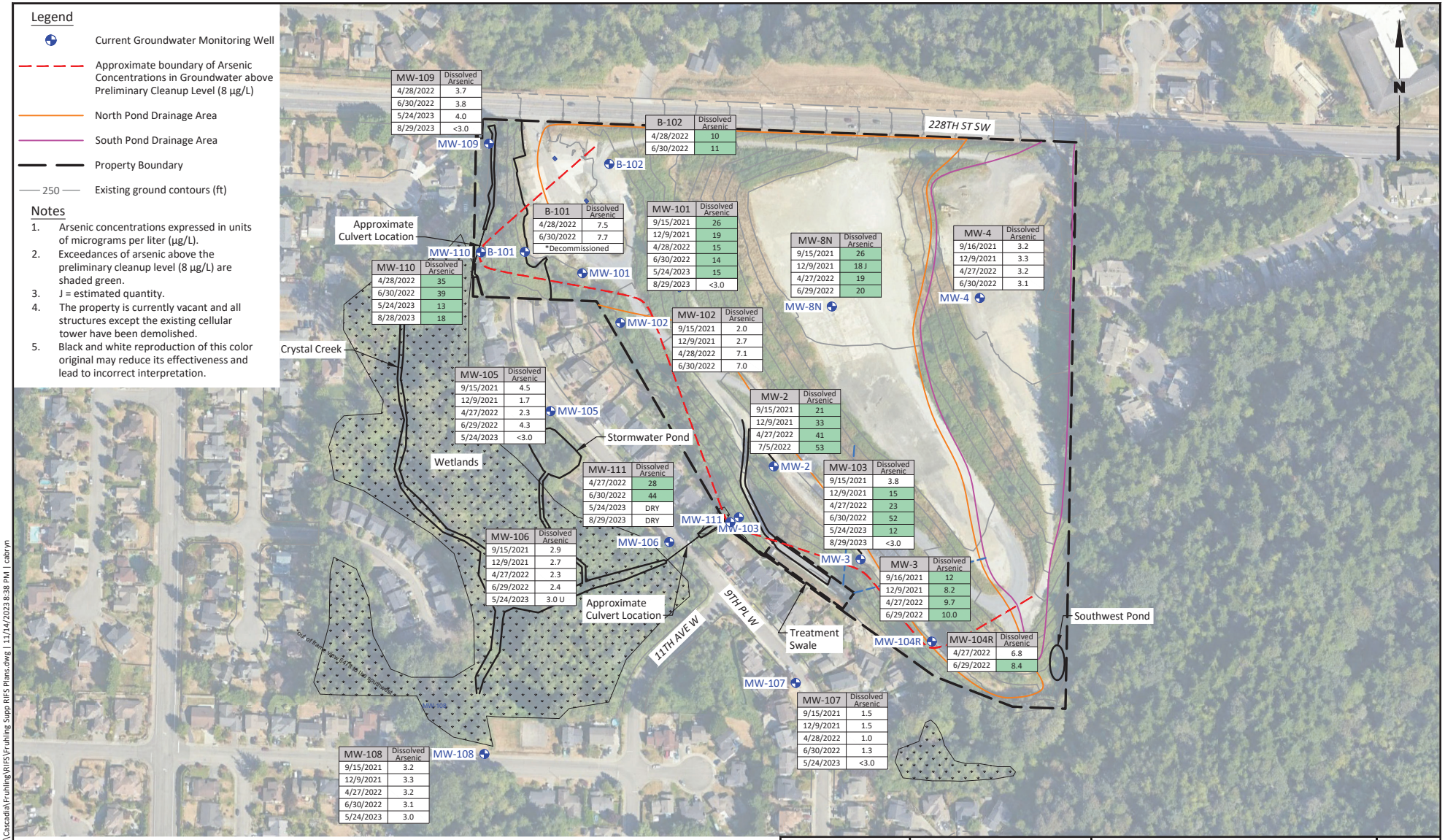
Cascadia Science and Engineering LLC

Supplemental FFS
Fruhling Sand and Topsoil
Bothell, Washington

South Area Site Plan

Figure 4

File: D:_Projects\Cascadia\Fruhling\RIFS\Fruhling Supp RIFS Plans.dwg | 11/14/2023 8:38 PM | cabryn



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Aerial image: Google Earth Imagery, 8-24-2022

Source: CAD BASEMAP PROVIDED BY NORTHPOINT AND LDC DATED 9-17-2021

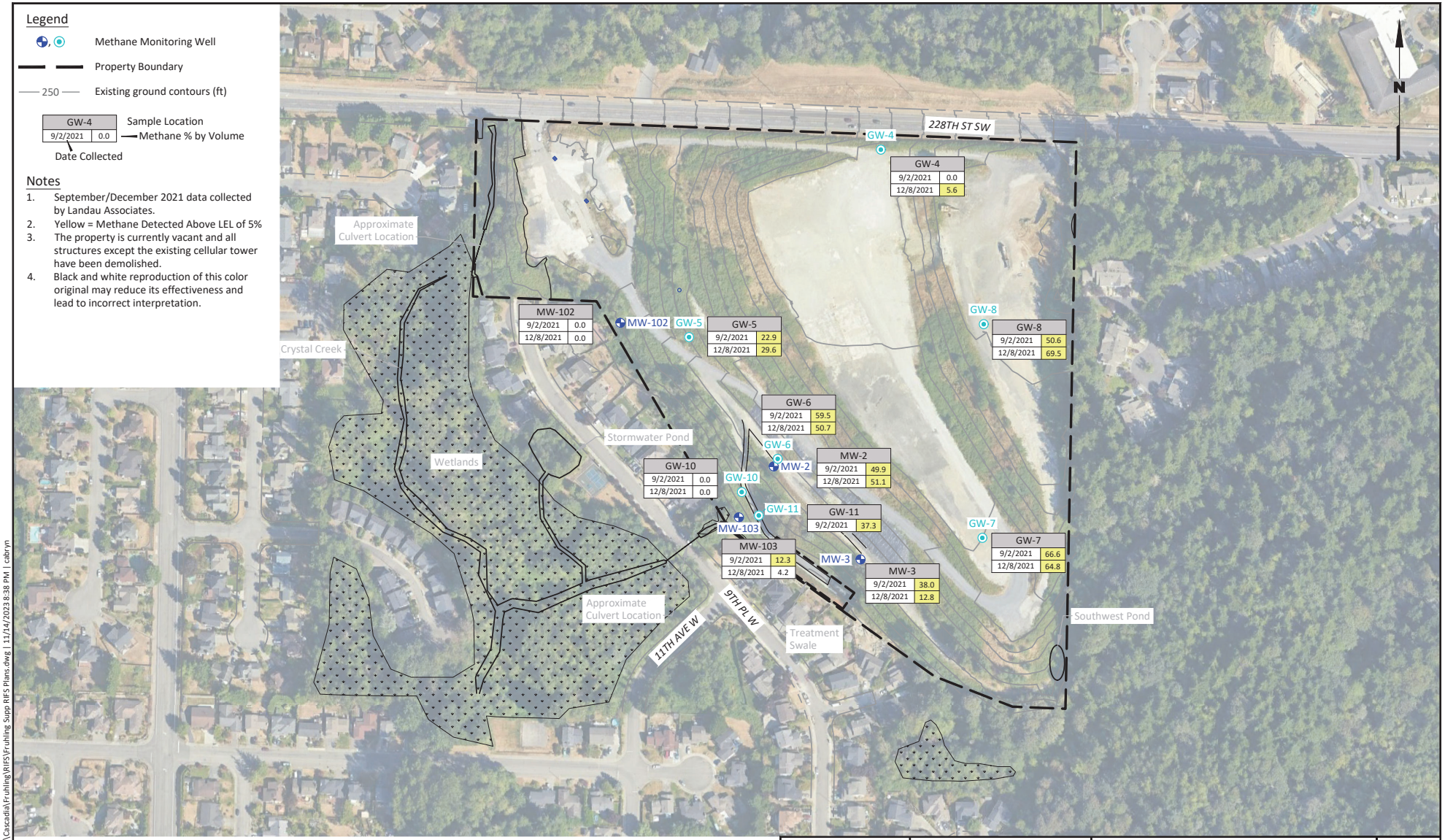
Cascadia Science and Engineering LLC

Supplemental FFS
Fruhling Sand and Topsoil
Bothell, Washington

Groundwater Analytical Results (Arsenic) 2021-2023

Figure 5

File: D:_Projects\Cascadia\Fruhling\RIFS\Fruhling Supp RIFS Plans.dwg | 11/14/2023 8:38 PM | cabryn



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Aerial image: Google Earth Imagery, 8-24-2022

Source: CAD BASEMAP PROVIDED BY NORTHPOINT AND LDC DATED 9-17-2021

0 200 400

Scale in Feet

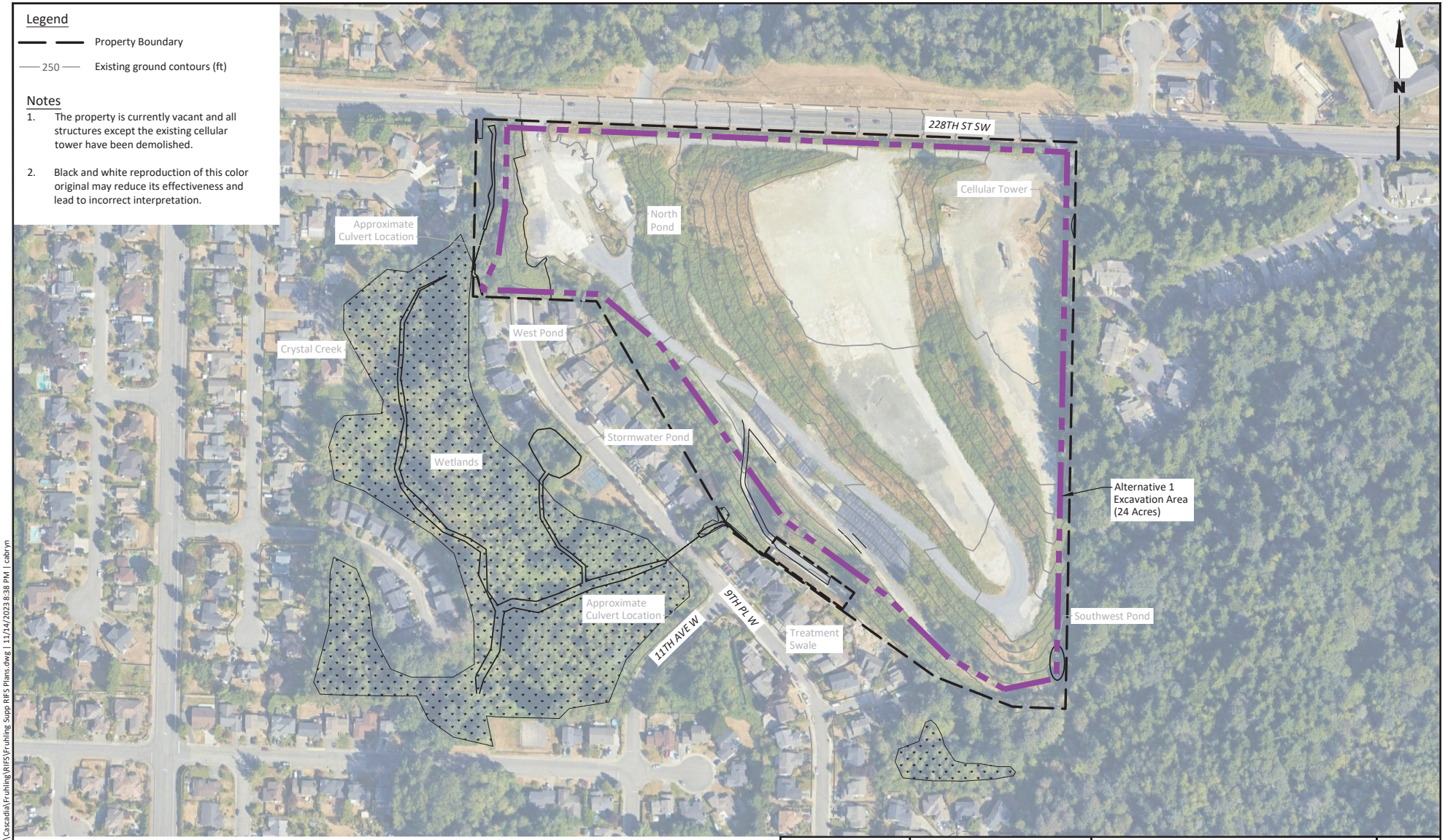
Cascadia Science and Engineering LLC

Supplemental FFS
Fruhling Sand and Topsoil
Bothell, Washington

Methane Monitoring Results

Figure 6

File: D:_Projects\Cascadia\Fruhling\RIFS\Fruhling Supp RIFS Plans.dwg | 11/14/2023 8:38 PM | cabryn



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Aerial image: Google Earth Imagery, 8-24-2022

Source: CAD BASEMAP PROVIDED BY NORTHPOINT AND LDC DATED 9-17-2021

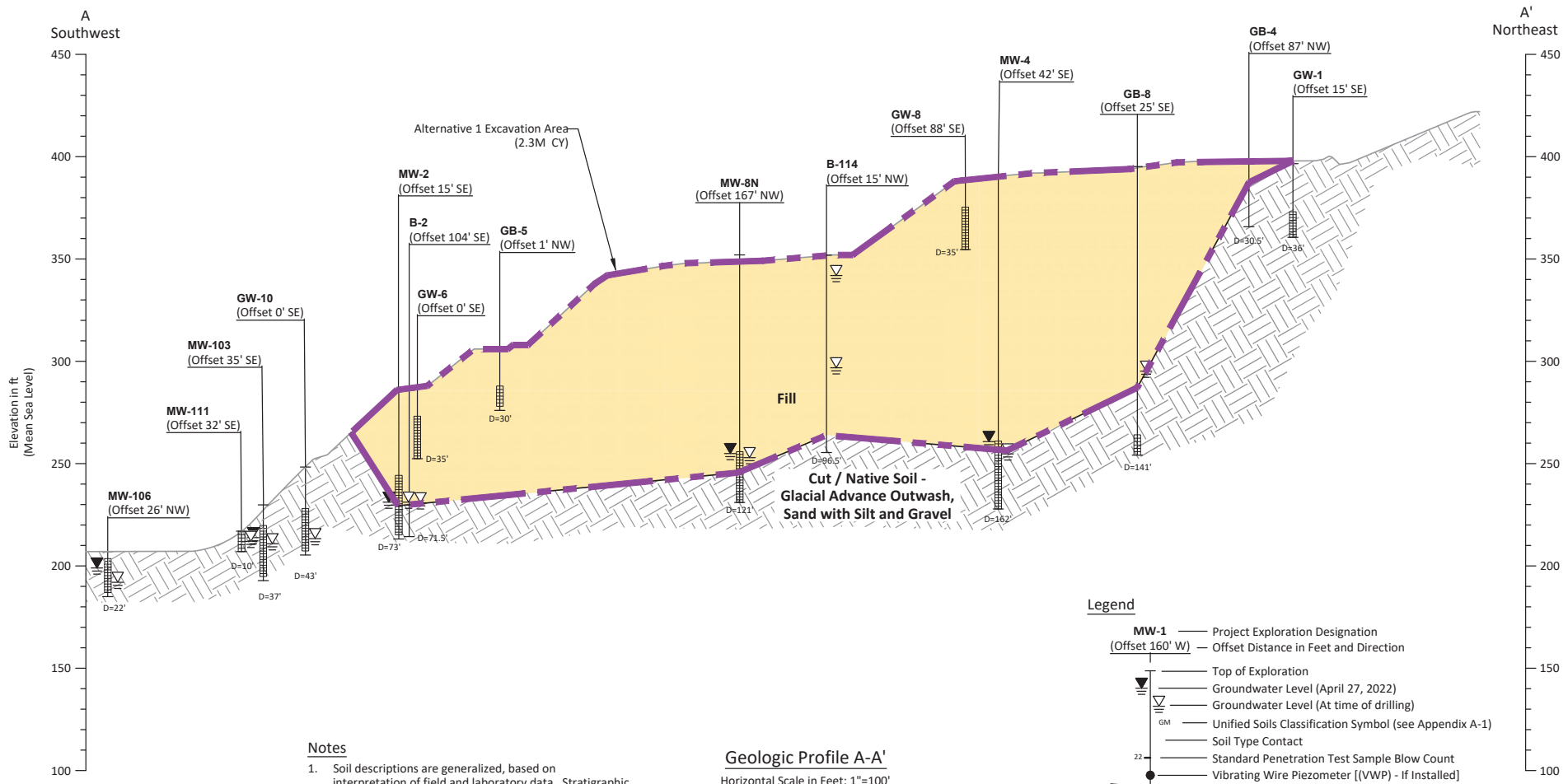
Cascadia Science and Engineering LLC

Supplemental FFS
Fruhling Sand and Topsoil
Bothell, Washington

Alternative 1
Concept Site Plan

Figure 7

File: D:_Projects\Cascadia\Fruhling\RIFS\Fruhling Supp RIFS Plans.dwg | 11/14/2023 8:38 PM | cabryn



Legend

- MW-1 (Offset 160' W) — Project Exploration Designation; Offset Distance in Feet and Direction
- Top of Exploration
- Groundwater Level (April 27, 2022)
- Groundwater Level (At time of drilling)
- GM — Unified Soils Classification Symbol (see Appendix A-1)
- Soil Type Contact
- 22 — Standard Penetration Test Sample Blow Count
- Vibrating Wire Piezometer [(VWP) - If Installed]
- Inferred Groundwater Table
- ? — Inferred Geologic Contact
- Well Screen Interval (If Installed)
- Bottom of Exploration
- D=14' — Depth of Exploration

Notes

1. Soil descriptions are generalized, based on interpretation of field and laboratory data. Stratigraphic contacts are interpolated between borings and based on topographic features; actual conditions may vary.
2. See report text for descriptions of geologic units.
3. For Cross Section location, see the Site and Exploration Plan, Figure 2.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Geologic Profile A-A'

Horizontal Scale in Feet: 1"=100'
Vertical Scale in Feet: 1"=50'

0 100 200

Scale in Feet
2x Vertical Exaggeration

DRAFT

Cascadia Science and Engineering LLC	Supplemental FFS Fruhling Sand and Topsoil Bothell, Washington	**Alternative 1 Excavation Area Cross Section**	Figure 8

File: D:_Projects\Cascadia\Fruhling\RIFS\Fruhling Supp RIFS Section.dwg | 11/14/2023 8:28 PM | cabryn

Enclosure B

Documents List

Documents List

1. Cascadia Science and Engineering. *Draft – Supplemental Remedial Investigation and Focused Feasibility Study Report, Fruhling Sand and Topsoil Site*. December 21, 2023.

2. Ecology. Technical Assistance – Ecology Feedback on Data Gaps Investigation Report and Focused Feasibility Study for the following Site: Fruhling Sand and Topsoil Site. July 27, 2023.

3. Cascadia Science and Engineering. *Draft – Focused Feasibility Study Report, Fruhling Sand and Topsoil Site*. July 10, 2023.

4. Cascadia Science and Engineering. *Data Gap Investigation Summary Report, Fruhling Sand and Topsoil Site*. July 10, 2023.

5. Ecology. *Technical Assistance – Ecology Feedback on Data Gaps Work Plan for the following Site: Fruhling Sand & Topsoil Site*. April 20, 2023.

6. Landau Associates. *Data Gap Investigation Work Plan, Fruhling Sand and Topsoil Site*. March 20, 2023.

7. Ecology. *Letter re Further Action at the Following Site, Fruhling Sand and Topsoil Site*. December 7, 2022.

8. Landau Associates. *Draft – Regulatory Review, Remedial Investigation Report, Fruhling Sand and Topsoil Site, 1010 228th Street Southwest, Bothell, Washington*. October 6, 2022.

9. Ecology. *Email: Department of Ecology Toxics Cleanup Program (TCP) Comments on Treatment Swale, Operation and Maintenance Plan, Fruhling Sand and Topsoil Site dated December 16, 2021.* December 21, 2021.

10. Landau Associates. *Treatment Swale Operation and Maintenance Plan, Fruhling Sand and Topsoil Site 1010 228th Street Southwest Bothell, Washington*. December 16, 2021.

11. Ecology. *Email: RE: Draft 60% Methane Mitigation Design – 1010 228th-Fruhling Sand and Topsoil Site.* November 12, 2021.

12. Landau Associates. *Draft 60% Design Plans, Fruhling Sand and Topsoil Site, Methane Mitigation Plans*. October 15, 2021.

13. Landau Associates. *Technical Memorandum, Site Background and Proposed Scope of Work Summary, Fruhling Sand and Topsoil Site*. April 9, 2021.

14. Ecology Water Quality Program. *Letter Re: Amended Agreed Order, Amended Order Docket No. 18098*. April 13, 2020.

15. Farallon Consulting. *The Sand and Gravel Permit – A National Pollution Discharge Elimination System and State Waste Discharge Permit, Site Management Plan, Revision 1, Fruhling Sand & Topsoil, Inc., 1010 228th Street Southwest, Bothell, Washington, Permit No: WAG-503168*. March 2020.

16. Ecology Water Quality Program. *Letter Re: Agreed Order Docket No. 16479*. October 22, 2019.

17. Ecology. *Letter Re: June 10, 2016, Email Concerning the Fruhling Sand & Topsoil, Inc. Unpermitted Landfill site*. July 22, 2016.

18. Ecology. *Letter Re: Opinion Pursuant to WAC 173-3400515(5) on Proposed Remedial Action for the Following Hazardous Waste Site: Fruhling Sand & Topsoil, 1010 228th Street Southwest, Bothell, WA 98011*. January 12, 2015.

19. Farallon Consulting. *Draft Remedial Investigation and Focused Feasibility Study Report, Fruhling Sand & Topsoil Property, 1010 228th Street Southwest, Bothell, Washington*. October 2014.

20. Ecology. *Letter Re: Opinion Pursuant to WAC 173-3400515(5) on Proposed Remedial Action for the Following Hazardous Waste Site: Fruhling Sand & Topsoil, 1010 228th Street Southwest, Bothell, WA 98011*. February 18, 2013.

21. Fruhling Sand & Topsoil, Inc., *Letter Re: Letter of Non-Compliance*. May 4, 2011.

22. Ecology. *Letter Re: Warning Non-Compliance – with Sand and Gravel General Permit (#WAG-503168) at Fruhling Sand & Topsoil, Inc., 1010 228th Street Southwest, Bothell, Washington*. April 5, 2011.

23. Snohomish Health District. *Letter discussing inert waste not being imported at this time*. February 27, 2004.