LANDAU ASSOCIATES

ANNUAL GROUNDWATER QUALITY REPORT

2022 BIOREMEDIATION PROGRAM

Blaine Marina, Inc.
Blaine, Washington

June 27, 2023

Prepared for

Port of Bellingham
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Annual Groundwater Quality Report
2022 Bioremediation Program
Blaine Marina, Inc.
Blaine, Washington

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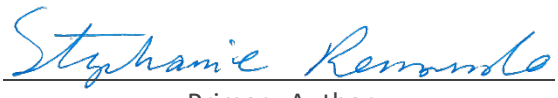
Document prepared by:  Stephanie Renando
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Document reviewed by:  Clint Jacob, PE
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Date:	June 27, 2023
Project No.:	0001034.010
File path:	P:\001\034\010\FileRm\R\Annual GW Monitoring Reports\2022
Project Coordinator:	Christopher C. Young

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APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

CAP ..... cleanup action plan
Ecology ..... Washington State Department of Ecology
EDR ..... engineering design report
ft ..... foot/feet
IHS ..... indicator hazardous substance
Landau ..... Landau Associates, Inc.
LNAPL ..... light non-aqueous phase liquid
mg-N/L ..... milligrams nitrogen per liter
MNA ..... monitored natural attenuation
MW ..... monitoring well
NAPL ..... non-aqueous phase liquid
OP ..... observation point
Port ..... Port of Bellingham
redox ..... oxidation-reduction
Site ..... Blaine Marina, Inc. cleanup site
TPH ..... total petroleum hydrocarbons
TPH-D ..... diesel-range total petroleum hydrocarbons
TPH-G ..... gasoline-range total petroleum hydrocarbons
UIC ..... Underground Injection Control
Work Plan ..... groundwater bioremediation work plan

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1.0 INTRODUCTION

On behalf of the Port of Bellingham (Port), Landau Associates, Inc. (Landau) prepared this annual groundwater quality report to provide details regarding implementation of the ongoing bioremediation cleanup action currently in progress at the Blaine Marina, Inc. cleanup site (Site) in Blaine, Washington (Figure 1). This work is being conducted by the Port under a Consent Decree (No. 18-2-01266-37) between the Washington State Department of Ecology (Ecology) and the Port (Ecology 2018). Following source removal in 2018, the bioremediation program described herein was initiated in 2019. This document summarizes the bioremediation program performance including infiltration and groundwater quality sampling activities conducted in 2022, and provides recommendations, where warranted, for proposed changes in the bioremediation approach.

1.1 Background

The Site is located at Blaine Harbor, at the north end of Drayton Harbor in Blaine, Washington, as shown on Figure 1. Blaine Marina, Inc. leased the area from the 1950s until 2015 and operated a bulk fuel storage and transfer facility at the Site. Operations at the facility resulted in the release of petroleum hydrocarbons to soil and groundwater. The Port conducted a series of preliminary investigations beginning in 1990 and completed the remedial investigation and feasibility study in August 2015 (Landau 2015). A pre-remedial design investigation was conducted in 2017 to further assess the extent of contamination and to support preparation of the construction plans, specifications, and engineering design report (Landau 2017).

1.2 Cleanup Activities

In 2018, the Port completed most of the required cleanup activities described in the cleanup action plan (CAP; Ecology 2017) and detailed in the engineering design report (EDR; Landau 2018). The primary cleanup activities completed in the summer of 2018 included removing approximately 4,000 tons of soil contaminated with petroleum hydrocarbons and light non-aqueous phase liquid (LNAPL) from the excavation. Additional demolition and Site restoration activities were required to complete the soil removal, since buildings were located above the source area where contaminant levels were highest. The contaminated materials were removed from the Site and disposed of at an offsite Resource Conservation and Recovery Act Subtitle D landfill facility. Through soil excavation and LNAPL removal in the source area, an equivalent of approximately 16,000 gallons of petroleum hydrocarbons were removed (Landau 2019a). The ongoing cleanup activities discussed herein relate to addressing the residual soil and groundwater contamination left-in-place outside of the source area.

1.3 Site Bioremediation History

After completion of the source removal activities described above, the Port implemented a bioremediation treatment program to address the remaining contamination; treatment is ongoing. The cleanup activities discussed herein were conducted in accordance with the groundwater bioremediation work plan (Work Plan; Landau 2019b), as approved by Ecology. The Work Plan provides details regarding implementation of enhanced, *in situ*, anaerobic bioremediation in groundwater. Bioremediation

activities are focused on stimulating the naturally occurring process by infiltrating a nitrate solution into the groundwater. The nitrate solution is introduced into the subsurface using four infiltration trenches that were installed in 2018 during source removal efforts. The infiltration trenches consist of clean sand and gravel backfill material to allow large quantities of nitrate solution to infiltrate into the source area, in and adjacent to where the contaminated soil was excavated and replaced with clean backfill material.

It is anticipated that the bioremediation program will continue in cooperation with Ecology until concentrations of the indicator hazardous substances (IHSs) in groundwater are reduced sufficiently to meet the cleanup requirements detailed in the CAP. The groundwater IHSs identified in the CAP include benzene, total petroleum hydrocarbons (TPH) in the gasoline and diesel range (TPH-G and TPH-D, respectively) and total naphthalenes. Ongoing bioremediation treatment performance is evaluated using analysis of TPH-G, TPH-D, oil-range TPH, and nitrate as nitrogen.

Treatment and performance evaluation activities are summarized in annual reports to document and share updates on the cleanup progress. At some future point when treatment is largely complete, further nitrate infiltration may be suspended and a period of monitored natural attenuation (MNA) may be implemented to confirm that cleanup standards are achieved and maintained. The transition to MNA would be made in coordination with Ecology when data indicate restoration would be possible without the further addition of nitrate. Once cleanup standards have been achieved, groundwater monitoring will be conducted to confirm that compliance is maintained throughout four consecutive quarters.

2.0 BIOREMEDIATION PROGRAM SUMMARY

As summarized above and detailed in the Work Plan (Landau 2019b) and previous annual reports (Landau 2020, 2021), nitrate solution is introduced into Site groundwater to stimulate anaerobic bioremediation. Nitrate provides the terminal electron acceptor necessary for naturally occurring aquifer bacteria to degrade petroleum hydrocarbons. The bacteria use petroleum hydrocarbons as electron donors in oxidation-reduction reactions to generate energy for growth and reproduction.

2.1 Approach and Procedures

Nitrate solution is introduced at the Site through injection into four infiltration trenches through four pairs of infiltration ports. These are shown on Figures 2 through 5 with trench infiltration ports labeled as OP-1/OP-2, OP-3/OP-4, OP-5/OP-6, and OP-7/OP-8.[1] The paired infiltration ports are connected in the subsurface by perforated piping installed horizontally near the groundwater table. Nitrate mixing procedures are described in detail in previous annual reports (Landau 2020, 2021). Two of the infiltration trenches (OP-3/OP-4 and OP-5/OP-6) were installed within the excavation area during the contaminant source removal, and two additional trenches (OP-1/OP-2 and OP-7/OP-8) were installed outside of the source removal excavation area to target the areas with the highest concentrations of residual petroleum hydrocarbon contamination. Like the trenches installed within the backfilled excavation, OP-1/OP-2 and OP-7/OP-8 were constructed with gravel and perforated piping.

Based on the desired distribution and estimated pore volumes, remediation at the Site is generally carried out by adding approximately 38,000 gallons of nitrate solution during each injection event. The volumes applied at each set of trenches is dependent on the infiltration rate of the native soils at each location. Approximately 36,000 gallons infiltrate into the excavation area through OP-3/OP-4 and OP-5/OP-6, and approximately 2,000 gallons into the east trench (OP-1/OP-2). Due to a much lower infiltration rate at OP-7/OP-8, a smaller volume (250 to 800 gallons) of nitrate solution has been successfully applied at this location. To accommodate for this condition and to address persistent elevated concentrations of TPH near monitoring well MW-7, more frequent hot spot injection treatments were conducted at OP-7/OP-8 during the first half of 2022 (three events). The hot spot injections used smaller-batch volumes with higher concentrations of nitrate, as described in Section 2.2.1.

Multiple nitrate injection events are typically required to complete treatment of petroleum hydrocarbon mass present in groundwater as non-aqueous phase liquid (NAPL) and sorbed onto aquifer soils. TPH concentrations in groundwater will continue to fluctuate during treatment until the non-aqueous mass is depleted. Upon depletion of available nitrate, contaminant mass will rebound due to dissolution of remaining NAPL and desorption from soil surfaces. Fluctuations in TPH concentrations also occur as groundwater levels rise and fall due to seasonal changes in rainfall, or tidal influence causes the groundwater to contact high smear-zone contamination that may be adsorbed to soil surfaces above the typical water table. Periodic nitrate addition will be necessary until NAPL-, sorbed-, and aqueous-phase

[1] OP = Observation point.

contamination has been adequately treated to maintain TPH concentrations in groundwater below cleanup levels,

2.2 Implementation Event Details – 2022

This section describes the sequenced approach to nitrate infiltration and treatment performance assessments conducted in 2022. In general, full-scale nitrate treatment events occur twice per year, with several hot spot treatments implemented at trench OP-7/OP-8. Quarterly groundwater assessments were completed at the 11 groundwater wells shown on Figure 2. The 2022 timeline of nitrate solution injection and assessment events is summarized below.

- January 2022: Supplemental performance assessment[2] and hot spot treatment
- February 2022: Supplemental performance assessment[2] and hot spot treatment
- April 2022: 1st Quarter performance assessment
- May 2022: Full injection event and hot spot treatment
- June 2022: 2nd Quarter performance assessment
- August 2022: 3rd Quarter performance assessment
- October 2022: Full injection event
- December 2022: 4th Quarter performance assessment

2.2.1 Nitrate Infiltration

Two full injection events and three hot spot treatments were conducted in 2022, with the timing, infiltration volumes, and concentrations selected based on Landau's evaluation of groundwater trends (primarily TPH and nitrate concentrations). Treatment events in 2022 were conducted to maintain elevated nitrate concentrations in the excavation and surrounding areas of residual contamination, and to address the persistent TPH near MW-7. Persistent TPH at MW-7 and nitrate not detected at that well indicate that nitrate infiltrating at trench OP-7/OP-8 is consumed as it migrates to the southwest along the groundwater flow path before reaching MW-7. The events in 2022 were completed in accordance with requirements set forth in the CAP, the EDR, and the Washington State Underground Injection Control (UIC) permit per Chapter 173-218 of the Washington Administrative Code.

Full injection events in the excavation area were conducted in May and October 2022. Infiltration trench pairs OP-1/OP-2, OP-3/OP-4, and OP-5/OP-6 were treated as planned for both events. A summary of nitrate volumes and solution concentrations for these two events is provided in Table 1.

Three additional hot spot injection events were conducted at OP-7/OP-8, in January, February, and May 2022. A total of 140 gallons of solution infiltrated into the OP-7/OP-8 trench over the three events, as

[2] Monitoring wells MW-7 and MW-12 were sampled in January and February to assess hot spot treatment efficacy. Nitrate was not detected at MW-7 in 2022.

summarized in Table 1. The achievable infiltration volume at OP-7/OP-8 during each event was approximately 40 to 50 gallons.

2.2.2 Quarterly Performance Assessment

Landau conducts quarterly assessments to evaluate the performance of the bioremediation program, document remedial action progress, and provide information for tracking and potentially modifying the infiltration approach. Performance assessments currently include groundwater elevation measurements and collection of groundwater samples to analyze TPH concentrations and evaluate the distribution of injected nitrate solution.

Although not a Site IHS, nitrate is analyzed during the quarterly events to evaluate the distribution of nitrate for desired treatment and the longevity of the nitrate as it is being consumed in the bioremediation process. Additionally, marine surface water samples are collected and analyzed for nitrate to confirm that the nitrate solution is not negatively impacting surface water. Nitrate analysis was conducted by OnSite Environmental, Inc. in Redmond, Washington and all other analyses were conducted by ALS Environmental Laboratory in Everett, Washington. Quarterly groundwater and surface water sampling is conducted according to the sampling summary provided in Table 2.

An oil/water interface meter was used to measure the depth to groundwater and the depth to LNAPL, if present. If a measurable thickness of LNAPL was detected, groundwater samples were not collected for analysis for IHS parameters from that location, and IHS concentrations were assumed to be greater than the applicable cleanup levels. Groundwater samples for analysis of nitrate were collected at most Site wells, including wells with measurable LNAPL,[3] to confirm that the infiltration solution is reaching the targeted areas. Cumulative groundwater elevations and measured LNAPL thicknesses through 2022 are provided in Table 3.

The Port will coordinate with Ecology to determine the frequency of IHS parameter monitoring when treatment performance data suggest that Site groundwater data are comparable to established cleanup levels and MNA is considered a viable, long-term remedy. IHS parameters are currently analyzed for in samples collected from selected wells on an annual basis Table 2 summarizes the treatment performance assessment parameters for the Site, along with the analytical methods used by the Ecology-accredited laboratories.

[3] In 2021, monitoring well MW-10 was sampled for nitrate analysis only due to the presence of LNAPL; additional TPH parameters were analyzed for in 2022.

3.0 BIOREMEDIATION PERFORMANCE ASSESSMENT

This section summarizes the analytical results used in assessing the performance and progress of the bioremediation program in 2022. The cumulative laboratory analytical results for groundwater are summarized in Table 4 with comparisons to the cleanup levels established in the CAP. Table 5 summarizes the analytical data that are used for evaluating bioremediation performance. Cumulative surface water results are summarized in Table 6. Laboratory analytical reports are maintained on file and available upon request.

3.1 Groundwater Quality

The TPH-G, TPH-D, and nitrate results used for tracking remedial progress are shown on Figures 2 through 4 and time (2018 through 2022) versus concentration plots are provided in Appendix A These parameters are discussed below as bioremediation treatment performance indicators for the Site.

Continued treatment is needed at wells with measurable LNAPL, or where TPH-G or TPH-D concentrations in groundwater are above applicable cleanup levels. In 2022, LNAPL thickness was measured during one or more quarters at MW-9 (2 quarters) and MW-10 (4 quarters). LNAPL that was previously observed at MW-5 in 2020 was not observed in 2021 or 2022. Analytical results from 2022 indicate that the TPH-D cleanup level was exceeded at MW-5 (April, June, and December), MW-13 (December), and at MW-14 (August and December). TPH-G was detected in three samples collected from MW-9 during 2022 with the August result exceeding the cleanup level. TPH-G was detected in two of the samples collected from MW-10 in 2022, with the June result exceeding the cleanup level. TPH-G concentrations also exceeded the cleanup level at MW-7 for all the 2022 sampling events, including the supplemental events (January and February; Figure 5).

The cumulative results from MW-7 indicate a slow but steady decrease of TPH-G concentrations (Figure A-3 in Appendix A). However, concentrations of TPH spiked at MW-7 and other shoreline wells (MW-5, MW-13, and MW-14 [Figures A-1, A-7, and A-8, respectively]) in December 2022. The December concentration spikes at these wells are most likely due to TPH desorption. The 2022 TPH-G and TPH-D results for all wells are shown on Figures 3 and 4, respectively.

3.1.1 Nitrate Distribution

Nitrate was detected in 2022 at all wells analyzed except for MW-7. These detections indicate an effective distribution of nitrate electron acceptor to the areas of residual contamination, except for the area between MW-12 and MW-7. Detected concentrations in 2022 ranged from 0.05 milligrams nitrogen per liter (mg-N/L) (2nd quarter; MW-5) to 655 mg-N/L (3rd quarter; MW-13). The 2022 nitrate results are shown on Figure 4 and shown on Figures A-1 through A-8 in Appendix A. Wells that have never had TPH detections above cleanup levels (MW-4 and MW-11) or still have measurable LNAPL (MW-10) are not included in the Appendix A figures.

The continued absence of nitrate at MW-7 in 2022 indicates that injected nitrate solution at OP-7/OP-8 is being consumed between MW-12 and MW-7. The hot spot treatment approach was implemented at

OP-7/OP-8 in 2022 to improve nitrate distribution and longevity toward MW-7. While there was a decrease in TPH concentrations at this well in 2022, the degradation is slow, and nitrate is still not reaching the area at concentrations high enough to be detected during follow-up performance sampling. Additional donor distribution is needed in this area in 2023.

Concentrations of nitrate remained significantly higher at wells MW-12, MW-13, and MW-14 (approximately 35 to 40 feet [ft] from the shoreline) than at wells MW-5, MW-6, and MW-7 (immediately adjacent to the shoreline). This reduction indicates that the nitrate is being effectively used for bioremediation between infiltration trenches and the shoreline. It also indicates that the infiltration program is providing an appropriate mass of nitrate for treatment while protecting surface water from nitrate discharge (see Section 3.2).

3.1.2 Light Non-Aqueous Phase Liquid Occurrence

LNAPL thicknesses measured at monitoring wells MW-9 and MW-10 in 2022 were comparable to 2021 results. While TPH-G and TPH-D concentrations at MW-9 exceeded the cleanup levels in 2022, the LNAPL thickness was measured at 0.01 ft or zero ft in two of the four readings collected. LNAPL thickness ranged from 0.00 to 0.19 ft, compared to a maximum of 0.02 ft in 2021. At MW-10, the LNAPL thickness ranged from 0.03 to 0.26 ft in 2022, comparable to the 2021 thicknesses ranging from 0.04 to 0.19 ft. No LNAPL was observed in MW-5 in 2022.

Persistent LNAPL accumulation continues to be observed at MW-10. The persistent presence of nitrate at MW-10 may be enhanced by radial flow of infiltrated fluid from excavation areas toward MW-10. Ongoing LNAPL monitoring will continue at all of the groundwater wells throughout the Site in 2023.

3.2 Surface Water Quality

As described in the Work Plan and required by the UIC permit, surface water samples are collected during the performance assessments to confirm that nitrate and nitrite concentrations remain below the acceptable limits throughout the bioremediation process. Although no marine surface water criteria are established for nitrate based on the Model Toxics Control Act cleanup levels, the primary concern for nitrate in marine surface water is that it can act as a nutrient and exacerbate algal blooms that occur naturally during summer months.

During each performance assessment event, two surface water samples were collected immediately adjacent to the shoreline (within 1 ft of the actual contact between the water and shoreline, which varies during tidal fluctuations), and at the base of the water column (within 2 inches of the sediment surface). Surface water sampling results are summarized in Table 6 and are compared to a Site-specific benchmark value of 20 mg-N/L nitrate + nitrite. The combined laboratory detections for nitrate + nitrite in surface water from 2022 ranged from 0.06 to 0.37 mg-N/L, well below the benchmark value. Nitrate and nitrite were not detected in the April and August 2022 samples. The cumulative surface water data collected since bioremediation began indicate that the program is being conducted in a manner protective of surface water quality.

4.0 RESTORATION TIMEFRAME ANALYSIS

A Mann-Kendall analysis was performed using concentration data collected to-date from selected wells to evaluate trends and conduct a predictive analysis to estimate the restoration timeframe for individual wells. An explanation of this process was provided in the 2021 Annual Groundwater Quality Report (Landau 2022). A subset of wells were selected for this analysis to include those considered representative of Site conditions. Wells with IHS concentrations above cleanup levels were evaluated. Analytical results that represented outliers (such as the spikes at wells MW-5 and MW-9 in December) were also excluded from the regression analysis. The results of this analysis, including the 2022 groundwater data, are summarized in the table below and provided in detail in Appendix B.

Constituent	Sample Size	Restoration Timeframe (95% CI)
TPH-G	1	2027
TPH-D	4	2025 (± 3 years)
Total TPH	4	2027 (± 9 years)

Total TPH = TPH-G + TPH-D
CI = confidence interval

The longest restoration interval predicted is for well MW-7, where TPH-G and TPH-D concentrations have decreased since 2020 but remain above their respective cleanup levels. As discussed previously, hot spot treatments were conducted in 2022 to increase the degradation rate of the contaminants near MW-7 and decrease the overall Site restoration timeframe. The 2022 groundwater assessment results indicate that the hot spot treatments were effective but should be increased to reach a reasonable restoration timeframe for the Site. Additional focused treatment will be necessary upgradient of MW-7 in 2023 to accelerate Site treatment; more frequent infiltration of higher-concentration nitrate solution into existing trench OP-7/OP-8 will be implemented to enhance treatment in this location.

5.0 CONCLUSIONS AND NEXT STEPS

Overall, the Site is responding well to the bioremediation treatment program as LNAPL thicknesses and TPH concentrations are decreasing. The Port plans to continue treatment through 2023 to keep nitrate levels elevated and promote biodegradation of the LNAPL and residual TPH remaining in the soil and groundwater. The cumulative data (November 2018 through December 2022) included in this report show that TPH concentrations have decreased to below the applicable cleanup levels throughout much of the Site but that continued treatment is needed in the vicinity of MW-5, MW-7, MW-9, MW-10, and MW-14.

In 2022, the Port implemented a hot spot treatment approach to increase the frequency of treatment and the nitrate concentrations infiltrated near MW-7. Three hot spot treatments occurred every other month at OP-7/OP-8 between January and May 2022. The injected nitrate concentrations were 10 times greater than delivered to this trench in 2021. The 2022 groundwater assessment results indicate that this approach was contributing to decreasing concentrations of TPH at downgradient wells MW-12 and MW-7, but enhancement of this approach is needed to more rapidly reduce TPH concentrations to below Site IHS cleanup levels. More frequent infiltration events of higher-concentration nitrate solution are planned for OP-7/OP-8 in 2023.

Injected nitrate concentrations were doubled at OP-1/OP-2 in 2022 to address the persistent presence of TPH near MW-9. Performance assessment results indicate that this approach has been effective to initiate desorption and dissolution of sorbed and NAPL TPH (increased TPH concentrations in groundwater) after the first annual treatment, followed by increased degradation (decreased TPH in groundwater) near MW-9. This response to nitrate injection, as shown on Figure A-5 in Appendix A, has been observed at this location during previous years but was more pronounced in 2022.

The Port intended to install two trenches (one near MW-10 and one near MW-7) at the same time but due to the presence of dense utilities between MW-7 and MW-12, only one trench is planned for installation near MW-10.

Cumulative TPH-D data through 2022 suggest that groundwater bioremediation treatment continues to effectively treat LNAPL and TPH in groundwater. In 2022, this process resulted in increased TPH concentrations in some wells (MW-5, MW-9, MW-13, and MW-14) while LNAPL thicknesses diminished to 0 ft at MW-9 (December 2022). The Port will continue to monitor the Site for changes in LNAPL thicknesses and/or locations, and quarterly performance monitoring will be ongoing through 2023.

TPH concentrations are decreasing significantly and meet cleanup levels in most areas of the Site. In areas near the 2018 excavation, TPH concentrations are above cleanup levels but are predictably declining and expected to be within compliance in the next 3 to 5 years. In areas of the Site near monitoring wells MW-7, MW-9, and MW-10, IHS concentrations are higher and additional focused infiltration efforts will be required to achieve cleanup levels on a schedule similar to the rest of the Site. Nitrate distribution and longevity have been favorable at MW-9 and MW-10 despite the presence of LNAPL; however, achievement of cleanup levels will be delayed as long as LNAPL remains.

The Port plans to continue semiannual nitrate solution injections in the excavation area (OP-3/OP-4 and OP-5/OP-6) and proceed with additional targeted treatment near MW-7, MW-9, and MW-10. Planned targeted treatment for 2023 is as follows:

- MW-9: Ongoing use of higher nitrate concentrations in solution to infiltrate into trench OP-1/OP-2. Analytical results for MW-9 to date show that nitrate is reaching MW-9 and that doubling the injected nitrate concentration in 2022 was effective in increasing desorption and degradation of TPH.
- MW-10: Installation of an additional infiltration trench to the west (i.e., upgradient) of this well. The new trench (OP-9/OP-10) will be in the approximate location shown on Figure 5.
- MW-7: More frequent hot spot injections (6 to 8 times per year) with increased nitrate concentrations injected into trench OP-7/OP-8 going forward.

The Port anticipates that ongoing and enhanced bioremediation will reduce TPH concentrations throughout 2023 and will continue to review and assess the data to evaluate trends and adjust the bioremediation program as needed to achieve cleanup levels in a timely manner. The CAP provided an anticipated restoration timeframe of 5 to 8 years, starting with commencement of the construction phase (i.e., excavation) of the cleanup (Ecology 2017). Since the construction phase was conducted in summer of 2018, and bioremediation treatments didn't begin until June 2019, the restoration timeframe analysis included in Section 4.0 is a more accurate estimate of restoration timeframes. Further, given the persistent contamination near MW-7, MW-9, and MW-10, the Site-wide restoration timeframe is still uncertain but will continue to be evaluated on an annual basis as Site treatment is enhanced in these areas.

The Port would like to consider conducting Site-wide MNA or a combination of MNA when and where IHS cleanup levels have been met, plus targeted treatment in areas of the Site where the presence of TPH persists. Consideration of MNA will be in cooperation with Ecology and any changes made regarding a shift to MNA will be documented in future annual reports, with final Ecology approval required prior to making changes.

6.0 UPCOMING SCHEDULE – 2023

The schedule below summarizes plans for continued bioremediation in 2023. The Port will continue coordinating these events with Ecology and may adjust the schedule shown below as needed based on performance observations and to avoid conflicts with tenant operations and combine mobilizations, where possible.

- March 2023: 1st Quarter performance assessment
- June 2023: 2nd Quarter performance assessment
- June 2023: Installation of new infiltration trench near MW-10 and high-concentration hot spot treatment near MW-7
- July 2023: Full-scale injection (9th event)
- August 2023: 3rd Quarter performance assessment
- September 2023: Full-scale injection (10th event)
- November 2023: 4th Quarter performance assessment
- Monthly, high-concentration hot spot injections will be conducted at OP-7/OP-8, starting in June 2023

7.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of the Port of Bellingham and applicable regulatory agencies for specific application to the Blaine Marina, Inc. cleanup site. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, these services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.

8.0 REFERENCES

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Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery.

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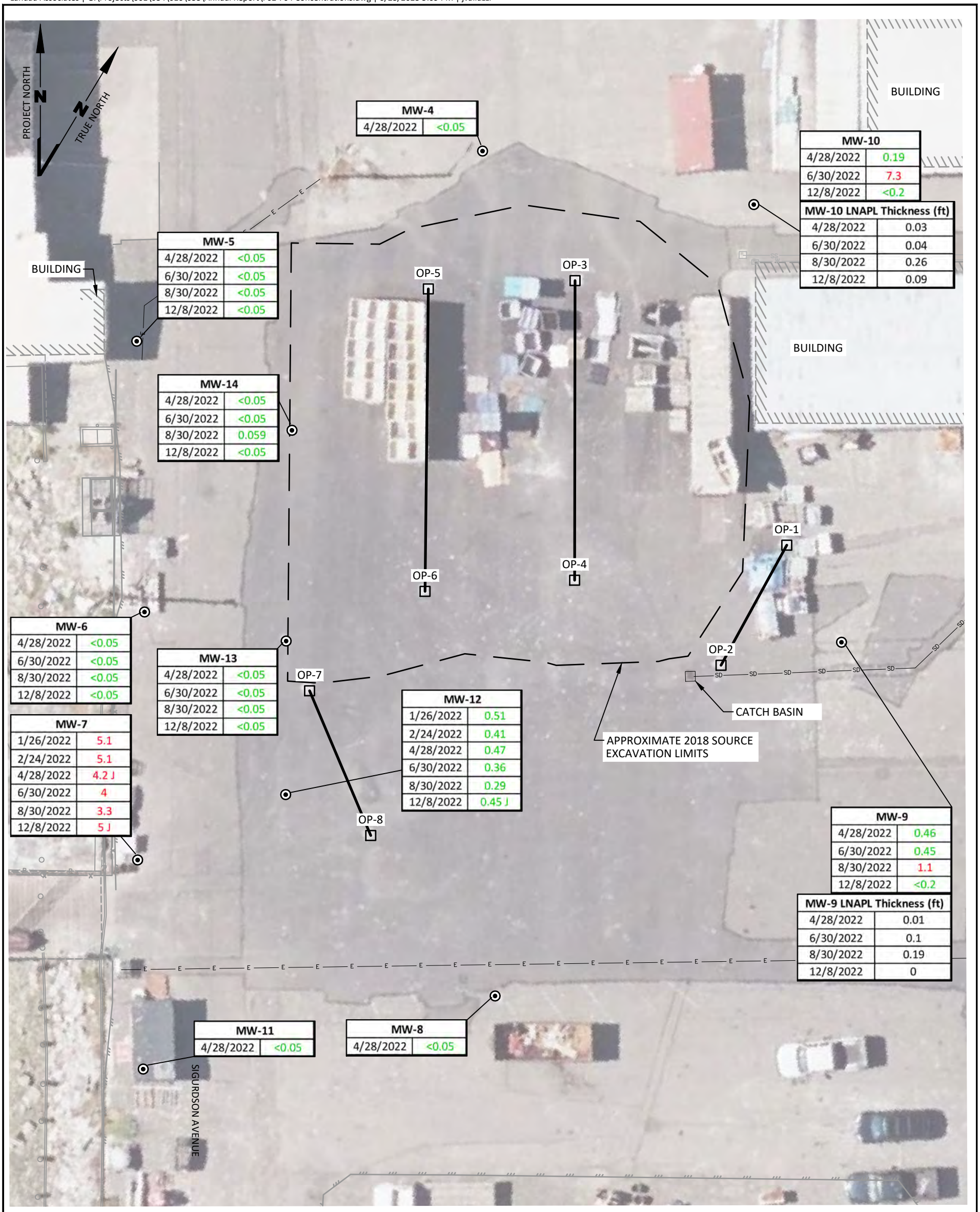
Blaine Marina, Inc. Site Blaine, Washington	**Vicinity Map**	Figure 1



Legend

- Groundwater Monitoring Well
  - IHS Concentration(s) Exceed Cleanup Levels
  - IHS Concentration(s) are Less Than Cleanup Levels
- Observation and Bioremediation Injection Points
- Treatment Trench
- Excavation Boundary

Sampling Location	
Date	Result

Notes

1. All results are reported in milligrams per liter (mg/L).
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

ft = feet
IHS = Indicator Hazardous Substances
J = Result is an estimated quantity. Associated numerical value is the approximate concentration of the analyte in the sample.
LNAPL = Light Non-Aqueous Phase Liquid
TPH-G = gasoline-range total petroleum hydrocarbons
--- = not analyzed

Cleanup level for TPH-G = 0.8 mg/L

Treatment Completion Dates		
Year	Full Scale	OP-7/8 Hot Spot
2019	6/14, 11/25	none
2020	4/16, 10/16	none
2021	6/14, 11/18	3/25, 6/15, 7/1 7/30, 8/31, 9/28, 10/20, 11/15, 12/23
2022	5/24, 9/27	1/26, 3/2

Sources: Wilson Engineering topographic survey, 4/26/17; Wilson Engineering topographic survey, 11/02/11

0 20 40
Scale in Feet

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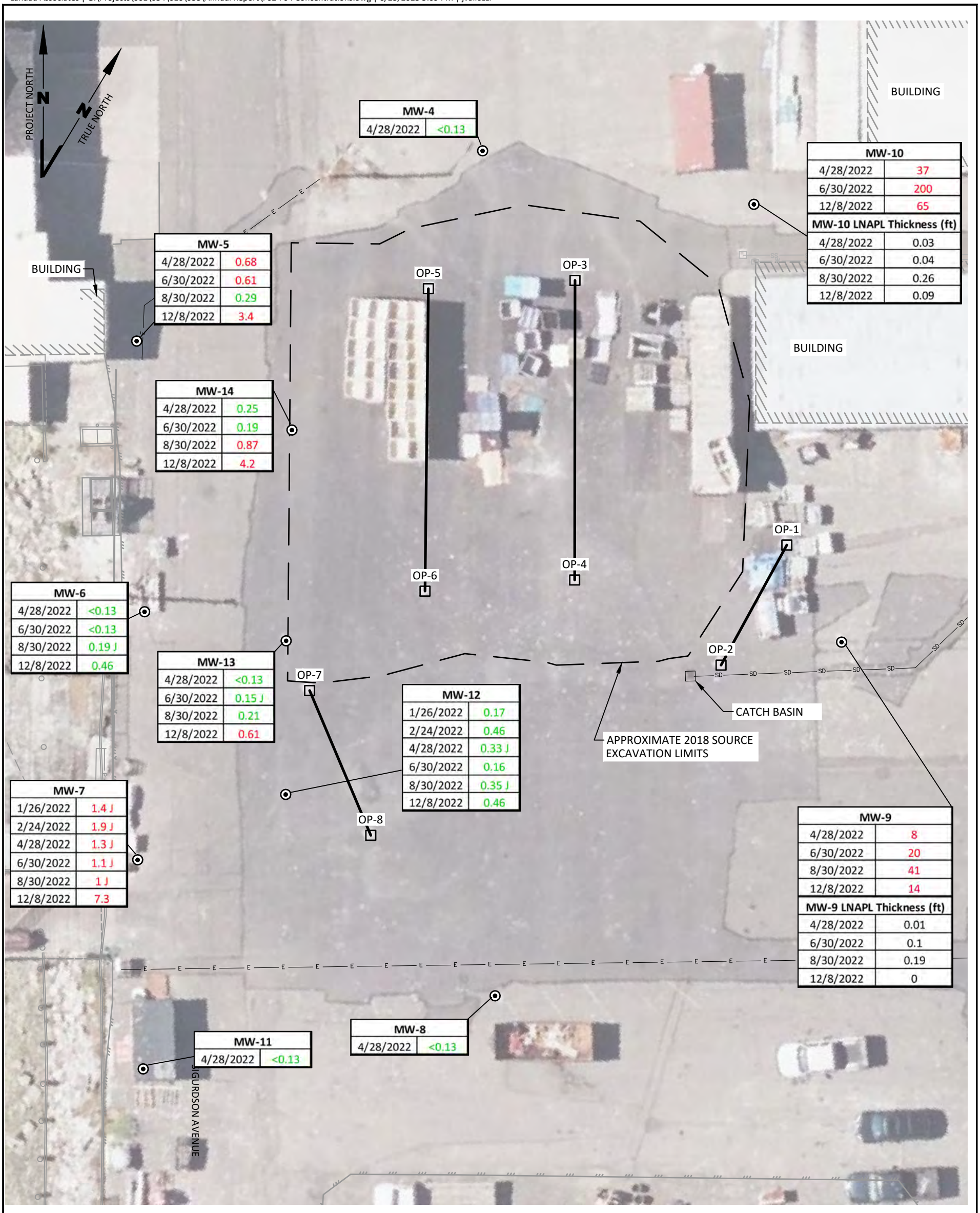
Blaine Marina, Inc. Site
Blaine, Washington

TPH-G Concentrations in Groundwater

Figure 2



Legend

- Groundwater Monitoring Well
- IHS Concentration(s) Exceed Cleanup Levels
- IHS Concentration(s) are Less Than Cleanup Levels
- Observation and Bioremediation Injection Points
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Sampling Location	
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ft = feet
IHS = Indicator Hazardous Substances
J = Result is an estimated quantity. Associated numerical value is the approximate concentration of the analyte in the sample.
LNAPL = Light Non-Aqueous Phase Liquid
TPH-D = diesel-range total petroleum hydrocarbons

Cleanup level for TPH-D = 0.5 mg/L

Treatment Completion Dates		
Year	Full Scale	OP-7/8 Hot Spot
2019	6/14, 11/25	none
2020	4/16, 10/16	none
2021	6/14, 11/18	3/25, 6/15, 7/1 7/30, 8/31, 9/28, 10/20, 11/15, 12/23
2022	5/24, 9/27	1/26, 3/2

Sources: Wilson Engineering topographic survey, 4/26/17; Wilson Engineering topographic survey, 11/02/11

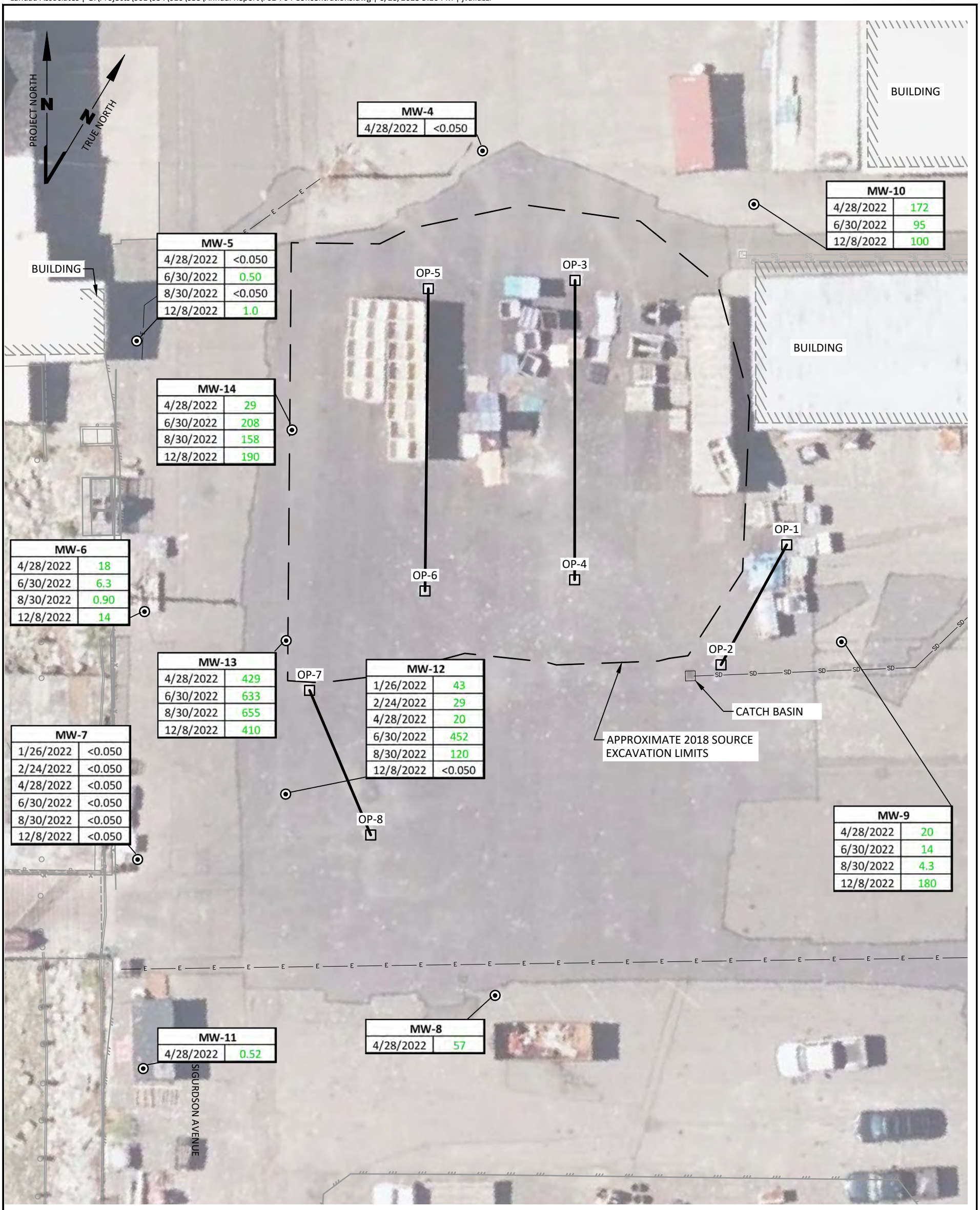
0 20 40
Scale in Feet

LANDAU ASSOCIATES

Blaine Marina, Inc. Site
Blaine, Washington

TPH-D Concentrations in Groundwater

Figure 3



Legend

- Groundwater Monitoring Well
  - Green Text Indicates Nitrate was Detected Above the Laboratory Reporting Limit
- Observation and Bioremediation Injection Points
- Treatment Trench
- Excavation Boundary

Sampling Location	
Date	Result

Notes

1. All results are reported in milligrams nitrogen per liter (mg-N/L).
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

J = Result is an estimated quantity. Associated numerical value is the approximate concentration of the analyte in the sample.

Treatment Completion Dates		
Year	Full Scale	OP-7/8 Hot Spot
2019	6/14, 11/25	none
2020	4/16, 10/16	none
2021	6/14, 11/18	3/25, 6/15, 7/1 7/30, 8/31, 9/28, 10/20, 11/15, 12/23
2022	5/24, 9/27	1/26, 3/2

Sources: Wilson Engineering topographic survey, 4/26/17; Wilson Engineering topographic survey, 11/02/11

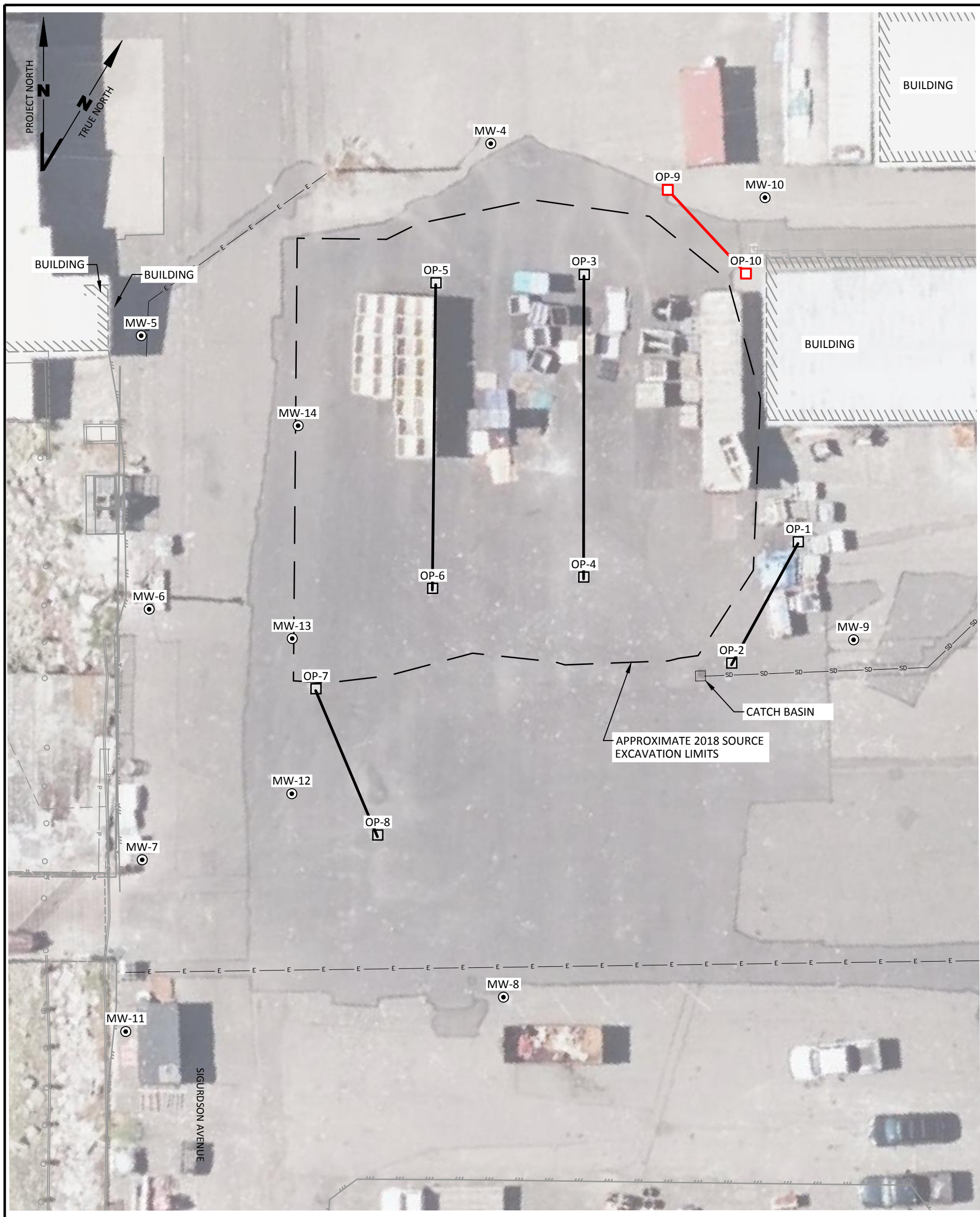
0 20 40
Scale in Feet

LANDAU ASSOCIATES

Blaine Marina, Inc. Site
Blaine, Washington

Nitrate Distribution

Figure 4



Legend

- Proposed Observation and Bioremediation Injection Point
- Proposed Treatment Trench
- Groundwater Monitoring Well
- Observation and Bioremediation Injection Point
- Treatment Trench
- Excavation Boundary

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Sources: Wilson Engineering topographic survey, 4/26/17; Wilson Engineering topographic survey, 11/02/11

LANDAU ASSOCIATES

0 20 40
Scale in Feet

Blaine Marina, Inc. Site
Blaine, Washington

Proposed Trench Location

Figure 5

Table 1
Bioremediation Infiltration Summary
Blaine Marina, Inc.
Blaine, Washington

Injection Well Pair	First Injection - June 2019						Second Injection - November 2019					
	Nitrate Dose	Nitrate Concentration		Injection Solution			Nitrate Dose	Nitrate Concentration		Injection Solution		
		mg NO_3/L	mg NO_3-N/L	Volume (gal)	AN Solution (gal)	Yeast Extract (lbs)		mg NO_3/L	mg NO_3-N/L	Volume (gal)	AN Solution (gal)	Yeast Extract (lbs)
OP-1/2	5x	5,000	1,129	2,000	38	2	8x	8,000	1,806	2,000	62.5	2
OP-3/4	5x	5,000	1,129	18,000	338	18	5x	5,000	1,129	18,000	350	18
OP-5/6	5x	5,000	1,129	18,000	338	18	5x	5,000	1,129	18,000	350	18
OP-7/8	5x	5,000	1,129	2,000	38	2	8x	8,000	1,806	2,000	62.5	2
Totals:				**40,000**	**752**	**40**				**40,000**	**825**	**40**

Table 1
Bioremediation Infiltration Summary
Blaine Marina, Inc.
Blaine, Washington

Injection Well Pair	Third Injection - April 2020						Fourth Injection - October 2020					
	Nitrate Dose	Nitrate Concentration		Injection Solution			Nitrate Dose	Nitrate Concentration		Injection Solution		
		mg NO_3/L	mg NO_3-N/L	Volume (gal)	AN Solution (gal)	Yeast Extract (lbs)		mg NO_3/L	mg NO_3-N/L	Volume (gal)	AN Solution (gal)	Yeast Extract (lbs)
OP-1/2	8x	8,000	1,806	2,000	60	2	8x	8,000	1,806	2,100	62	2
OP-3/4	5x	5,000	1,129	18,000	345	18	5x	5,000	1,129	19,100	347	18
OP-5/6	5x	5,000	1,129	18,000	345	18	5x	5,000	1,129	18,000	324	18
OP-7/8	(a)						5x	5,000	1,129	800	17	2
Totals:				**38,000**	**750**	**38**				**40,000**	**750**	**40**

Table 1
Bioremediation Infiltration Summary
Blaine Marina, Inc.
Blaine, Washington

Injection Well Pair	Fifth Injection - June 2021						Sixth Injection - November 2021					
	Nitrate Dose	Nitrate Concentration		Injection Solution			Nitrate Dose	Nitrate Concentration		Injection Solution		
		mg NO_3/L	mg NO_3-N/L	Volume (gal)	AN Solution (gal)	Yeast Extract (lbs)		mg NO_3/L	mg NO_3-N/L	Volume (gal)	AN Solution (gal)	Yeast Extract (lbs)
OP-1/2	8x	8,000	1,806	1,950	90	2	8x	8,000	1,806	2,000	77	2
OP-3/4	5x	5,000	1,129	19,500	450	20	5x	5,000	1,129	21,100	485	21
OP-5/6	5x	5,000	1,129	17,000	450	17	5x	5,000	1,129	15,000	363	15
OP-7/8	10x	10,000	2,258	2,000[b]	120[b]	2[b]	20x	20,000	4,516	250[c]	25[c]	0.25[c]
Totals:				**40,450**	**1,110**	**41**				**38,350**	**950**	**38**

Table 1
Bioremediation Infiltration Summary
Blaine Marina, Inc.
Blaine, Washington

Injection Well Pair	Seventh Injection - May 2022						Eighth Injection - October 2022					
	Nitrate Dose	Nitrate Concentration		Injection Solution			Nitrate Dose	Nitrate Concentration		Injection Solution		
		mg NO_3/L	mg NO_3-N/L	Volume (gal)	AN Solution (gal)	Yeast Extract (lbs)		mg NO_3/L	mg NO_3-N/L	Volume (gal)	AN Solution (gal)	Yeast Extract (lbs)
OP-1/2	20x	20,000	4,516	2,000	155	(e)	20x	20,000	4,516	2,000	155	(e)
OP-3/4	5x	5,000	1,129	18,300	386	(e)	5x	5,000	1,129	17,200	386	(e)
OP-5/6	5x	5,000	1,129	18,000	378	(e)	5x	5,000	1,129	21,900	378	(e)
OP-7/8	10x	10,000	2,258	140[d]	30[d]	(e)	20x	20,000	4,516	800	40	(e)
Totals:				**38,300**	**919**					**41,900**	**959**	

Notes:

(a) Nitrate infiltration was not conducted at the OP-7/OP-8 in April 2020 and May 2022 due to decreased injection rates and short circuiting injection solution in the surrounding area.

(b) June totals for OP-7/OP-8 are a sum of seven hot spot treatment events from March through October 2021.

(c) November totals for OP-7/OP-8 are a sum of three hot spot treatment events from November through December 2021.

(d) May totals for OP-7/OP-8 are a sum of three hot spot treatment events from January through May 2022.

(e) Yeast was not available in 2022.

Abbreviations and Acronyms:

AN = ammonium nitrate

gal = gallons

lbs = pounds

mg NO_3/L = milligrams of nitrate per liter

mg NO_3-N/L = milligrams nitrate as nitrogen per liter

Table 2
Treatment Performance Sampling Summary – 2022
Blaine Marina, Inc.
Blaine, Washington

Sample Type	Location	1Q22				2Q22				3Q22				4Q22			
		TPH-Gx[a]	TPH-Dx[a]	Volatiles[b]	General Chemistry[c]	TPH-Gx[a]	TPH-Dx[a]	Volatiles[b]	General Chemistry[c]	TPH-Gx[a]	TPH-Dx[a]	Volatiles[b]	General Chemistry[c]	TPH-Gx[a]	TPH-Dx[a]	Volatiles[b]	General Chemistry[c]
Groundwater	MW-4	X	X		X												
	MW-5	X[1]	X[1]	X	X	X[1]	X[1]		X	X[1]	X[1]		X	X	X		X
	MW-6	X	X		X	X	X		X	X	X		X	X	X		X
	MW-7	X	X	X	X	X	X		X	X	X		X	X	X		X
	MW-8	X	X		X												
	MW-9	X[1]	X[1]		X	X[1]	X[1]		X	X[1]	X[1]		X	X[1]	X[1]		X
	MW-10	X[1]	X[1]		X	X[1]	X[1]		X	X[1]	X[1]		X[1]	X[1]	X[1]		X
	MW-11	X	X		X												
	MW-12	X	X		X	X	X		X	X	X		X	X	X		X
	MW-13	X	X	X	X	X	X		X	X	X		X	X	X		X
	MW-14	X	X	X	X	X	X		X	X	X		X	X	X		X
Surface Water	SW-2				X[2]				X[2]				X[2]				X[2]
	SW-3				X[2]				X[2]				X[2]				X[2]

Notes:

[a] TPH-Gx and TPH-Dx = Gasoline- and diesel-range organics (mg/L; NWTPH-Gx and NWTPH-Dx with silica-gel cleanup)

[b] Volatiles = Benzene, Naphthalene (mg/L; SW-846 8260C)

[c] General Chemistry = Nitrate/Nitrite, Sulfate (mg/L; EPA 353.3/SM 5310C)

[1] Sampled if no product present - Typically occurs when there is no measureable LNAPL or thickness is less than 0.1 ft.

[2] Sulfate not sampled at this location

One duplicate sample collected per quarter.

Actual sampling parameters collected at each location varies by event based on the current treatment and monitoring goals at the Site

Acronyms

EPA = US Environmental Protection Agency

LNAPL = light non-aqueous phase liquid

mg/L = milligrams per liter

NWTPH -Dx = Northwest total petroleum hydrocarbon extended-range diesel analysis

NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analysis

TPH = Total Petroleum Hydrocarbons

Table 3
Groundwater Elevations
Blaine Marina, Inc. – Blaine, Washington

Monitoring Well	Sampling Date	TOC Elevation (ft)	Depth to LNAPL (ft from TOC)	LNAPL Thickness (ft)	Depth to Groundwater (ft from TOC)	Groundwater Elevation (ft)
MW-4	11/8/2018	16.67	--	0.00	8.33	8.34
	7/15/2019	16.67	--	0.00	9.02	7.65
	10/7/2019	16.67	--	0.00	10.32	6.35
	2/25/2020	16.67	--	0.00	8.23	8.44
	6/9/2020	16.67	--	0.00	8.29	8.38
	8/26/2020	16.67	--	0.00	9.05	7.62
	11/19/2020	16.67	--	0.00	7.46	9.21
	6/13/2021	16.67	--	0.00	8.05	8.62
	7/29/2021	16.67	--	0.00	8.97	7.70
	10/20/2021	16.67	--	0.00	7.91	8.76
	12/20/2021	16.67	--	0.00	7.51	9.16
	4/28/2022	16.67	--	0.00	8.75	7.92
	6/30/2022	16.67	--	0.00	8.69	7.98
	8/30/2022	16.67	--	0.00	9.2	7.47
	12/8/2022	16.67	--	0.00	7.60	9.07
MW-5	11/8/2018	15.61	--	0.00	7.24	8.37
	7/15/2019	15.61	--	0.00	8.92	6.69
	10/7/2019	15.61	--	0.00	9.43	6.18
	2/25/2020	15.61	--	0.00	7.12	8.49
	6/9/2020	15.61	6.76	0.08	6.84	8.83
	8/26/2020	15.61	8.18	0.02	8.2	7.43
	11/19/2020	15.61	--	0.00	5.39	10.22
	6/13/2021	15.61	--	0.00	7.09	8.52
	7/29/2021	15.61	--	0.00	7.32	8.29
	10/20/2021	15.61	--	0.00	6.18	9.43
	12/20/2021	15.61	--	0.00	5.43	10.18
	4/28/2022	15.61	--	0.00	7.61	8.00
	6/30/2022	15.61	--	0.00	7.08	8.53
	8/30/2022	15.61	--	0.00	8.14	7.47
	12/8/2022	15.61	--	0.00	5.57	10.04
MW-6	11/8/2018	15.63	--	0.00	7.12	8.51
	7/15/2019	15.63	--	0.00	7.97	7.66
	10/7/2019	15.63	--	0.00	8.85	6.78
	2/25/2020	15.63	--	0.00	7.19	8.44
	6/9/2020	15.63	--	0.00	6.77	8.86
	8/26/2020	15.63	--	0.00	8.51	7.12
	11/19/2020	15.63	--	0.00	6.38	9.25
	6/13/2021	15.63	---	0.00	7.25	8.38
	7/29/2021	15.63	--	0.00	8.14	7.49
	10/20/2021	15.63	--	0.00	5.79	9.84
	12/20/2021	15.63	--	0.00	5.44	10.19
	4/28/2022	15.63	--	0.00	7.69	7.94
	6/30/2022	15.63	--	0.00	7.37	8.26
	8/30/2022	15.63	--	0.00	8.35	7.28
	12/8/2022	15.63	--	0.00	5.09	10.54

Table 3
Groundwater Elevations
Blaine Marina, Inc. – Blaine, Washington

Monitoring Well	Sampling Date	TOC Elevation (ft)	Depth to LNAPL (ft from TOC)	LNAPL Thickness (ft)	Depth to Groundwater (ft from TOC)	Groundwater Elevation (ft)
MW-7	11/8/2018	15.77	--	0.00	7.41	8.36
	7/15/2019	15.77	--	0.00	8.25	7.52
	10/7/2019	15.77	--	0.00	8.60	7.17
	2/25/2020	15.77	--	0.00	7.40	8.37
	6/9/2020	15.77	--	0.00	7.18	8.59
	8/26/2020	15.77	--	0.00	9.78	5.99
	11/19/2020	15.77	--	0.00	6.61	9.16
	6/13/2021	15.77	---	0.00	7.86	7.91
	7/29/2021	15.77	--	0.00	8.18	7.59
	10/20/2021	15.77	--	0.00	6.04	9.73
	12/20/2021	15.77	--	0.00	6.14	9.63
	4/28/2022	15.77	--	0.00	8.11	7.66
	6/30/2022	15.77	--	0.00	7.61	8.16
	8/30/2022	15.77	--	0.00	8.5	7.27
	12/8/2022	15.77	--	0.00	5.56	10.21
MW-8	11/8/2018	15.98	--	0.00	8.08	7.9
	7/15/2019	15.98	--	0.00	8.52	7.46
	10/7/2019	15.98	--	0.00	8.79	7.19
	2/25/2020	15.98	--	0.00	7.81	8.17
	6/9/2020	15.98	--	0.00	7.84	8.14
	8/26/2020	15.98	--	0.00	8.58	7.4
	11/19/2020	15.98	--	0.00	7.04	8.94
	6/13/2021	15.98	--	0.00	8.3	7.68
	7/29/2021	15.98	--	0.00	8.44	7.54
	10/20/2021	15.98	--	0.00	7.12	8.86
	12/20/2021	15.98	--	0.00	6.96	9.02
	4/28/2022	15.98	--	0.00	8.29	7.69
	6/30/2022	15.98	--	0.00	7.89	8.09
	8/30/2022	15.98	--	0.00	8.62	7.36
	12/8/2022	15.98	--	0.00	6.99	8.99
MW-9	11/8/2018	15.61	7.29	0.34	7.63	8.25
	7/15/2019	15.61	8.07	0.17	8.24	7.51
	10/7/2019	15.61	7.71	0.25	7.96	7.85
	11/12/2019	15.61	7.35	0.00	7.35	8.26
	11/25/2019	15.61	7.77	0.00	7.77	7.84
	2/25/2020	15.61	7.33	0.02	7.35	8.28
	6/9/2020	15.61	--	0.00	7.84	7.77
	8/26/2020	15.61	7.68	0.04	7.72	7.92
	11/19/2020	15.61	--	0.00	6.42	9.19
	6/13/2021	15.61	--	0.00	7.7	7.91
	7/29/2021	15.61	8.03	0.02	8.05	7.58
	10/20/2021	15.61	--	0.00	7.04	8.57
	12/20/2021	15.61	--	0.00	6.11	9.50
	4/28/2022	15.61	7.25	0.01	7.26	8.36
	6/30/2022	15.61	7.61	0.10	7.71	7.98
	8/30/2022	15.61	7.81	0.19	8	7.76
	12/8/2022	15.61	--	0.00	6.86	8.75

Table 3
Groundwater Elevations
Blaine Marina, Inc. – Blaine, Washington

Monitoring Well	Sampling Date	TOC Elevation (ft)	Depth to LNAPL (ft from TOC)	LNAPL Thickness (ft)	Depth to Groundwater (ft from TOC)	Groundwater Elevation (ft)
MW-10	11/8/2018	16.12	7.67	0.13	7.8	8.42
	7/15/2019	16.12	8.19	0.24	8.43	7.88
	10/7/2019	16.12	8.07	0.24	8.31	8.00
	11/12/2019	16.12	8.22	0.13	8.35	7.87
	11/25/2019	16.12	7.8	0.12	7.92	8.30
	2/25/2020	16.12	7.34	0.14	7.48	8.75
	6/9/2020	16.12	7.69	0.28	7.97	8.37
	8/26/2020	16.12	8.11	0.41	8.52	7.93
	11/19/2020	16.12	6.76	0.47	7.23	9.27
	6/13/2021	16.12	8.12	0.19	8.31	7.96
	7/29/2021	16.12	8.41	0.04	8.45	7.70
	10/20/2021	16.12	7.58	0.11	7.69	8.52
	12/20/2021	16.12	6.71	0.04	6.75	9.40
	4/28/2022	16.12	7.85	0.03	7.88	8.26
	6/30/2022	16.12	7.10	0.04	7.14	9.01
	8/30/2022	16.12	8.30	0.26	8.56	7.77
	12/8/2022	16.12	7.37	0.09	7.46	8.73
MW-11	11/8/2018	15.62	--	0.00	7.38	8.24
	7/15/2019	15.62	--	0.00	9.15	6.47
	10/7/2019	15.62	--	0.00	10.93	4.69
	2/25/2020	15.62	--	0.00	7.44	8.18
	6/9/2020	15.62	--	0.00	7.29	8.33
	8/26/2020	15.62	--	0.00	9.48	6.14
	11/19/2020	15.62	--	0.00	5.9	9.72
	6/13/2021	15.62	--	0.00	9.22	6.4
	7/29/2021	15.62	--	0.00	8.98	6.64
	10/20/2021	15.62	--	0.00	6.71	8.91
	12/20/2021	15.62	--	0.00	5.89	9.73
	4/28/2022	15.62	--	0.00	8.65	6.97
	6/30/2022	15.62	--	0.00	8.59	7.03
	8/30/2022	15.62	--	0.00	8.7	6.92
	12/8/2022	15.62	--	0.00	5.61	10.01
MW-12	11/8/2018	16.06	--	0.00	7.71	8.35
	7/15/2019	16.06	--	0.00	8.55	7.51
	10/7/2019	16.06	--	0.00	8.90	7.16
	2/25/2020	16.06	--	0.00	7.78	8.28
	6/9/2020	16.06	--	0.00	7.96	8.10
	8/26/2020	16.06	--	0.00	7.69	8.37
	11/19/2020	16.06	--	0.00	7.13	8.93
	6/13/2021	16.06	--	0.00	8.4	7.66
	7/29/2021	16.06	--	0.00	8.47	7.59
	10/20/2021	16.06	--	0.00	6.82	9.24
	12/20/2021	16.06	--	0.00	5.62	10.44
	4/28/2022	16.06	--	0.00	8.37	7.69
	6/30/2022	16.06	--	0.00	7.94	8.12
	8/30/2022	16.06	--	0.00	8.47	7.59
	12/8/2022	16.06	--	0.00	6.48	9.58

Table 3
Groundwater Elevations
Blaine Marina, Inc. – Blaine, Washington

Monitoring Well	Sampling Date	TOC Elevation (ft)	Depth to LNAPL (ft from TOC)	LNAPL Thickness (ft)	Depth to Groundwater (ft from TOC)	Groundwater Elevation (ft)
MW-13	11/8/2018	16.13	--	0.00	7.71	8.42
	7/15/2019	16.13	--	0.00	8.60	7.53
	10/7/2019	16.13	--	0.00	8.85	7.28
	2/25/2020	16.13	--	0.00	7.47	8.66
	6/9/2020	16.13	--	0.00	7.70	8.43
	8/26/2020	16.13	--	0.00	8.66	7.47
	11/19/2020	16.13	--	0.00	6.96	9.17
	6/13/2021	16.13	--	0.00	8.33	7.8
	7/29/2021	16.13	--	0.00	8.45	7.68
	10/20/2021	16.13	--	0.00	6.95	9.18
	12/20/2021	16.13	--	0.00	6.59	9.54
	4/28/2022	16.13	--	0.00	8.16	7.97
	6/30/2022	16.13	--	0.00	7.81	8.32
	8/30/2022	16.13	--	0.00	8.42	7.71
	12/8/2022	16.13	--	0.00	6.61	9.52
MW-14	11/8/2018	16.36	--	0.00	8.01	8.35
	7/15/2019	16.36	--	0.00	8.78	7.58
	10/7/2019	16.36	--	0.00	9.15	7.21
	2/25/2020	16.36	--	0.00	7.45	8.91
	6/9/2020	16.36	--	0.00	7.96	8.40
	8/26/2020	16.36	--	0.00	8.71	7.65
	11/19/2020	16.35	--	0.00	6.71	9.64
	6/14/2021	16.35	--	0.00	8.41	7.94
	7/29/2021	16.35	--	0.00	8.45	7.90
	10/20/2021	16.35	--	0.00	7.44	8.91
	12/20/2021	16.35	--	0.00	6.63	9.72
	4/28/2022	16.35	--	0.00	8.04	8.31
	6/30/2022	16.35	--	0.00	7.75	8.60
	8/30/2022	16.35	--	0.00	8.41	7.94
	12/8/2022	16.35	--	0.00	7.25	9.10
OP-1	11/8/2018	15.41	--	0.00	6.84	8.57
	7/15/2019	15.41	--	0.00	7.49	7.92
	10/7/2019	15.41	--	0.00	7.29	8.12
	2/25/2020	15.41	--	0.00	6.26	9.15
	6/9/2020	15.41	--	0.00	6.96	8.45
	8/26/2020	15.41	7.35	0.11	7.46	8.04
	11/19/2020	15.41	5.92	0.03	5.95	9.48
	6/13/2021	15.41	--	0.00	7.42	7.99
	7/29/2021	15.41	--	0.00	7.39	8.02
	10/20/2021	15.41	--	0.00	5.78	9.63
	12/20/2021	15.41	--	0.00	5.67	9.74
	4/28/2022	15.41	--	0.00	6.88	8.53
	6/30/2022	15.41	--	0.00	6.76	8.65
	8/30/2022	15.41	--	0.00	7.55	7.86
	12/8/2022	15.41	--	0.00	6.69	8.72

Table 3
Groundwater Elevations
Blaine Marina, Inc. – Blaine, Washington

Monitoring Well	Sampling Date	TOC Elevation (ft)	Depth to LNAPL (ft from TOC)	LNAPL Thickness (ft)	Depth to Groundwater (ft from TOC)	Groundwater Elevation (ft)
OP-2	11/8/2018	14.52	5.93	0.23	6.16	8.54
	7/15/2019	14.52	6.61	0.12	6.73	7.89
	10/7/2019	14.52	6.32	0.01	6.33	8.20
	2/25/2020	14.52	--	0.00	5.35	9.17
	6/9/2020	14.52	6.06	0.02	6.08	8.46
	8/26/2020	14.52	6.41	0.19	6.6	8.07
	11/19/2020	14.52	4.98	0.01	4.99	9.54
	6/13/2021	14.52	--	0.00	8.40	6.12
	7/29/2021	14.52	--	0.00	6.46	8.06
	10/20/2021	14.52	--	0.00	5.61	8.91
	12/20/2021	14.52	--	0.00	4.71	9.81
	4/28/2022	14.52	--	0.00	5.86	8.66
	6/30/2022	14.52	--	0.00	5.82	8.70
	8/30/2022	14.52	--	0.00	6.58	7.94
	12/8/2022	14.52	--	0.00	5.92	8.60
OP-3	11/8/2018	15.63	--	0.00	6.96	8.67
	7/15/2019	15.63	--	0.00	--	dry
	10/7/2019	15.63	--	0.00	7.38	8.25
	2/25/2020	15.63	--	0.00	6.43	9.20
	6/9/2020	15.63	--	0.00	7.01	8.62
	8/26/2020	15.63	--	0.00	--	dry
	11/19/2020	15.63	--	0.00	5.67	9.96
	6/13/2021	15.63	--	0.00	--	dry
	7/29/2021	15.63	--	0.00	7.44	8.19
	10/20/2021	15.63	--	0.00	6.49	9.14
	12/20/2021	15.63	--	0.00	5.48	10.15
	4/28/2022	15.63	--	0.00	6.87	8.76
	6/30/2022	15.63	--	0.00	6.74	8.89
	8/30/2022	15.63	--	0.00	7.45	8.18
	12/8/2022	15.63	--	0.00	6.93	8.70
OP-4	11/8/2018	15.05	--	0.00	6.44	8.61
	7/15/2019	15.05	--	0.00	7.13	7.92
	10/7/2019	15.05	--	0.00	6.93	8.12
	2/25/2020	15.05	--	0.00	5.75	9.30
	6/9/2020	15.05	--	0.00	6.52	8.53
	8/26/2020	15.05	--	0.00	6.93	8.12
	11/19/2020	15.05	--	0.00	5.28	9.77
	6/13/2021	15.05	--	0.00	6.82	8.23
	7/29/2021	15.05	--	0.00	6.85	8.20
	10/20/2021	15.05	--	0.00	5.95	9.10
	12/20/2021	15.05	--	0.00	5.09	9.96
	4/28/2022	15.05	--	0.00	6.47	8.58
	6/30/2022	15.05	--	0.00	6.27	8.78
	8/30/2022	15.05	--	0.00	7.01	8.04
	12/8/2022	15.05	--	0.00	6.24	8.81

Table 3
Groundwater Elevations
Blaine Marina, Inc. – Blaine, Washington

Monitoring Well	Sampling Date	TOC Elevation (ft)	Depth to LNAPL (ft from TOC)	LNAPL Thickness (ft)	Depth to Groundwater (ft from TOC)	Groundwater Elevation (ft)
OP-5	11/8/2018	15.93	7.2	0.01	7.21	8.73
	7/15/2019	15.93	--	0.00	7.26	8.67
	10/7/2019	15.93	--	0.00	7.27	8.66
	2/25/2020	15.93	--	0.00	6.41	9.52
	6/9/2020	15.93	--	0.00	7.25	8.68
	8/26/2020	15.93	--	0.00	7.26	8.67
	11/19/2020	15.93	--	0.00	5.96	9.97
	6/13/2021	15.93	--	0.00	7.31	8.62
	7/29/2021	15.93	--	0.00	7.29	8.64
	10/20/2021	15.93	--	0.00	6.14	9.79
	12/20/2021	15.93	--	0.00	5.79	10.14
	4/28/2022	15.93	--	0.00	7.16	8.77
	6/30/2022	15.93	--	0.00	6.99	8.94
	8/30/2022	15.93	--	0.00	7.27	8.66
	12/8/2022	15.93	--	0.00	7.09	8.84
OP-6	11/8/2018	15.42	--	0.00	6.52	8.9
	7/15/2019	15.42	--	0.00	6.53	8.89
	10/7/2019	15.42	--	0.00	6.51	8.91
	2/25/2020	15.42	--	0.00	6.03	9.39
	6/9/2020	15.42	--	0.00	6.52	8.90
	8/26/2020	15.42	--	0.00	6.54	8.88
	11/19/2020	15.42	--	0.00	5.51	9.91
	6/13/2021	15.42	--	0.00	6.50	8.92
	7/29/2021	15.42	--	0.00	6.54	8.88
	10/20/2021	15.42	--	0.00	6.28	9.14
	12/20/2021	15.42	--	0.00	5.41	10.01
	4/28/2022	15.42	--	0.00	6.55	8.87
	6/30/2022	15.42	--	0.00	6.54	8.88
	8/30/2022	15.42	--	0.00	6.51	8.91
	12/8/2022	15.42	--	0.00	6.34	9.08
OP-7	11/8/2018	15.31	--	0.00	7.18	8.13
	7/15/2019	15.31	--	0.00	7.06	8.25
	10/7/2019	15.31	--	0.00	7.07	8.24
	2/25/2020	15.31	--	0.00	5.10	10.21
	6/9/2020	15.31	--	0.00	6.52	8.79
	8/26/2020	15.31	--	0.00	6.84	8.47
	11/19/2020	15.31	--	0.00	3.2	12.11
	6/13/2021	15.31	--	0.00	6.86	8.45
	7/29/2021	15.31	--	0.00	7.07	8.24
	10/20/2021	15.31	--	0.00	5.27	10.04
	12/20/2021	15.31	--	0.00	4.55	10.76
	4/28/2022	15.31	--	0.00	6.44	8.87
	6/30/2022	15.31	--	0.00	6.76	8.55
	8/30/2022	15.31	--	0.00	7.02	8.29
	12/8/2022	15.31	--	0.00	5.52	9.79

Table 3
Groundwater Elevations
Blaine Marina, Inc. – Blaine, Washington

Monitoring Well	Sampling Date	TOC Elevation (ft)	Depth to LNAPL (ft from TOC)	LNAPL Thickness (ft)	Depth to Groundwater (ft from TOC)	Groundwater Elevation (ft)
OP-8	11/8/2018	15.72	--	0.00	7.36	8.36
	7/15/2019	15.72	--	0.00	7.30	8.42
	10/7/2019	15.72	--	0.00	4.91	10.81
	2/25/2020	15.72	--	0.00	5.25	10.47
	6/9/2020	15.72	--	0.00	6.62	9.10
	8/26/2020	15.72	--	0.00	6.65	9.07
	11/19/2020	15.72	--	0.00	2.1	13.62
	6/13/2021	15.72	--	0.00	5.23	10.49
	7/29/2021	15.72	--	0.00	6.99	8.73
	10/20/2021	15.72	--	0.00	3.39	12.33
	12/20/2021	15.75	--	0.00	2.45	13.30
	4/28/2022	15.75	--	0.00	4.29	11.46
	6/30/2022	15.75	--	0.00	5.92	9.83
	8/30/2022	15.75	--	0.00	6.62	9.13
	12/8/2022	15.75	--	0.00	5.88	9.87

Abbreviations/Acronyms:

ft = feet

LNAPL = light non-aqueous phase liquid

TOC = top of casing

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Laboratory Sample ID, Sampling Date, Sample Type														
		MW-4 EV18110065-07 11/8/2018 N	MW-4 EV19070106-03 7/15/2019 N	MW-4 EV19100043-02 10/7/2019 N	MW-4 EV20020153-03 2/25/2020 N	MW-4 EV22040163-08 4/28/2022 N	MW-5 EV18110065-02 11/8/2018 N	MW-5 EV19070106-06 7/15/2019 N	MW-5 EV19100043-04 10/7/2019 N	MW-5 EV20020153-06 2/25/2020 N	MW-5 EV20080140-11 8/26/2020 N	MW-5 EV21060076-01 6/14/2021 N	MW-5 EV21070148-04 7/29/2021 N	MW-5 EV21100112-04 10/20/2021 N	MW-5 EV21120136-09 12/20/2021 N	MW-5 EV22040163-03 4/28/2022 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/DxSG)																
Gasoline Range C5-C12	0.8	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.47 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Diesel Range C12-C24	0.5	0.13 U	0.13 U	**0.16**	0.13 U	0.13 U	**0.35**	**0.22**	**0.15**	0.13 U	**13**	**1.2**	**0.84 J**	**1.1**	**0.27 J**	**0.68**
Motor Oil Range C24-C40	0.5	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1.2 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Combined TPH (b)	0.5	0.25 U	0.25 U	**0.16**	0.25 U	0.25 U	**0.35**	**0.22**	**0.15**	0.25 U	**13**	**1.2**	**0.84 J**	**1.1**	**0.27 J**	**0.68**
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--	0.0020 U	--	--	--	0.0020 U
Naphthalene	0.083 (d)	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--	0.0020 U	--	--	--	0.0020 U
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310C)																
Nitrate (mg/L)	N/A	**0.16 J**	**0.19 J**	0.15 U	0.22 U	0.22 U	15 UJ	1.5 UJ	0.76 U	**3.5**	--	**3.1**	**0.30**	**4.3**	**6.0**	0.22 U
Nitrate (mg-N/L)	N/A	**0.036 J**	**0.043 J**	0.034 U	0.050 U	0.050 U	3.4 UJ	0.34 UJ	0.17 U	**0.79**	--	**0.70**	**0.07**	**0.97**	**1.4**	0.050 U
Sulfate	N/A	**130**	**110**	**120**	**100**	**130**	**2,300**	**2,000**	**1,900**	**2,000**	--	**2,000**	**2,300**	**2,200**	**1,800**	**2,000**
Total Organic Carbon	N/A	**1.8**	--	--	--	--	1.0 U	--	--	--	--	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Laboratory Sample ID, Sampling Date, Sample Type														
		MW-5 EV22060180-08 6/30/2022 N	MW-5 EV22080135-08 8/30/2022 N	MW-5 EV22120067-07 12/8/2022 N	MW-6 EV18110065-03 11/8/2018 N	MW-6 EV19070106-02 7/15/2019 N	MW-6 EV19100043-06 10/7/2019 N	MW-6 EV20020153-02 2/25/2020 N	MW-6 EV20060047-02 6/9/2020 N	MW-6 EV20080140-02 8/26/2020 N	MW-6 EV20110126-01 11/19/2020 N	MW-6 EV21060076-02 6/14/2021 N	MW-6 EV21070148-03 7/29/2021 N	MW-6 EV21100112-06 10/20/2021 N	MW-6 EV21120136-07 12/20/2021 N	MW-6 EV22040163-01 4/28/2022 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	--	--	--	--	--	--	--	0.05 U
Diesel Range C12-C24	0.5	**0.61**	**0.29**	**3.4**	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	**0.16**	0.20 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
Motor Oil Range C24-C40	0.5	0.25 U	0.25 U	**0.46**	0.25 U	0.25 U	0.25 U	**0.29**	0.25 U	**0.31**	**0.67**	0.25 U	0.25 U	0.25 U	0.25 U	**0.4**
Combined TPH (b)	0.5	**0.61**	**0.29**	**3.86**	0.25 U	0.25 U	0.25 U	**0.29**	0.25 U	**0.47**	**0.67**	0.25 U	0.25 U	0.25 U	0.25 U	**0.4**
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	--	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--	--	--	--	--	--	--	--
Naphthalene	0.083 (d)	--	--	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--	--	--	--	--	--	--	--
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	**2.2**	0.22 U	**4.4**	15 UJ	**17 J**	**88**	**13**	**33**	**13**	**19**	**23**	**7.1**	**28**	**51**	**80**
Nitrate (mg-N/L)	N/A	**0.50**	0.050 U	**1.0**	3.4 UJ	**3.8 J**	**20**	**2.9**	**7.5**	**2.9**	**4.3**	**5.2**	**1.6**	**6.3**	**12**	**18**
Sulfate	N/A	**1,800**	**1,700**	**2,100**	**1,700**	**1,300**	**530**	**840**	**310**	**1,100**	**640**	**790**	**1,600**	**690**	**160**	**590**
Total Organic Carbon	N/A	--	--	--	1.0 U	--	--	--	--	--	--	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Laboratory Sample ID, Sampling Date, Sample Type														
		MW-6 EV22060180-06 6/30/2022 N	MW-6 EV22080135-05 8/30/2022 N	MW-6 EV22120067-03 12/8/2022 N	MW-7 EV18110065-08 11/8/2018 N	MW-7 EV18110065-01 11/8/2018 FD	MW-7 EV19070106-07 7/15/2019 N	MW-7 EV19070106-01 7/15/2019 FD	MW-7 EV19100043-03 10/7/2019 N	MW-7 EV19100043-01 10/7/2019 FD	MW-7 EV20020153-07 2/25/2020 N	MW-7 EV20020153-01 2/25/2020 FD	MW-7 EV20060047-04 6/9/2020 N	MW-7 EV20060047-01 6/9/2020 FD	MW-7 EV20080140-04 8/26/2020 N	MW-7 EV20080140-01 8/26/2020 FD
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	0.05 U	0.05 U	0.05 U	**11**	**10**	**13 J**	**10 J**	**7.3**	**7.2**	**9.2**	**11**	**6.4**	**6.3**	**5.6**	**5.5**
Diesel Range C12-C24	0.5	0.13 U	**0.19 J**	**0.46**	**3.3 J**	**3.7 J**	**2.2 J**	**1.7 J**	**2.4 J**	**2.2 J**	**1.7 J**	**2 J**	**1.0 J**	**1.1 J**	**5.8**	**6.6**
Motor Oil Range C24-C40	0.5	**0.33**	**0.77**	**1.9**	**0.4**	**0.45**	**0.3**	**0.3**	0.25 U	0.25 U	0.25 U	**0.28**	0.25 U	0.25 U	1.2 U	**0.54**
Combined TPH (b)	0.5	**0.33**	**0.96 J**	**2.36**	**3.7 J**	**4.15 J**	**2.5 J**	**2.0 J**	**2.4 J**	**2.2 J**	**1.7 J**	**2.28 J**	**1.0 J**	**1.1 J**	**5.8**	**7.14**
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	--	--	0.0020 UJ	0.0020 UJ	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 UJ	0.0020 UJ	--	--	--	--
Naphthalene	0.083 (d)	--	--	--	**0.047**	**0.043**	**0.03**	**0.032**	**0.038 J**	**0.027 J**	**0.018 J**	**0.018 J**	--	--	--	--
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	**28**	**4.0**	**62**	15 UJ	1.5 U	0.31 UJ	1.5 UJ	0.76 U	0.76 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Nitrate (mg-N/L)	N/A	**6.3**	**0.90**	**14**	3.4 UJ	0.34 U	0.070 UJ	0.34 UJ	0.17 U	0.17 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Sulfate	N/A	**490**	**1,400**	**270**	**1,500**	**1,500**	**960**	**980**	**740**	**700**	**1,100**	**1,100**	**1,200**	**1,300**	**1,200**	**1,200**
Total Organic Carbon	N/A	--	--	--	**3.0**	**3.7**	--	--	--	--	--	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Lab Sample ID, Sampling Date, Sample Type														
		MW-7 EV20110126-02 11/19/2020 N	MW-7 EV20110126-08 11/19/2020 FD	MW-7 EV21060076-03 6/14/2021 N	MW-7 EV21070148-02 7/29/2021 N	MW-7 EV21070148-01 7/29/2021 FD	MW-7 EV21100112-02 10/20/2021 N	MW-7 EV21100112-01 10/20/2021 FD	MW-7 EV21120136-05 12/20/2021 N	MW-7 EV21120136-02 12/20/2021 FD	MW-7 EV22010113-01 1/26/2022 N	MW-7 EV22020137-02 2/24/2022 N	MW-7 EV22040163-04 4/28/2022 N	MW-7 EV22040163-05 4/28/2022 FD	MW-7 EV22060180-02 6/30/2022 N	MW-7 EV22060180-03 6/30/2022 FD
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	**6.5**	**6.6**	**4.7**	**3.7**	**3.7**	**3.3 J**	**5.1 J**	(c)	(c)	**5.1**	**5.1**	**4.2 J**	**3.4 J**	**4**	**4**
Diesel Range C12-C24	0.5	**4.8 J**	**4.6 J**	**0.86 J**	**1.1 J**	**1.1 J**	**3.9**	**3.8**	**1.6 J**	**1.4 J**	**1.4 J**	**1.9 J**	**1.3 J**	**1.4 J**	**1.1 J**	**1 J**
Motor Oil Range C24-C40	0.5	0.50 U	0.50 U	0.25 U	0.25 U	0.25 U	**0.99 J**	**0.56 J**	**0.47**	**0.28**	0.51 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Combined TPH (b)	0.5	**4.8 J**	**4.6 J**	**0.86 J**	**1.1 J**	**1.1 J**	**4.89 J**	**4.36 J**	**2.07 J**	**1.68 J**	**1.4 J**	**1.9 J**	**1.3 J**	**1.4 J**	**1.1 J**	**1 J**
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	--	0.0020 U	--	--	--	--	--	--	--	--	0.0020 UJ	0.0020 UJ	**--**	**--**
Naphthalene	0.083 (d)	--	--	**0.0038**	--	--	--	--	--	--	--	--	**0.0029 J**	**0.0026 J**	**--**	**--**
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	0.22 U	0.22 U	0.22 U	0.22 U	**0.24**	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Nitrate (mg-N/L)	N/A	0.050 U	0.050 U	0.050 U	0.050 U	**0.054**	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Sulfate	N/A	**1,400**	**1,300**	**1,500**	**1,500**	**1,500**	**1,300**	**1,400**	**1,600**	**1,600**	--	--	**1,200**	**1,200**	**3,800**	**4,100**
Total Organic Carbon	N/A	**--**	**--**	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Lab Sample ID, Sampling Date, Sample Type														
		MW-7 EV22080135-02 8/30/2022 N	MW-7 EV22080135-03 8/30/2022 FD	MW-7 EV22120067-01 12/8/2022 N	MW-7 EV22120067-02 12/8/2022 FD	MW-8 EV18110065-10 11/8/2018 N	MW-8 EV19070106-10 7/15/2019 N	MW-8 EV19100043-08 10/7/2019 N	MW-8 EV20020153-10 2/25/2020 N	MW-8 EV20060047-05 6/9/2020 N	MW-8 EV20080140-05 8/26/2020 N	MW-8 EV20110126-03 11/19/2020 N	MW-8 EV21060076-04 6/14/2021 N	MW-8 EV21070148-05 7/29/2021 N	MW-8 EV21100112-08 10/20/2021 N	MW-8 EV21120136-08 12/20/2021 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	**3.3**	**3.1**	**5 J**	**4.7 J**	**0.082**	**0.097**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	--	--	--	--
Diesel Range C12-C24	0.5	**1.0 J**	**0.94 J**	**7.3**	**7.3**	**0.62**	**0.39**	**0.99**	**0.26**	**0.210**	**0.4**	**0.14**	**0.14 J**	**0.13 J**	0.13 U	0.13 U
Motor Oil Range C24-C40	0.5	0.25 U	0.25 U	1.2 U	1.2 U	0.25 U	0.25 U	0.25 U	**0.7**	0.25 U	0.25 U	0.25 U	**0.46 J**	0.25 U	0.25 U	0.25 U
Combined TPH (b)	0.5	**1.0 J**	**0.94 J**	**7.3**	**7.3**	**0.62**	**0.39**	**0.99**	**0.96**	**0.210**	**0.4**	**0.14**	**0.60 J**	**0.13 J**	0.25 U	0.25 U
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	--	--	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--	--	--	--	--	--	--
Naphthalene	0.083 (d)	--	--	--	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--	--	--	--	--	--	--
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	0.22 U	0.22 U	0.22 U	0.22 U	1.5 UJ	**15**	**170**	**320**	**450**	**260**	**1.0**	**480**	**500**	**4.7**	0.22 U
Nitrate (mg-N/L)	N/A	0.050 U	0.050 U	0.050 U	0.050 U	0.34 UJ	**3.4**	**38**	**72**	**102**	**59**	**0.23**	**108**	**113**	**1.1**	0.050 U
Sulfate	N/A	**1,100**	**1,000**	**1,100**	**1,100**	**190**	**25**	**170**	**400**	**360**	**400**	**220**	**590**	**640**	**180**	**380**
Total Organic Carbon	N/A	--	--	--	--	**2.5**	--	--	--	--	--	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Lab Sample ID, Sampling Date, Sample Type														
		MW-8 EV22040163-11 4/28/2022 N	MW-9 EV19070106-05 7/15/2019 N	MW-9 EV19100043-11 10/7/2019 N	MW-9 EV20020153-05 2/25/2020 N	MW-9 EV21060076-05 6/14/2021 N	MW-9 EV21070148-07 7/29/2021 N	MW-9 EV21100112-09 10/20/2021 N	MW-9 EV21120136-01 12/20/2021 N	MW-9 EV22040163-12 4/28/2022 N	MW-9 EV22060180-09 6/30/2022 N	MW-9 EV22080135-07 8/30/2022 N	MW-9 EV22120067-08 12/8/2022 N	MW-10 EV19070106-04 7/15/2019 N	MW-10 EV19100043-12 10/7/2019 N	MW-10 EV20020153-04 2/25/2020 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	0.05 U	--	--	--	**0.45**	**0.53 J**	**1.6 J**	**1.8 J**	**0.46**	**0.45**	**1.1**	0.2 U	--	--	--
Diesel Range C12-C24	0.5	0.13 U	--	--	--	**6 J**	**4.8 J**	**82**	**16 J**	**8**	**20**	**41**	**14**	--	--	--
Motor Oil Range C24-C40	0.5	0.25 U	--	--	--	0.5 U	0.25 U	5 U	1.2 U	0.5 U	2.5 U	5.0 U	2.5 U	--	--	--
Combined TPH (b)	0.5	0.25 U	--	--	--	**6 J**	**4.8 J**	**82**	**16 J**	**8**	**20**	**41**	**14**	--	--	--
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	--	--	--	**0.0042**	--	--	--	--	--	--	--	--	--	--
Naphthalene	0.083 (d)	--	--	--	--	**0.0023**	--	--	--	--	--	--	--	--	--	--
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	**250**	**290**	**2.5**	**810**	**310**	**64**	**4.4**	**480**	**89**	**61**	**19**	**796**	**2.1 J**	**18**	**580**
Nitrate (mg-N/L)	N/A	**57**	**66**	**0.57**	**180**	**70**	**14**	**1.0**	**108**	**20**	**14**	**4.3**	**180**	**0.47 J**	**4.1**	**130**
Sulfate	N/A	**480**	**84**	**76**	**220**	**620**	**530**	**310**	**160**	**170**	**260**	**240**	**200**	**32**	**90**	**220**
Total Organic Carbon	N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Lab Sample ID, Sampling Date, Sample Type														
		MW-10 EV20060047-06 6/9/2020 N	MW-10 EV20080140-06 8/26/2020 N	MW-10 EV20110126-09 11/19/2020 N	MW-10 2106-131-06 6/14/2021 N	MW-10 2107-306-10 7/29/2021 N	MW-10 2110-188-09 10/20/2021 N	MW-10 2112-216-11 12/20/2021 N	MW-10 EV22040163-10 4/28/2022 N	MW-10 EV22060180-07 6/30/2022 N	MW-10 EV22120067-09 12/8/2022 N	MW-11 EV18110065-09 11/8/2018 N	MW-11 EV19070106-09 7/15/2019 N	MW-11 EV19100043-05 10/7/2019 N	MW-11 EV20020153-09 2/25/2020 N	MW-11 EV20060047-03 6/9/2020 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	--	--	--	--	--	--	--	**0.19**	**7.3**	0.2 U	**0.079**	0.05 U	0.05 U	0.05 U	0.05 U
Diesel Range C12-C24	0.5	--	--	--	--	--	--	--	**37**	**200**	**65**	0.13 U	0.13 U	0.13 U	0.13 U	--
Motor Oil Range C24-C40	0.5	--	--	--	--	--	--	--	2.5 U	25 U	5 U	0.25 U	0.25 U	0.25 U	0.25 U	--
Combined TPH (b)	0.5	--	--	--	--	--	--	--	**37**	**200**	**65**	0.25 U	0.25 U	0.25 U	0.25 U	--
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	--	--	--	--	--	--	--	--	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--
Naphthalene	0.083 (d)	--	--	--	--	--	--	--	--	--	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	--
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	**180**	**83**	**470**	**580**	**300**	**110**	**1,300**	**760**	**420**	**442**	31 UJ	**4.3 J**	**3.3**	**8.1**	**6.7**
Nitrate (mg-N/L)	N/A	**41**	**19**	**106**	**131**	**68**	**25**	**294**	**172**	**95**	**100**	7.0 UJ	**0.97 J**	**0.75**	**1.83**	**1.5**
Sulfate	N/A	**190**	**180**	**170**	--	--	--	--	**60**	**120**	**150**	**2,400**	**2,000**	**1,800**	**1,600**	**1,500**
Total Organic Carbon	N/A	--	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Lab Sample ID, Sampling Date, Sample Type														
		MW-11 EV20080140-03 8/26/2020 N	MW-11 EV20110126-04 11/19/2020 N	MW-11 2106-131-07 6/14/2021 N	MW-11 2107-306-05 7/29/2021 N	MW-11 2110-188-07 10/20/2021 N	MW-11 2112-216-02 12/20/2021 N	MW-11 EV22040163-02 4/28/2022 N	MW-12 EV18110065-06 11/8/2018 N	MW-12 EV19070106-12 7/15/2019 N	MW-12 EV19100043-10 10/7/2019 N	MW-12 EV20020153-12 2/25/2020 N	MW-12 EV20060047-08 6/9/2020 N	MW-12 EV20080140-08 8/26/2020 N	MW-12 EV20110126-05 11/19/2020 N	MW-12 EV21060076-06 6/14/2021 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	0.05 U	0.05 U	--	--	--	--	0.05 U	**0.98**	**0.64**	**0.67 J**	**0.34**	**0.41**	**0.54 J**	**0.96**	**0.57**
Diesel Range C12-C24	0.5	--	--	--	--	--	--	0.13 U	**0.18**	**0.4**	**0.61**	**0.32**	**0.34**	**0.53**	**0.23 J**	**0.2 J**
Motor Oil Range C24-C40	0.5	--	--	--	--	--	--	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**0.46**	0.25 U	0.25 U
Combined TPH (b)	0.5	--	--	--	--	--	--	0.25 U	**0.18**	**0.4**	**0.61**	**0.32**	**0.34**	**0.99**	**0.23 J**	**0.2 J**
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	--	--	--	--	--	--	0.0020 U	0.0020 U	**0.0023 J**	**0.0022**	--	--	--	0.0020 U
Naphthalene	0.083 (d)	--	--	--	--	--	--	--	0.0020 U	0.0020 U	0.0020 UJ	**0.0025**	--	--	--	0.0020 U
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	**5.8**	**3.7**	**3.4**	**3.7**	**5.0**	**4.1**	**2.3**	15 UJ	**170**	**14**	**250**	**14**	0.22 U	**4.1**	**81**
Nitrate (mg-N/L)	N/A	**1.3**	**0.84**	**0.77**	**0.84**	**1.1**	**0.93**	**0.52**	3.4 UJ	**38**	**3.2**	**56.5**	**3.2**	0.050 U	**0.93**	**18**
Sulfate	N/A	**1,600**	**2,600**	**--**	**--**	**--**	**--**	**1,900**	**1,700**	**620**	**360**	**420**	**430**	**860**	**1,800**	**1,400**
Total Organic Carbon	N/A	--	--	--	--	--	--	--	1.0 U	--	--	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Lab Sample ID, Sampling Date, Sample Type														
		MW-12 EV21070148-09 7/29/2021 N	MW-12 EV21100112-03 10/20/2021 N	MW-12 EV21120136-06 12/20/2021 N	MW-12 EV22010113-02 1/26/2022 N	MW-12 EV22020137-01 2/24/2022 N	MW-12 EV22040163-09 4/28/2022 N	MW-12 EV22060180-01 6/30/2022 N	MW-12 EV22080135-01 8/30/2022 N	MW-12 EV22120067-04 12/8/2022 N	MW-13 EV18110065-05 11/8/2018 N	MW-13 EV19070106-11 7/15/2019 N	MW-13 EV19100043-09 10/7/2019 N	MW-13 EV20020153-11 2/25/2020 N	MW-13 EV20060047-09 6/9/2020 N	MW-13 EV20080140-09 8/26/2020 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	**0.29**	**0.34**	**0.38**	**0.51**	**0.41**	**0.47**	**0.36**	**0.29**	**0.45 J**	**0.74**	**0.22**	0.05 U	**0.094**	**0.067**	**0.073**
Diesel Range C12-C24	0.5	**0.27 J**	**0.17**	**0.34 J**	**0.17**	**0.46**	**0.33 J**	**0.16**	**0.350 J**	**0.46**	**3.2**	**0.51**	**0.99**	0.13 U	**0.150**	**0.43 J**
Motor Oil Range C24-C40	0.5	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**0.41 J**	0.25 U	0.25 U	0.25 U	0.25 U	**0.9**
Combined TPH (b)	0.5	**0.27 J**	**0.17**	**0.34 J**	**0.17**	**0.46**	**0.33 J**	**0.16**	**0.350 J**	**0.46**	**3.61 J**	**0.51**	**0.99**	0.25 U	**0.150**	**1.33 J**
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	--	--	--	--	--	--	--	--	**0.0029**	0.0020 U	**0.018**	0.0020 U	--	--
Naphthalene	0.083 (d)	--	--	--	--	--	--	--	--	--	**0.0048**	**0.0024**	0.0020 U	**0.0021**	--	--
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	**450**	**0.58**	**480**	**190**	**130**	**88**	**2,000**	**530**	0.22 U	0.15 UJ	**1,200**	**900**	**860**	**2,100**	**1,300**
Nitrate (mg-N/L)	N/A	**102**	**0.13**	**108**	**43**	**29**	**20**	**452**	**120**	0.050 U	0.034 UJ	**270**	**200**	**190**	**480**	**290**
Sulfate	N/A	**980**	**1,700**	**1,300**	--	--	**530**	**520**	**480**	**1,600**	**98**	**69**	**330**	**130**	**120**	**280**
Total Organic Carbon	N/A	--	--	--	--	--	--	--	--	--	**8.8**	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Lab Sample ID, Sampling Date, Sample Type														
		MW-13 EV20110126-06 11/19/2020 N	MW-13 EV21060076-07 6/14/2021 N	MW-13 EV21070148-08 7/29/2021 N	MW-13 EV21100112-05 10/20/2021 N	MW-13 EV21120136-04 12/20/2021 N	MW-13 EV22040163-06 4/28/2022 N	MW-13 EV22060180-04 6/30/2022 N	MW-13 EV22080135-04 8/30/2022 N	MW-13 EV22120067-05 12/8/2022 N	MW-14 EV18110065-04 11/8/2018 N	MW-14 EV19070106-08 7/15/2019 N	MW-14 EV19100043-07 10/7/2019 N	MW-14 EV20020153-08 2/25/2020 N	MW-14 EV20060047-07 6/9/2020 N	MW-14 EV20080140-07 8/26/2020 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D																
Gasoline Range C5-C12	0.8	**0.15**	**0.052**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.58**	**0.17**	**0.17**	**0.086**	**0.150**	**0.11**
Diesel Range C12-C24	0.5	0.13 U	**0.13**	**0.17 J**	0.13 U	0.13 U	0.13 U	**0.15 J**	**0.210**	**0.6**	**2.2**	**0.57**	**2**	**0.23**	**1.1**	**1.4**
Motor Oil Range C24-C40	0.5	0.25 U	0.25 U	**0.27**	0.25 U	**0.27**	0.25 U	**0.45**	0.25 U	**0.28**	**0.37 J**	0.25 U	0.25 U	0.25 U	**0.52**	**0.5**
Combined TPH (b)	0.5	0.25 U	**0.13**	**0.44 J**	0.25 U	**0.27**	0.25 U	**0.60 J**	**0.210**	**0.89**	**2.57 J**	**0.57**	**2**	**0.23**	**1.62**	**1.9**
Volatiles (mg/L; SW-846 8260C)																
Benzene	0.0024	--	0.0020 U	--	--	--	**0.0025**	--	--	--	**0.042**	**0.021**	**0.023**	0.0020 U	--	--
Naphthalene	0.083 (d)	--	0.0020 U	--	--	--	0.0020 U	--	--	--	**0.0069**	**0.0025**	**0.0032**	**0.0021**	--	--
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310																
Nitrate (mg/L)	N/A	**12**	**420**	**2,100**	**500**	**1,900**	**1,900**	**2,800**	**2,900**	**1,814**	0.15 UJ	**1,800**	**690**	**30**	**940**	**950**
Nitrate (mg-N/L)	N/A	**2.7**	**95**	**475**	**113**	**429**	**429**	**633**	**655**	**410**	0.034 UJ	**410**	**160**	**7**	**210**	**210**
Sulfate	N/A	**87**	**250**	**220**	**490**	**200**	**180**	**150**	**210**	**360**	**55**	**35**	**46**	**31**	**31**	**22**
Total Organic Carbon	N/A	--	--	--	--	--	--	--	--	--	**15**	--	--	--	--	--

Table 4
Groundwater Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Analyte	Cleanup Level (a)	Sampling Location, Lab Sample ID, Sampling Date, Sample Type								
		MW-14 EV20110126-07 11/19/2020 N	MW-14 EV21060076-08 6/14/2021 N	MW-14 EV21070148-06 7/29/2021 N	MW-14 EV21100112-07 10/20/2021 N	MW-14 EV21120136-03 12/20/2021 N	MW-14 EV22040163-07 4/28/2022 N	MW-14 EV22060180-05 6/30/2022 N	MW-14 EV22080135-06 8/30/2022 N	MW-14 EV22120067-06 12/8/2022 N
Total Petroleum Hydrocarbons (mg/L; NWTPH-Gx/D										
Gasoline Range C5-C12	0.8	**0.074 J**	**0.078**	**0.16 J**	**0.087 J**	R	0.05 U	0.05 U	**0.059**	0.05 U
Diesel Range C12-C24	0.5	**0.76**	**0.42**	**1.4 J**	**0.6**	**0.43 J**	**0.25**	**0.19**	**0.87**	**4.2**
Motor Oil Range C24-C40	0.5	0.25 U	**0.33**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**0.31 J**	1.2 U
Combined TPH (b)	0.5	**0.76**	**0.75**	**1.4 J**	**0.6**	**0.43 J**	**0.25**	**0.19**	**1.18 J**	**4.2**
Volatiles (mg/L; SW-846 8260C)										
Benzene	0.0024	--	0.0020 U	--	--	--	0.0020 U	--	--	--
Naphthalene	0.083 (d)	--	0.0020 U	--	--	--	0.0020 U	--	--	--
General Chemistry (mg/L; EPA 300.0/353.2/SM 5310										
Nitrate (mg/L)	N/A	**59**	**42**	**670**	**240**	**150**	**130**	**920**	**700**	**841**
Nitrate (mg-N/L)	N/A	**13**	**9.5**	**151**	**54**	**34**	**29**	**208**	**158**	**190**
Sulfate	N/A	**52**	**29**	**54**	**54**	**62**	**47**	**51**	**61**	**52**
Total Organic Carbon	N/A	--	--	--	--	--	--	--	--	

Notes:

All reported results are from post-source removal, which occurred in summer 2018.

MW-9 and MW-10 were not included in the baseline sampling event due to the presence NAPL.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

R = The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

Bold = detected compound -- = not analyzed

Green Box = detected concentration is greater than the associated screening level.

(a) Cleanup level based on lowest Water Quality Standard or Practical Quantitation Limit (PQL).

(b) Combined TPH represents the sum of detected diesel- and motor oil-range constituents. If both diesel- and motor oil-range constituents were not detected at a concentration greater than the laboratory reporting limit, the greater of the two limits is presented as the Combined TPH result.

(c) Due to a laboratory instrument failure, the analysis for the analyte was incomplete.

(d) Cleanup level based on total naphthalenes.

Abbreviations/Acronyms:

EPA = US Environmental Protection Agency
FD = field duplicate
ID = identification
mg/L = milligrams per liter
mg-N/L = milligrams nitrogen per liter
N = primary sample
N/A = not applicable
NAPL = non-aqueous phase liquid
NWTPH-Dx = Northwest total petroleum hydrocarbon extended-range diesel analytical method
NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analytical method
PQL = practical quantitation limit
SM = Standard Methods
TPH = total petroleum hydrocarbons

Table 5
Groundwater Results – Bioremediation Summary
Blaine Marina, Inc.
Blaine, Washington

Well Location	Sampling Date	Elapsed Time from Injection 1 (Days)	Elapsed Time from Injection 2 (Days)	Elapsed Time from Injection 3 (Days)	Elapsed Time from Injection 4 (Days)	Elapsed Time from Injection 5 (Days)	Elapsed Time from Injection 6 (Days)	Elapsed Time from Injection 7 (Days)	Elapsed Time from Injection 8 (Days)	Petroleum Hydrocarbons			Volatiles		Redox Conditions						Aquifer Parameters					Comments
										GRO mg/L	DRO mg/L	ORO mg/L	Benzene mg/L	Naphthalene mg/L	DO mg/L	ORP mV	Nitrate mg/L	Nitrate mg-N/L	Iron II mg/L	Sulfate mg/L	Cond. (µS/cm)	Temp. (°C)	Turbidity (NTU)	TOC mg/L	pH (SU)	
Groundwater Cleanup Level[a]:										0.8	0.5	0.5	0.0024	0.083[b]	--	--	--	--	--	--	--	--	--	--	--	
MW-4	11/8/2018	Baseline								0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	0.39	-87.6	0.16 J	0.036 J	1.0	130	2,612	15.9	4.72	1.8	6.73	
	7/15/2019	31								0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	0.63	-62.4	0.19 J	0.043 J	4.0	110	1,755	16.5	23.10	--	6.93	
	10/7/2019	115	-49							0.05 U	0.16	0.25 U	0.0020 U	0.0020 U	1.77	-3.9	0.15 U	0.034 U	1.0	120	1,688	15.9	37.82	--	6.87	
	2/25/2020	256	92	-51						0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	0.72	-65.1	0.22 U	0.050 U	1.5	100	1,446	11.6	1.70	--	6.94	
	4/28/2022	1049	885	742	559	318	156			0.05 U	0.13 U	0.25 U	--	--	0.57	-49.5	0.22 U	0.050 U	4.0	130	1,626	11.9	26.60	--	6.86	
MW-5	11/8/2018	Baseline								0.05 U	0.35	0.25 U	0.0020 U	0.0020 U	1.62	149.0	15 UJ	3.4 UJ	0.0	2,300	34,024	12.6	2.20	1.0 U	7.11	
	7/15/2019	31								0.05 U	0.22	0.25 U	0.0020 U	0.0020 U	0.47	-225.6	1.5 UJ	0.34 UJ	1.0	2,000	36,516	18.3	9.77	--	7.42	
	10/7/2019	115	-49							0.05 U	0.15	0.25 U	0.0020 U	0.0020 U	0.61	-6.0	0.76 U	0.17 U	0.5	1,900	25,170	16.1	25.15	--	7.34	
	2/25/2020	256	92	-51						0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	6.81	107.1	3.5	0.79	0.0	2,000	30,271	8.1	2.30	--	7.53	
	8/26/2020	439	275	132	-51					0.47 J	**13**	1.2 U	--	--	0.88	-301.5	--	--	1.2	--	31,795	19.2	16.01	--	7.50	
	6/14/2021	731	567	424	241	0				0.05 U	**1.2**	0.25 U	0.0020 U	0.0020 U	3.0	64.8	3.1	0.70	0.0	2000	31,158	14.9	2.00	--	7.39	
	7/29/2021	776	612	469	286	45				0.05 U	**0.84 J**	0.25 U	--	--	0.90	-149.6	0.30	0.07	0.2	2300	36,998	20.0	1.21	--	7.10	
	10/20/2021	859	695	552	369	128	-34			0.05 U	**1.1**	0.25 U	--	--	2.99	-25.1	4.3	0.97	0.0	2200	36,839	15.1	10.53	--	7.22	
	12/20/2021	920	756	613	430	189	27			0.05 U	0.27 J	0.25 U	--	--	8.14	83.6	6.0	1.4	0.0	1800	50,158	9.4	0.90	--	7.59	
	4/28/2022	1049	885	742	559	318	156	-26		0.05 U	**0.68**	0.25 U	0.0020 U	0.0020 U	0.79	2.3	0.22 U	0.050 U	0.5	2000	39,468	9.7	8.8	--	7.16	
	6/30/2022	1112	948	805	622	381	219	37		0.05 U	**0.61**	0.25 U	--	--	5.71	6.6	2.2	0.50	0.0	1,800	29,176	16.1	16.7	--	7.55	
	8/30/2022	1173	1009	866	683	442	280	98	-45	0.05 U	0.29	0.25 U	--	--	0.41	-308.2	0.22 U	0.05 U	0.0	1,700	32,669	19.4	1.1	--	7.37	
	12/8/2022	1273	1109	966	783	542	380	198	55	0.05 U	**3.4**	0.46	--	--	8.19	-8.9	4.4	1.0	0.0	2,100	41,818	10.1	32.7	--	7.53	
MW-6	11/8/2018	Baseline								0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	0.72	195.0	15 UJ	3.4 UJ	0.0	1,700	25,802	13.4	19.57	1.0 U	6.79	
	7/15/2019	31								0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	4.34	6.1	17 J	3.8 J	0.0	1,300	25,900	20.0	27.84	--	7.03	
	10/7/2019	115	-49							0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	3.94	65.9	88	20	0.0	530	7,637	15.2	16.90	--	7.18	
	2/25/2020	256	92	-51						0.05 U	0.13 U	0.29	0.0020 U	0.0020 U	6.39	114.9	13	2.9	0.0	840	13,175	8.0	2.02	--	7.28	
	6/9/2020	361	197	54						--	0.13 U	0.25 U	--	--	7.10	181.0	33	7.5	0.0	310	6,878	12.2	0.98	--	7.43	
	8/26/2020	439	275	132	-51					--	0.16	0.31	--	--	1.86	148.2	13	2.9	0.0	1,100	19,865	18.6	5.20	--	7.15	
	11/19/2020	524	360	217	34					--	0.20 U	**0.67**	--	--	4.69	76.2	19	4.3	0.0	640	5,177	11.8	1.53	--	7.08	
	6/14/2021	731	567	424	241	0				--	0.13 U	0.25 U	--	--	3.24	87.1	23	5.2	0.0	790	8,865	15.1	0.62	--	7.65	
	7/29/2021	776	612	469	286	45				--	0.13 U	0.25 U	--	--	4.12	-85.1	7.1	1.6	0.0	1,600	27,752	19.0	3.03	--	6.99	
	10/20/2021	859	695	552	369	128	-34			--	0.13 U	0.25 U	--	--	7.03	-26.8	28	6.3	0.0	690	11,984	15.0	4.24	--	7.11	
	12/20/2021	920	756	613	430	189	27			--	0.13 U	0.25 U	--	--	5.10	-17.9	51	12	0.0	160	2,702	9.6	0.12	--	7.30	
	4/28/2022	1049	885	742	559	318	156	-26		0.05 U	0.13 U	0.4	--	--	5.98	286.3	80	18	0.0	590	11,178	9.2	4.34	--	7.29	
	6/30/2022	1112	948	805	622	381	219	37		0.05 U	0.13 U	0.33	--	--	4.15	-55.5	28	6.3	0.0	490	10,454	15.0	22.28	--	7.35	
	8/30/2022	1173	1009	866	683	442	280	98	-45	0.05 U	0.19 J	**0.77**	--	--	2.64	-46.5	4.0	0.90	0.0	1,400	29,572	19.3	3.41	--	7.02	
	12/8/2022	1273	1109	966	783	542	380	198	55	0.05 U	0.46	**1.9**	--	--	3.27	-56.1	62	14	0.0	270	6,604	9.3	--	--	7.05	

Table 5
Groundwater Results – Bioremediation Summary
Blaine Marina, Inc.
Blaine, Washington

Well Location	Sampling Date	Elapsed Time from Injection 1 (Days)	Elapsed Time from Injection 2 (Days)	Elapsed Time from Injection 3 (Days)	Elapsed Time from Injection 4 (Days)	Elapsed Time from Injection 5 (Days)	Elapsed Time from Injection 6 (Days)	Elapsed Time from Injection 7 (Days)	Elapsed Time from Injection 8 (Days)	Petroleum Hydrocarbons			Volatiles		Redox Conditions						Aquifer Parameters					Comments
										GRO mg/L	DRO mg/L	ORO mg/L	Benzene mg/L	Naphthalene mg/L	DO mg/L	ORP mV	Nitrate mg/L	Nitrate mg-N/L	Iron II mg/L	Sulfate mg/L	Cond. (µS/cm)	Temp. (°C)	Turbidity (NTU)	TOC mg/L	pH (SU)	
Groundwater Cleanup Level[a]:										0.8	0.5	0.5	0.0024	0.083[b]	--	--	--	--	--	--	--	--	--	--	--	
MW-7	11/8/2018	Baseline								**11**	**3.3 J**	0.4	0.0020 UJ	0.047	0.56	-369.7	15 UJ	3.4 UJ	0.4	1,500	33,063	14.0	9.0	3.0	6.94	
	7/15/2019	31								**13 J**	**2.2 J**	0.3	0.0020 U	0.03	--	-389.5	0.31 UJ	0.070 UJ	0.4	960	27,198	17.7	0.98	--	7.04	Equipment malfunction prevented DO measurement
	10/7/2019	115	-49							**7.3**	**2.4 J**	0.25 U	0.0020 U	0.038 J	1.70	-279.3	0.76 U	0.17 U	0.0	740	15,810	15.3	3.62	--	7.05	
	2/25/2020	256	92	-51						**9.2**	**1.7 J**	0.25 U	0.0020 UJ	0.018 J	1.91	--	0.22 U	0.050 U	0.5	1,100	17,973	8.4	4.33	--	6.78	
	6/9/2020	361	197	54						**6.4**	**1.0 J**	0.25 U	--	--	1.46	-361.4	0.22 U	0.050 U	0.4	1,200	23,472	12.4	0.89	--	6.99	
	8/26/2020	439	275	132	-51					**5.6**	**5.8**	1.2 U	--	--	0.51	-378.8	0.22 U	0.050 U	0.5	1,200	29,099	18.2	2.71	--	7.00	
	11/19/2020	524	360	217	34					**6.5**	**4.8 J**	0.50 U	--	--	0.80	-339.4	0.22 U	0.050 U	0.5	1,400	28,060	12.4	1.10	--	7.04	
	6/14/2021	731	567	424	241	0				**4.7**	**0.86 J**	0.25 U	0.0020 U	0.0020 U	0.90	-374.7	0.22 U	0.050 U	0.0	1,500	29,886	14.0	1.20	--	7.00	
	7/29/2021	776	612	469	286	45				**3.7**	**1.1 J**	0.25 U	--	--	3.03	-363.8	0.22 U	0.050 U	0.0	1,500	29,706	17.8	0.77	--	6.91	
	10/20/2021	859	695	552	369	128	-34			**3.3 J**	**3.9**	**0.99 J**	--	--	0.42	-323.4	0.22 U	0.050 U	0.0	1,300	34,657	14.6	2.85	--	6.56	
	12/20/2021	920	756	613	430	189	27			(c)	**1.6 J**	0.47	--	--	5.66	-233.2	0.22 U	0.050 U	0.0	1,600	25,406	9.7	2.0	--	6.86	
	1/26/2022	957	793	650	467	226	64			**5.1**	**1.4 J**	0.51 U	--	--	0.0	-282.2	0.22 U	0.050 U	1.25	--	26,373	5.4	5.69	--	6.69	
	2/24/2022	987	823	680	497	256	94			**5.1**	**1.9 J**	0.25 U	--	--	0.35	-320.0	0.22 U	0.050 U	1.25	--	21,573	8.1	6.70	--	6.95	
	4/28/2022	1049	885	742	559	318	156	-26		**4.2 J**	**1.3 J**	0.25 U	0.0020 UJ	0.0029 J	0.14	-355.8	0.22 U	0.050 U	0.0	1,200	24,631	10.1	5.0	--	6.90	
	6/30/2022	1112	948	805	622	381	219	37		**4**	**1.1 J**	0.25 U	--	--	0.60	-418.4	0.22 U	0.050 U	0.0	3,800	13,475	13.7	5.8	--	7.22	
	8/30/2022	1173	1009	866	683	442	280	98	-45	**3.3**	**1 J**	0.25 U	--	--	0.98	-354.2	0.22 U	0.050 U	0.0	1,100	26,564	17.9	0.0	--	7.07	
	12/8/2022	1273	1109	966	783	542	380	198	55	**5 J**	**7.3**	1.2 U	--	--	0.44	-192.0	0.22 U	0.050 U	0.0	1,100	28,981	10.0	--	--	6.97	
MW-8	11/8/2018	Baseline								0.082	**0.62**	0.25 U	0.0020 U	0.0020 U	0.43	-221.9	1.5 UJ	0.34 UJ	0.6	190	5,522	14.3	0.73	2.5	7.15	
	7/15/2019	31								0.097	0.39	0.25 U	0.0020 U	0.0020 U	0.46	-114.1	15	3.4	0.8	25	1,520	19.2	8.64	--	7.55	
	10/7/2019	115	-49							0.05 U	**0.99**	0.25 U	0.0020 U	0.0020 U	0.42	107.8	170	38	0.0	170	1,590	18.0	0.72	--	7.46	
	2/25/2020	256	92	-51						0.05 U	0.26	**0.7**	0.0020 U	0.0020 U	0.12	-50.7	320	72	0.0	400	1,568	11.2	2.08	--	7.57	
	6/9/2020	361	197	54						0.05 U	0.21	0.25 U	--	--	1.01	-112.4	450	102	0.0	360	1,918	14.0	0.15	--	7.49	
	8/26/2020	439	275	132	-51					0.05 U	0.4	0.25 U	--	--	0.44	-122.3	260	59	1.1	400	2,898	18.9	3.01	--	7.34	
	11/19/2020	524	360	217	34					0.05 U	0.14	0.25 U	--	--	1.56	-158.9	1.0	0.23	1.5	220	2,993	14.9	1.08	--	7.38	
	6/14/2021	731	567	424	241	0				--	0.14 J	0.46 J	--	--	0.83	10.0	480	108	0.5	590	2,557	15.5	4.41	--	6.95	
	7/29/2021	776	612	469	286	45				--	0.13 J	0.25 U	--	--	1.50	-42.0	500	113	0.2	640	3,040	19.4	5.25	--	7.14	
	10/20/2021	859	695	552	369	128	-34			--	0.13 U	0.25 U	--	--	0.37	-149.6	4.7	1.1	0.0	180	2,257	17.3	4.41	--	7.15	
	12/20/2021	920	756	613	430	189	27			--	0.13 U	0.25 U	--	--	1.10	-3.3	0.22 U	0.050 U	1.0	380	1,441	13.8	1.70	--	7.70	
	4/28/2022	1049	885	742	559	318	156			0.05 U	0.13 U	0.25 U	--	--	0.12	-71.9	250	57	0.25	480	2,156	13.4	2.60	--	7.20	
MW-9	11/8/2018	Baseline								--	**--**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Not sampled due to NAPL
	7/15/2019	31								--	--	--	--	--	0.62	-13.5	290	66	0.0	84	3,216	19.2	4.66	--	7.42	
	10/7/2019	115	-49							--	--	--	--	--	5.65	96.4	2.5	0.57	1.6	76	1,545	16.9	--	--	7.03	
	2/25/2020	256	92	-51						--	--	--	--	--	0.23	0.3	810	180	0.5	220	2,878	11.9	6.05	--	7.07	
	6/14/2021	731	567	424	241	0				0.45	**6 J**	0.5 U	**0.0042**	0.0023	1.04	11.4	310	70	0.0	620	2,524	16.1	10.89	--	7.00	
	7/29/2021	776	612	469	286	45				0.53 J	**4.8 J**	0.25 U	--	--	0.98	-89.4	64	14	0.0	530	2,752	20.1	10.72	--	7.20	
	10/20/2021	859	695	552	369	128	-34			**1.6 J**	**82**	5 U	--	--	0.46	-166.0	4.4	1.0	0.0	310	1,998	17.5	38.21	--	6.94	
	12/20/2021	920	756	613	430	189	27			**1.8 J**	**16 J**	1.2 U	--	--	2.60	41.1	480	108	0.0	160	1,225	13.5	48.9	--	7.27	
	4/28/2022	1049	885	742	559	318	156	-26		0.46	**8**	0.5 U	--	--	0.13	-60.6	89	20	1.5	170	1,935	13.4	51.9	--	7.13	
	6/30/2022	1112	948	805	622	381	219	37		0.45	**20**	2.5 U	--	--	0.66	-206.0	61	14	7.0	260	1,680	16.4	15.0	--	7.26	
	8/30/2022	1173	1009	866	683	442	280	98	-45	**1.1**	**41**	5 U	--	--	0.97	-28.2	19	4.3	4.0	240	2,072	20.1	51.2	--	7.32	
	12/8/2022	1273	1109	966	783	542	380	198	55	0.2 U	**14**	2.5 U	--	--	0.67	-74.2	796.5	180	4.0	200	2,804	14.8	--	--	7.14	

Table 5
Groundwater Results – Bioremediation Summary
Blaine Marina, Inc.
Blaine, Washington

Well Location	Sampling Date	Elapsed Time from Injection 1 (Days)	Elapsed Time from Injection 2 (Days)	Elapsed Time from Injection 3 (Days)	Elapsed Time from Injection 4 (Days)	Elapsed Time from Injection 5 (Days)	Elapsed Time from Injection 6 (Days)	Elapsed Time from Injection 7 (Days)	Elapsed Time from Injection 8 (Days)	Petroleum Hydrocarbons			Volatiles		Redox Conditions						Aquifer Parameters					Comments
										GRO mg/L	DRO mg/L	ORO mg/L	Benzene mg/L	Naphthalene mg/L	DO mg/L	ORP mV	Nitrate mg/L	Nitrate mg-N/L	Iron II mg/L	Sulfate mg/L	Cond. (µS/cm)	Temp. (°C)	Turbidity (NTU)	TOC mg/L	pH (SU)	
Groundwater Cleanup Level[a]:										0.8	0.5	0.5	0.0024	0.083[b]	--	--	--	--	--	--	--	--	--	--	--	
MW-10	11/8/2018	Baseline								--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Not sampled due to NAPL
	7/15/2019	31								--	--	--	--	--	0.74	-34.7	2.1 J	0.47 J	0.0	32	883	16.8	11.75	--	7.52	
	10/7/2019	115	-49							--	--	--	--	--	2.96	160.4	18	4.1	0.0	90	825	14.6	--	--	7.38	
	2/25/2020	256	92	-51						--	--	--	--	--	0.20	-12.6	580	130	1.0	220	1,618	11.2	6.26	--	7.63	
	6/9/2020	361	197	54						--	--	--	--	--	1.51	-46.0	180	41	0.0	190	1,140	13.0	--	--	7.98	
	8/26/2020	439	275	132	-51					--	--	--	--	--	0.80	-36.7	83	19	0.5	180	1,164	17.8	6.99	--	7.70	
	11/19/2020	524	360	217	34					--	--	--	--	--	1.53	-115.4	470	106	0.0	170	1,300	14.1	32.11	--	7.64	
	6/14/2021	731	567	424	241	0				--	--	--	--	--	0.27	-6.7	580	131	0.0	--	1,383	15.1	3.38	--	7.41	
	7/29/2021	776	612	469	286	45				--	--	--	--	--	1.45	-94.1	300	68	0.0	--	1,498	17.0	7.29	--	7.46	
	10/20/2021	859	695	552	369	128	-34			--	--	--	--	--	0.72	-53.2	110	25	0.0	--	1,144	15.5	18.36	--	7.35	
	12/20/2021	920	756	613	430	189	27			--	--	--	--	--	0.91	32.5	1300	294	0.0	--	1,373	13.1	8.3	--	7.60	
	4/28/2022	1049	885	742	559	318	156	-26		0.19	**37**	2.5 U	--	--	0.49	-62.7	760	172	1.0	60	2,069	11.1	11.6	--	7.40	
	6/30/2022	1112	948	805	622	381	219	37	-106	**7.3**	**200**	25 U	--	--	0.29	77.6	420	95	0.5	120	1,738	15.5	0.93	--	7.23	
	12/8/2022	1273	1109	966	783	542	380	198	55	0.2 U	**65**	5 U	--	--	0.38	-31.6	442.5	100	0.3	150	2,043	12.5	--	--	7.40	
MW-11	11/8/2018	Baseline								0.079	0.13 U	0.25 U	0.0020 U	0.0020 U	1.70	-102.9	31 UJ	7.0 UJ	0.8	2,400	36,231	14.7	0.11	1.0 U	7.13	
	7/15/2019	31								0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	2.92	-41.6	4.3 J	0.97 J	1.2	2,000	31,825	17.5	8.93	--	7.26	
	10/7/2019	115	-49							0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	2.86	138.2	3.3	0.75	0.0	1,800	26,293	15.4	0.16	--	7.29	
	2/25/2020	256	92	-51						0.05 U	0.13 U	0.25 U	0.0020 U	0.0020 U	5.40	15.3	8.1	1.8	0.5	1,600	24,146	8.9	1.89	--	7.45	
	6/9/2020	361	197	54						0.05 U	--	--	--	--	6.06	-134.3	6.7	1.5	0.2	1,500	26,301	12.5	0.00	--	7.51	
	8/26/2020	439	275	132	-51					0.05 U	--	--	--	--	2.55	22.7	5.8	1.3	0.0	1,600	26,840	16.7	1.38	--	7.21	
	11/19/2020	524	360	217	34					0.05 U	--	--	--	--	2.81	-114.6	3.7	0.84	0.5	2,600	31,839	12.8	1.20	--	7.64	
	6/14/2021	731	567	424	241	0				--	--	--	--	--	5.67	-123.4	3.4	0.77	0.0	--	30,802	13.5	0.50	--	7.74	
	7/29/2021	776	612	469	286	45				--	--	--	--	--	2.47	-33.7	3.7	0.84	0.0	--	17,428	16.8	0.00	--	7.39	
	10/20/2021	859	695	552	369	128	-34			--	--	--	--	--	3.64	-95.0	5.0	1.1	0.0	--	35,470	15.6	0.21	--	7.33	
	12/20/2021	920	756	613	430	189	27			--	--	--	--	--	0.16	195.0	4.1	0.93	0.0	--	26,578	10.5	0.38	--	7.47	
	4/28/2022	1049	885	742	559	318	156			0.05 U	0.13 U	0.25 U	--	--	5.21	226.8	2.3	0.52	0.0	1,900	37,799	9.4	0.60	--	7.44	
MW-12	11/8/2018	Baseline								**0.98**	0.18	0.25 U	0.0020 U	0.0020 U	0.10	-291.9	15 UJ	3.4 UJ	0.0	1,700	33,594	15.0	0.88	1.0 U	7.34	
	7/15/2019	31								0.64	0.4	0.25 U	0.0020 U	0.0020 U	0.21	-122.9	170	38	0.0	620	12,938	18.4	3.72	--	8.17	
	10/7/2019	115	-49							0.67 J	**0.61**	0.25 U	0.0023 J	0.0020 UJ	0.14	-115.8	14	3.2	0.2	360	12,568	18.0	9.76	--	8.09	
	2/25/2020	256	92	-51						0.34	0.32	0.25 U	0.0022	0.0025	0.25	54.8	250	57	0.0	420	6,040	9.8	2.23	--	8.05	
	6/9/2020	361	197	54						0.41	0.34	0.25 U	--	--	0.50	-161.8	14	3.2	0.0	430	8,517	14.3	0.47	--	7.85	
	8/26/2020	439	275	132	-51					0.54 J	**0.53**	0.46	--	--	0.10	118.9	0.22 U	0.050 U	1.0	860	19,834	20.1	5.16	--	7.64	
	11/19/2020	524	360	217	34					**0.96**	0.23 J	0.25 U	--	--	0.45	-188.4	4.1	0.93	0.0	1,800	24,028	14.0	24.11	--	7.55	
	6/14/2021	731	567	424	241	0				**0.57**	0.2 J	0.25 U	0.0020 U	0.0020 U	1.51	-180.4	81	18	0.0	1,400	22,153	14.7	1.50	--	7.69	
	7/29/2021	776	612	469	286	45				0.29	0.27 J	0.25 U	--	--	0.25	-128.4	450	102	0.0	980	19,316	19.6	2.47	--	7.47	
	10/20/2021	859	695	552	369	128	-34			0.34	0.17	0.25 U	--	--	0.16	-303.8	0.58	0.13	1.1	1,700	32,056	17.2	6.58	--	7.54	
	12/20/2021	920	756	613	430	189	27			0.38	0.34 J	0.25 U	--	--	2.49	40.5	480	108	0.0	1,300	3,789	13.6	1.10	--	8.02	
	1/26/2022	957	793	650	467	226	64			0.51	0.17	0.25 U	--	--	0.08	-204.8	190	43	0.25	--	24,912	7.85	0.75	--	7.63	
	2/24/2022	987	823	680	497	256	94			0.41	0.46	0.25 U	--	--	0.96	143.5	130	29	0.0	--	16,716	10.3	3.96	--	7.53	
	4/28/2022	1049	885	742	559	318	156	-26		0.47	0.33 J	0.25 U	--	--	0.14	-120.4	88	20	0.0	530	9,298	12.4	3.0	--	7.68	
	6/30/2022	1112	948	805	622	381	219	37		0.36	0.16	0.25 U	--	--	0.26	198.9	2,000	452	0.0	520	13,900	14.7	2.8	--	7.46	
	8/30/2022	1173	1009	866	683	442	280	98	-45	0.29	0.35 J	0.25 U	--	--	1.63	-33.6	530	120	0.5	480	10,634	19.1	5.1	--	7.41	
	12/8/2022	1273	1109	966	783	542	380	198	55	0.45 J	0.46	0.25 U	--	--	0.08	-212.8	0.22 U	0.050 U	0.5	1,600	28,156	14.0	--	--	7.46	

Table 5
Groundwater Results – Bioremediation Summary
Blaine Marina, Inc.
Blaine, Washington

Well Location	Sampling Date	Elapsed Time from Injection 1 (Days)	Elapsed Time from Injection 2 (Days)	Elapsed Time from Injection 3 (Days)	Elapsed Time from Injection 4 (Days)	Elapsed Time from Injection 5 (Days)	Elapsed Time from Injection 6 (Days)	Elapsed Time from Injection 7 (Days)	Elapsed Time from Injection 8 (Days)	Petroleum Hydrocarbons			Volatiles		Redox Conditions						Aquifer Parameters					Comments
										GRO mg/L	DRO mg/L	ORO mg/L	Benzene mg/L	Naphthalene mg/L	DO mg/L	ORP mV	Nitrate mg/L	Nitrate mg-N/L	Iron II mg/L	Sulfate mg/L	Cond. (µS/cm)	Temp. (°C)	Turbidity (NTU)	TOC mg/L	pH (SU)	
Groundwater Cleanup Level[a]:										0.8	0.5	0.5	0.0024	0.083[b]	--	--	--	--	--	--	--	--	--	--	--	
MW-13	11/8/2018	Baseline								0.74	**3.2**	0.41 J	**0.0029**	0.0048	0.13	25.4	0.15 UJ	0.034 UJ	0.0	98	4,085	15.1	18.74	8.8	7.03	
	7/15/2019	31								0.22	**0.51**	0.25 U	0.0020 U	0.0024	0.36	129.4	1,200	270	0.0	69	3,412	18.9	3.83	--	7.53	
	10/7/2019	115	-49							0.05 U	**0.99**	0.25 U	**0.018**	0.0020 U	0.20	22.0	900	200	0.0	330	2,533	16.5	62.02	--	7.78	
	2/25/2020	256	92	-51						0.094	0.13 U	0.25 U	0.0020 U	0.0021	0.26	63.4	860	190	0.0	130	2,535	10.8	1.42	--	7.21	
	6/9/2020	361	197	54						0.067	0.15	0.25 U	--	--	0.53	-7.4	2,100	480	0.0	120	4,046	14.8	0.21	--	7.12	
	8/26/2020	439	275	132	-51					0.073	0.43 J	**0.9**	--	--	0.18	50.5	1,300	290	0.0	280	3,940	20.2	3.99	--	7.09	
	11/19/2020	524	360	217	34					0.15	0.13 U	0.25 U	--	--	0.49	28.9	12	2.7	0.0	87	1,339	14.7	0.00	--	7.13	
	6/14/2021	731	567	424	241	0				0.052	0.13	0.25 U	0.0020 U	0.0020 U	0.31	9.7	420	95	0.0	250	2,955	15.6	1.12	--	6.96	
	7/29/2021	776	612	469	286	45				0.05 U	0.17 J	0.27	--	--	0.03	-133.2	2100	475	0.1	220	5,443	19.2	1.17	--	6.83	
	10/20/2021	859	695	552	369	128	-34			0.05 U	0.13 U	0.25 U	--	--	0.42	-215.4	500	113	0.0	490	3,621	17.1	2.75	--	6.90	
	12/20/2021	920	756	613	430	189	27			0.05 U	0.13 U	0.27	--	--	1.43	52.5	1,900	429	0.0	200	1,880	13.0	1.70	--	7.26	
	4/28/2022	1049	885	742	559	318	156	-26		0.05 U	0.13 U	0.25 U	**0.0025**	0.0020 U	0.70	128.1	1,900	429	0.0	180	5,493	11.5	1.2	--	6.93	
	6/30/2022	1112	948	805	622	381	219	37		0.05 U	0.15 J	0.45	--	--	0.73	213.1	2,800	633	0.0	150	6,494	15.5	0.3	--	6.76	
	8/30/2022	1173	1009	866	683	442	280	98	-45	0.05 U	0.21	0.25 U	--	--	0.68	-6.4	2,900	655	0.0	210	7,630	19.1	2.9	--	6.93	
	12/8/2022	1273	1109	966	783	542	380	198	55	0.05 U	**0.61**	0.28	--	--	2.69	-11.9	1,814	410	0.0	360	4,665	14.7	--	--	6.89	
MW-14	11/8/2018	Baseline								0.58	**2.2**	0.37 J	**0.042**	0.0069	0.97	150.1	0.15 UJ	0.034 UJ	0.0	55	1,160	14.5	0.71	15	7.02	
	7/15/2019	31								0.17	**0.57**	0.25 U	**0.021**	0.0025	0.30	85.6	1,800	410	0.0	35	3,832	21.1	1.37	--	6.70	
	10/7/2019	115	-49							0.17	**2**	0.25 U	**0.023**	0.0032	0.23	70.1	690	160	0.0	46	1,733	18.9	1.04	--	6.88	
	2/25/2020	256	92	-51						0.086	0.23	0.25 U	0.0020 U	0.0021	0.30	28.5	30	7	0.0	31	706	9.4	1.23	--	7.11	
	6/9/2020	361	197	54						0.15	**1.1**	**0.52**	--	--	0.66	-16.2	940	210	0.0	31	2,246	15.4	0.65	--	6.95	
	8/26/2020	439	275	132	-51					0.11	**1.4**	0.5	--	--	0.29	94.2	950	215	0.0	22	2,514	21.3	3.38	--	6.85	
	11/19/2020	524	360	217	34					0.074 J	**0.76**	0.25 U	--	--	0.52	36.0	59	13	0.0	52	1,279	13.9	0.38	--	6.84	
	6/14/2021	731	567	424	241	0				0.078	0.42	0.33	0.0020 U	0.0020 U	0.49	3.5	42	9.5	0.0	29	1,046	15.8	1.11	--	6.97	
	7/29/2021	776	612	469	286	45				0.16 J	**1.4 J**	0.25 U	--	--	0.51	-125.7	670	151	0.0	54	2,250	21.2	1.01	--	6.80	
	10/20/2021	859	695	552	369	128	-34			0.087 J	**0.6**	0.25 U	--	--	0.67	-45.4	240	54	0.0	54	1,662	16.5	3.07	--	6.84	
	12/20/2021	920	756	613	430	189	27			R	0.43 J	0.25 U	--	--	2.07	54.5	150	34	0.0	62	1,020	12.6	5.60	--	7.16	
	4/28/2022	1049	885	742	559	318	156	-26		0.05 U	0.25	0.25 U	0.0020 U	0.0020 U	0.53	106.5	130	29	0.0	47	1,384	11.5	0.00	--	7.05	
	6/30/2022	1112	948	805	622	381	219	37		0.05 U	0.19	0.25 U	--	--	0.32	160.9	920	208	0.5	51	2,930	16.6	0.60	--	6.79	
	8/30/2022	1173	1009	866	683	442	280	98	-45	0.059	**0.87**	0.31 J	--	--	0.47	-6.9	700	158	0.0	61	3,456	19.6	2.5	--	6.94	
	12/8/2022	1273	1109	966	783	542	380	198	55	0.05 U	**4.2**	1.2 U	--	--	0.81	0.0	841	190	0.0	52	2,649	13.5	--	--	7.03	

Notes:

All reported results are from post-source removal, which occurred in summer 2018.

(a) Cleanup level based on lowest Water Quality Standard or Practical Quantitation Limit.

(b) Cleanup level based on total naphthalenes.

(c) Due to a laboratory instrument failure, the analysis for the analyte was incomplete.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

R = The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

Bold = detected concentration is greater than the associated screening level.

-- = not analyzed

Abbreviations and Acronyms:

µS/cm = microSiemens per centimeter
°C = degrees Celsius
calc. = calculated
Cond. = conductivity
DO = dissolved oxygen
DRO = diesel-range organics
GRO = gasoline-range organics
mg/L = milligrams per liter
mg-N/L = milligrams nitrogen per liter
mV = millivolts
NAPL = non-aqueous phase liquid
NTU = nephelometric turbidity units
ORO = oil-range organics
ORP = oxidation-reduction potential
SU = standard unit
Temp. = temperature
TOC = total organic carbon

Table 6
Surface Water Analytical Results
Blaine Marina, Inc.
Blaine, Washington

Sampling Location	Laboratory Sample ID	Sampling Date	Analytical Method, Analyte, Unit of Measurement, Screening Level					
			EPA 300.0 Nitrate mg/L	Calc. Nitrate mg-N/L	EPA 300.0 Nitrite mg/L	Calc. Nitrite mg-N/L	Calc. Nitrate+Nitrite mg-N/L	EPA 350.1 Ammonia mg/L
			N/A	N/A	N/A	N/A	20	N/A
SW-1	EV18100074-01	10/9/2018	1.5 U	0.34 U	1.4 U	0.043 U	0.34 U	0.060
SW-2	EV18100074-02	10/9/2018	1.5 U	0.34 U	1.4 U	0.043 U	0.34 U	0.051
SW-1	EV19070105-01	7/15/2019	1.8	0.41	14 U	0.43 U	0.41	--
SW-1	EV19100044-01	10/7/2019	1.5 U	0.34 U	71 U	2.2 U	2.2 U	--
SW-2	EV19070105-02	7/15/2019	1.5 U	0.34 U	14 U	0.43 U	0.43 U	--
SW-2	EV19100044-02	10/7/2019	1.5 U	0.34 U	71 U	2.2 U	2.2 U	--
SW-2	02-259-01	2/25/2020	2.0	0.45	0.066 U	0.002 U	0.45	--
SW-3	02-259-02	2/25/2020	1.8	0.41	0.066 U	0.002 U	0.41	--
SW-2	06-111-01	6/9/2020	1.0	0.23	0.066 U	0.002 U	0.23	--
SW-3	06-111-02	6/9/2020	1.1	0.25	0.066 U	0.002 U	0.25	--
SW-2	08-266-01	8/26/2020	0.22 U	0.050 U	0.066 U	0.002 U	0.050 U	--
SW-3	08-266-02	8/26/2020	0.22 U	0.050 U	0.066 U	0.002 U	0.050 U	--
SW-2	11-209-01	11/19/2020	2.0	0.45	0.066 U	0.002 U	0.45	--
SW-3	11-209-02	11/19/2020	2.0	0.45	0.066 U	0.002 U	0.45	--
SW-2	06-131-11	6/14/2021	0.22 U	0.050 U	0.066 U	0.002 U	0.050 U	--
SW-3	06-131-12	6/14/2021	0.22 U	0.050 U	0.066 U	0.002 U	0.050 U	--
SW-2	07-307-02	7/29/2021	0.42	0.09	0.066 U	0.002 U	0.09	--
SW-3	07-307-01	7/29/2021	0.55	0.12	0.066 U	0.002 U	0.12	--
SW-2	2110-187-01	10/20/2021	1.2	0.27	0.066 U	0.002 U	0.27	--
SW-3	2110-187-02	10/20/2021	1.4	0.32	0.066 U	0.002 U	0.32	--
SW-2	2112-217-01	12/20/2021	2.1	0.47	0.066 U	0.002 U	0.47	--
SW-3	2112-217-02	12/20/2021	2.3	0.52	0.066 U	0.002 U	0.52	--
SW-2	2204-325-01	4/28/2022	0.22 U	0.050 U	0.066 U	0.002 U	0.050 U	--
SW-3	2204-325-02	4/28/2022	0.22 U	0.050 U	0.066 U	0.002 U	0.050 U	--
SW-2	2207-007-01	6/30/2022	0.33	0.075	0.066 U	0.002 U	0.075	--
SW-3	2207-007-02	6/30/2022	0.28	0.063	0.066 U	0.002 U	0.063	--
SW-2	2208-336-01	8/30/2022	0.22 U	0.050 U	0.066 U	0.002 U	0.050 U	--
SW-3	2208-336-02	8/30/2022	0.22 U	0.050 U	0.066 U	0.002 U	0.050 U	--
SW-2	2212-096-01	12/8/2022	1.64	0.37	0.66 U	0.020 U	0.37	--
SW-3	2212-096-02	12/8/2022	1.59	0.36	0.66 U	0.020 U	0.36	--

Note:

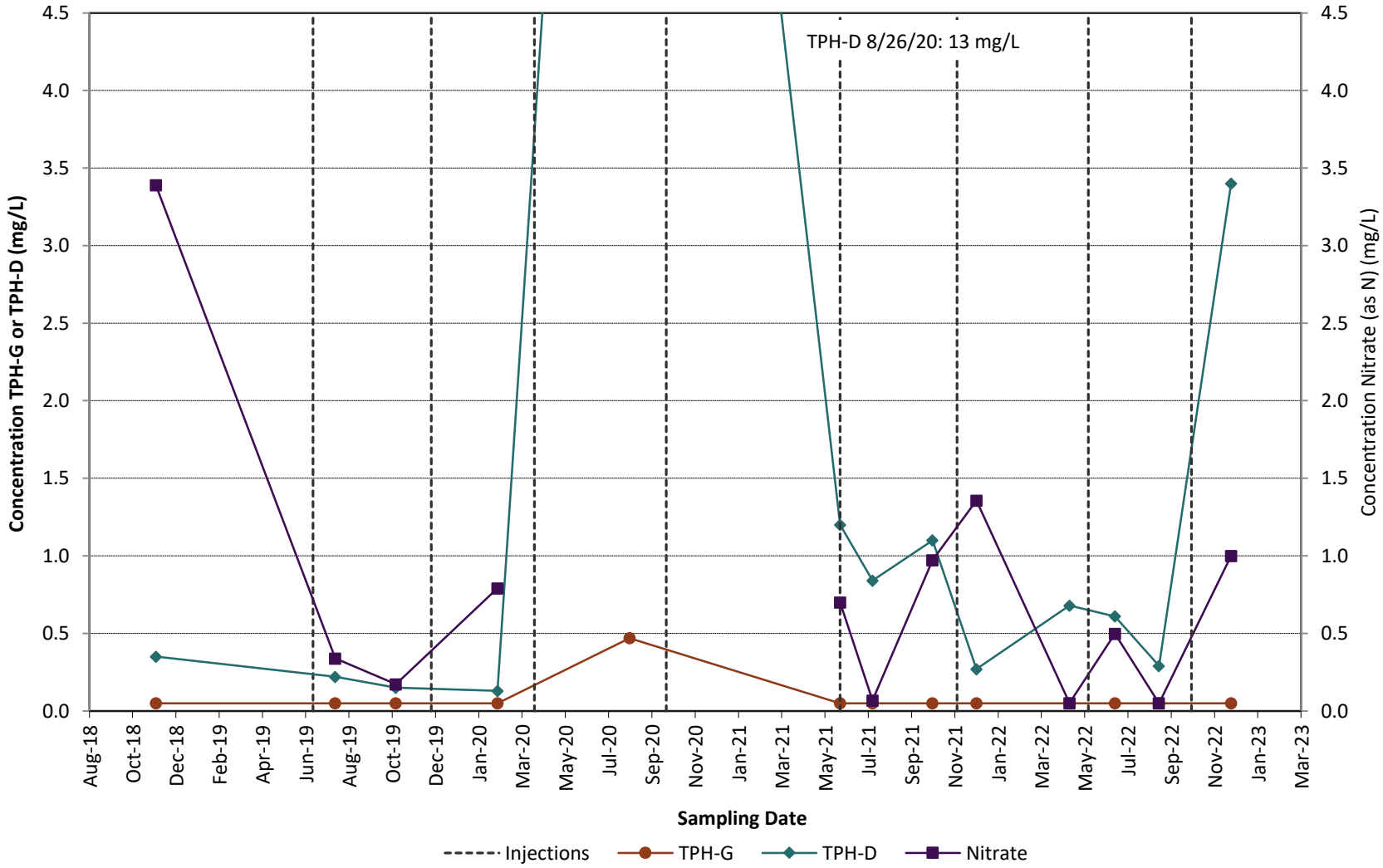
U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

Abbreviations and Acronyms:

-- = not analyzed
calc. = calculated
EPA = US Environmental Protection Agency
ID = identification
mg/L = milligrams per liter
mg-N/L = milligrams nitrogen per liter
N/A = not applicable

APPENDIX A

Time vs. Concentration Plots



Blaine Marina, Inc. Site Blaine, Washington	**MW-5**	Figure **A-1**

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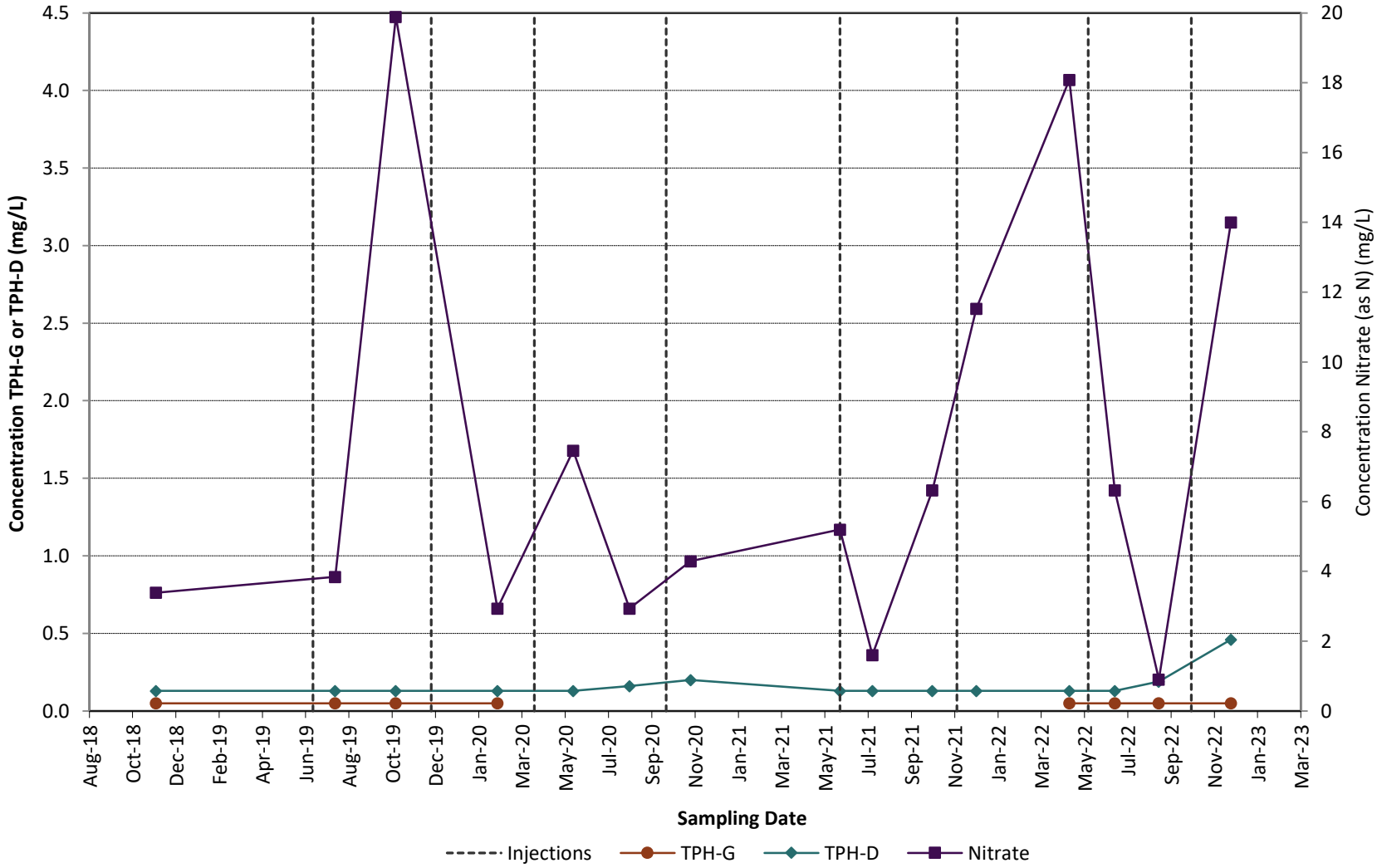
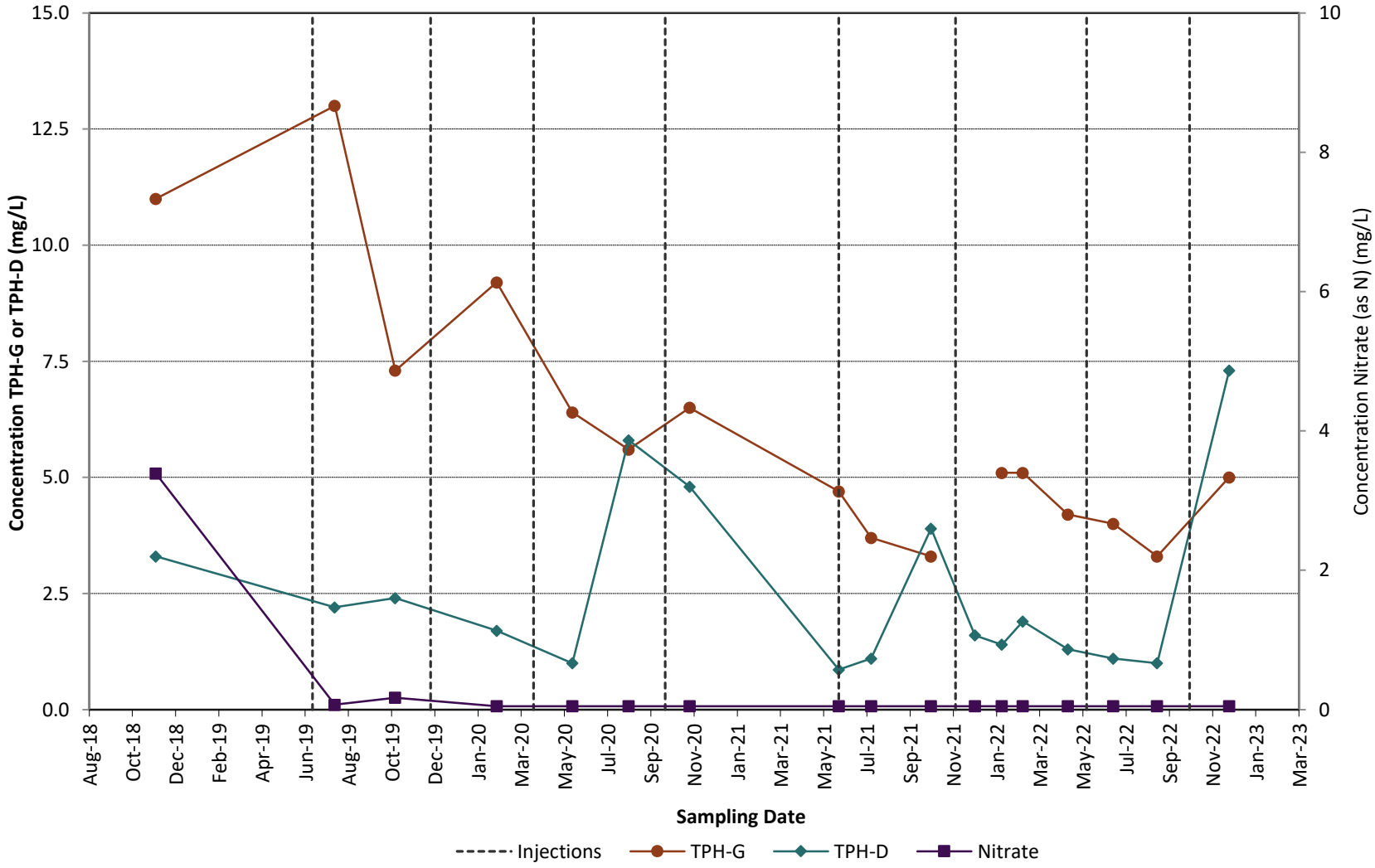


Blaine Marina, Inc. Site Blaine, Washington	**MW-6**	Figure **A-2**

LANDAU ASSOCIATES



Blaine Marina, Inc. Site Blaine, Washington	**MW-7**	Figure **A-3**

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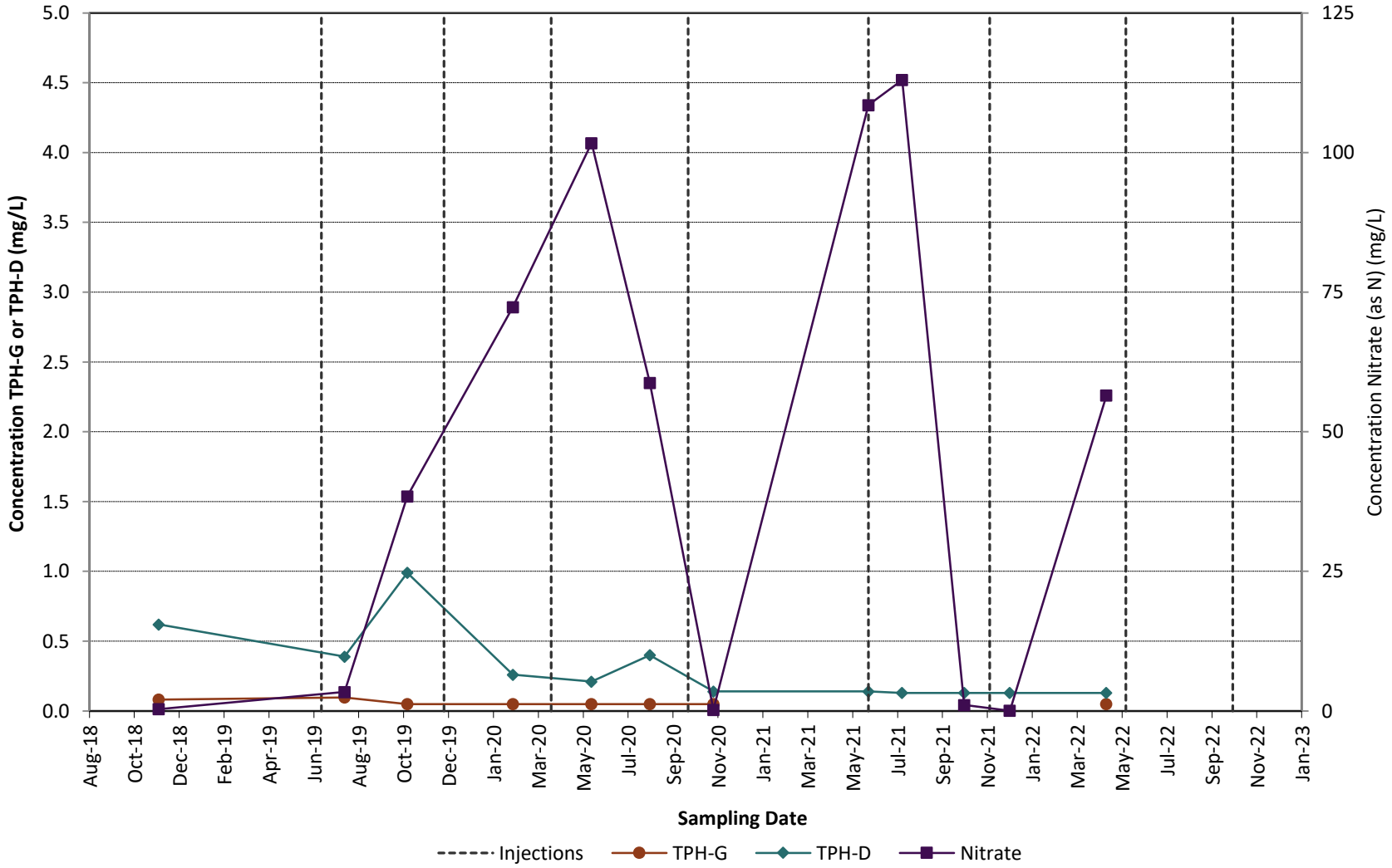
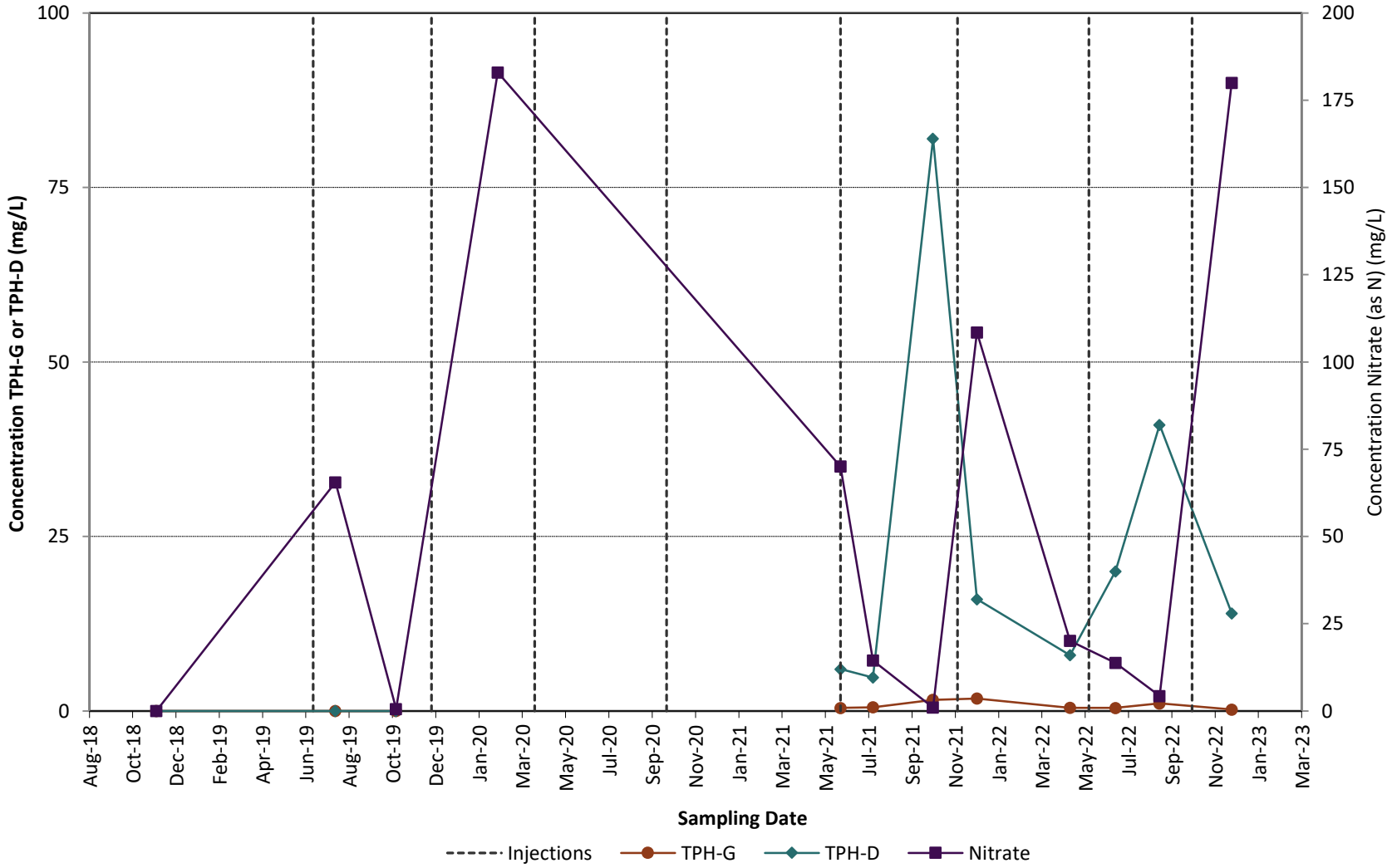


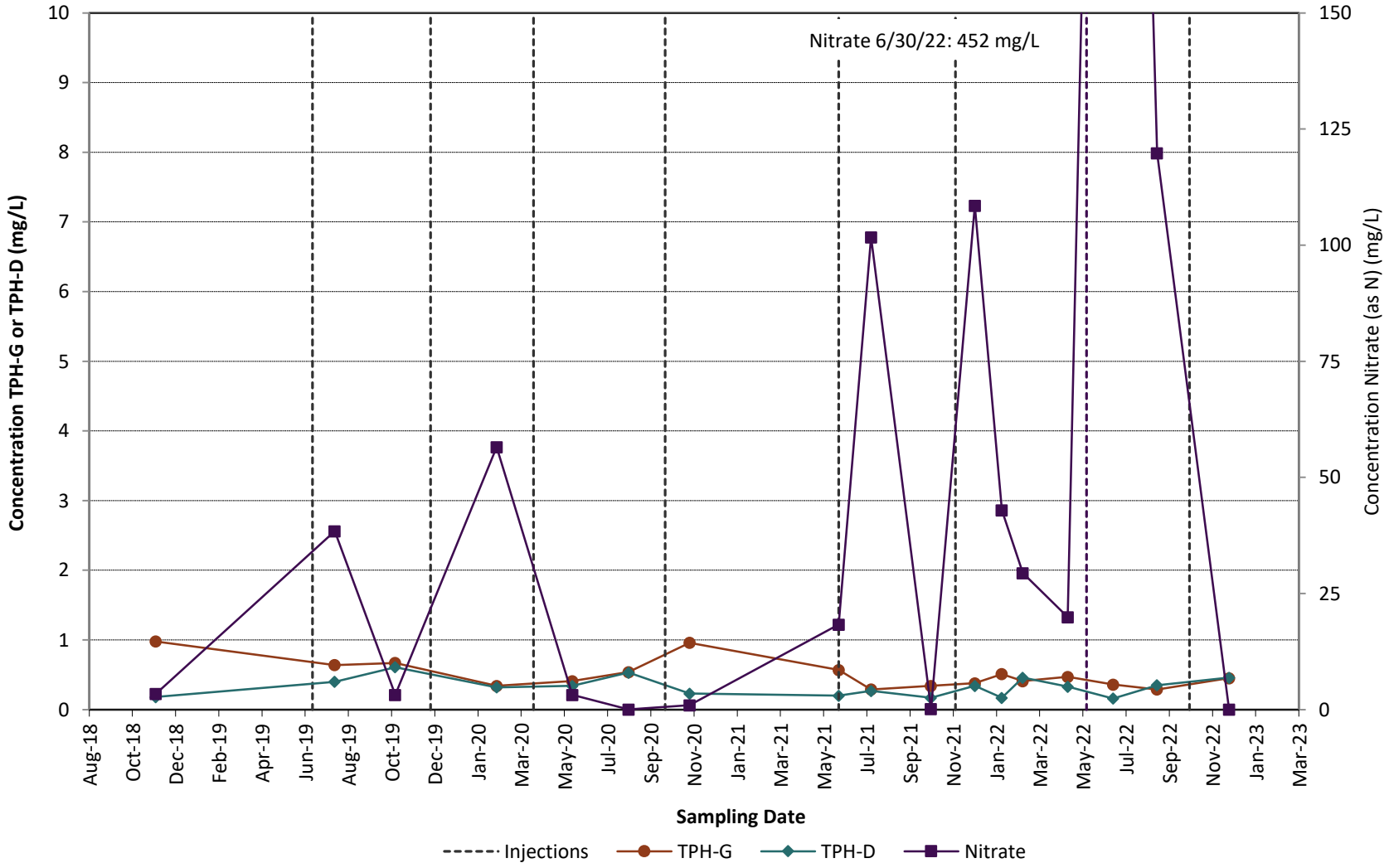
Blaine Marina, Inc. Site Blaine, Washington	**MW-8**	Figure **A-4**

LANDAU ASSOCIATES



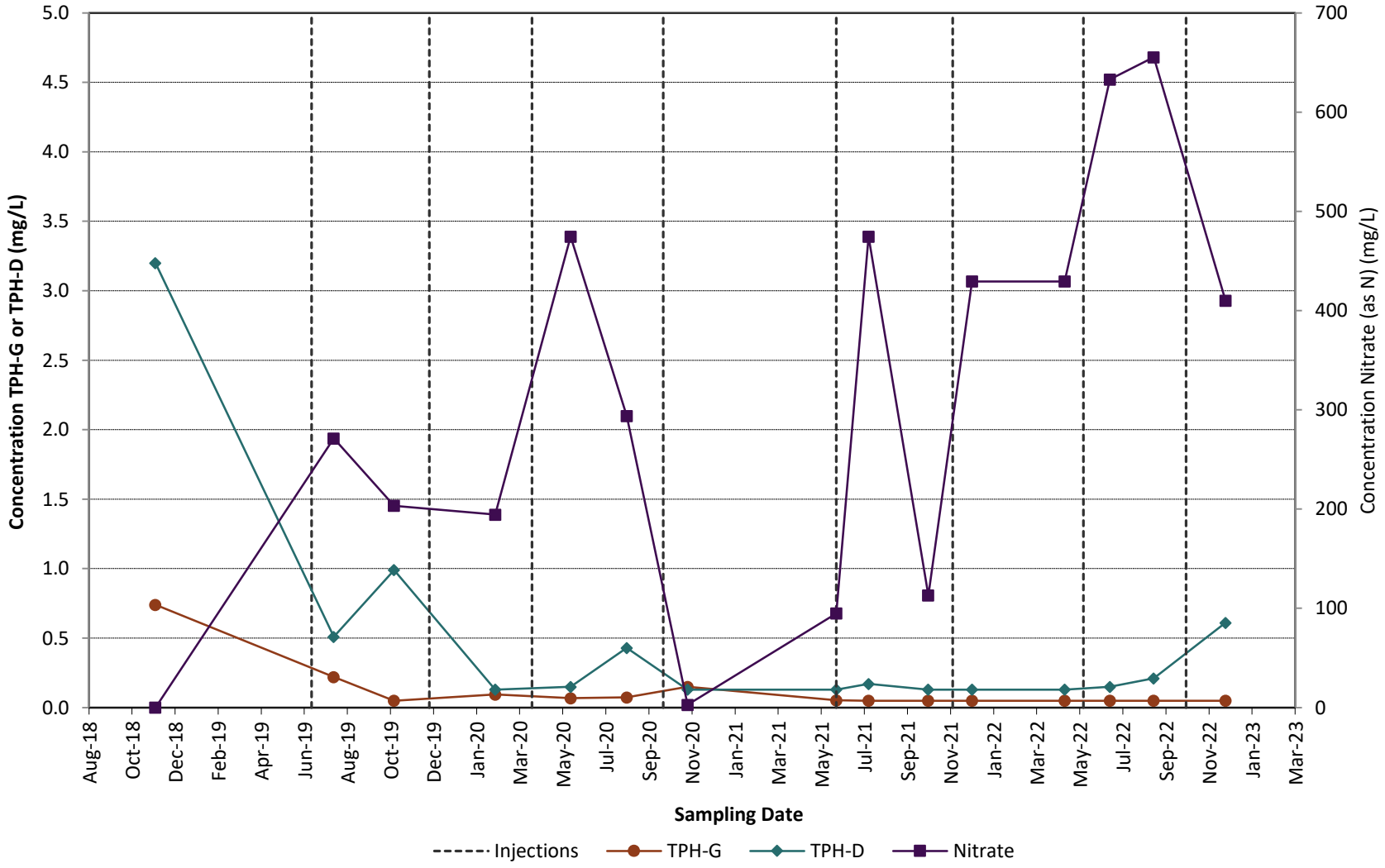
Blaine Marina, Inc. Site Blaine, Washington	**MW-9**	Figure **A-5**

LANDAU ASSOCIATES



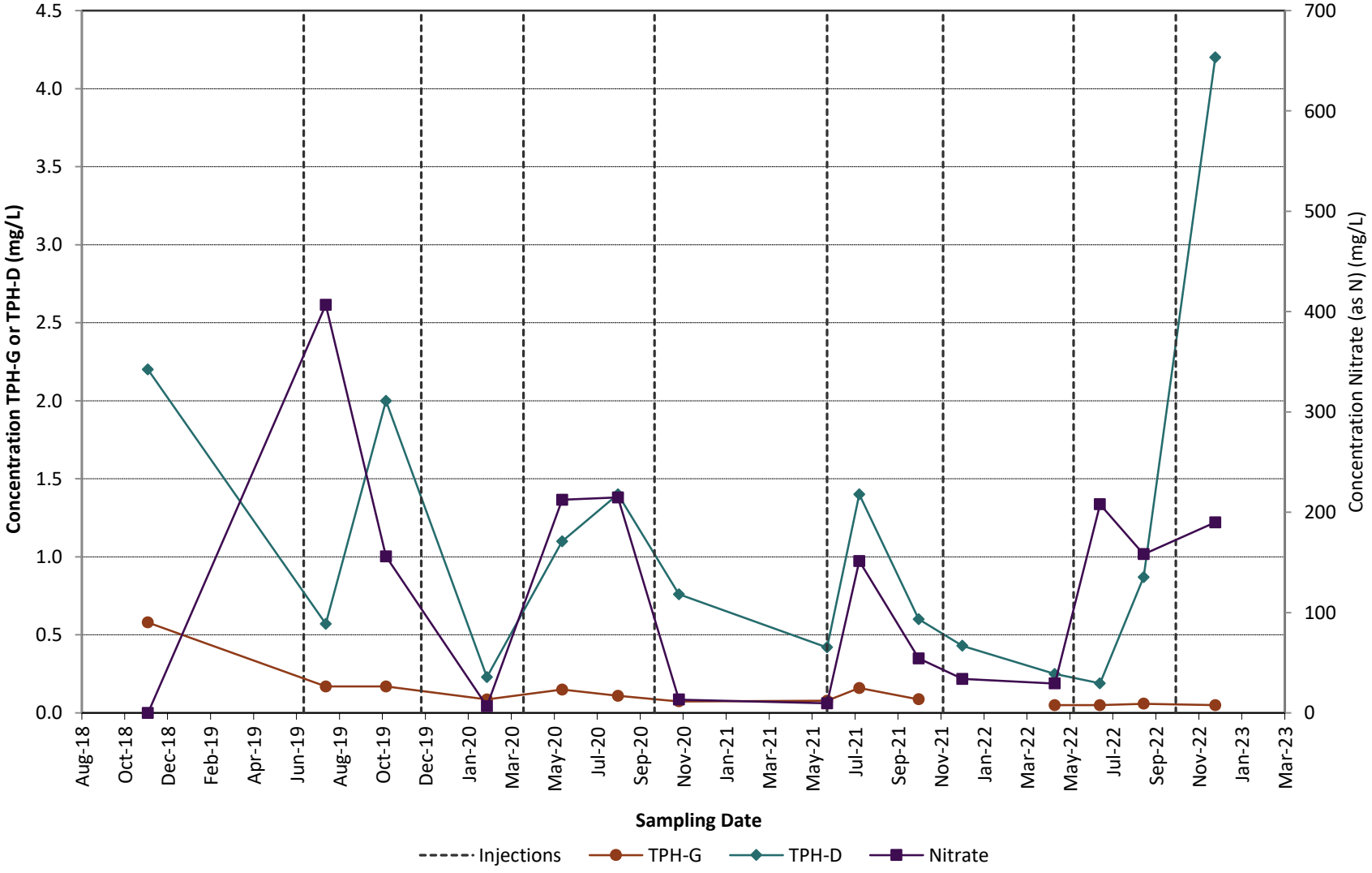
Blaine Marina, Inc. Site Blaine, Washington	**MW-12**	Figure **A-6**

LANDAU ASSOCIATES



Blaine Marina, Inc. Site Blaine, Washington	**MW-13**	Figure **A-7**

LANDAU ASSOCIATES



Blaine Marina, Inc. Site Blaine, Washington	**MW-14**	Figure **A-8**

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APPENDIX B

Restoration Timeframe Analysis

Table 1
Regression Summary of Calculated Restoration Timeframes
Blaine Marina, Inc.
Blaine, Washington

TPH Regression Summary

Well		Slope (1/yr)	Y-intercept	R2	ln(CUL)	X-intercept	Restoration Timeframe (yrs)	Notes
MW-7	1	-0.2479	512.03	0.4879	8.25	2032	14	Target of additional infiltration trenches
MW-12	2	-0.1490	309.89	0.3625	8.25	2024	6	Concentrations are low and highly variable, but generally declining
MW-13	3	--	--	--	--	--	--	Cleanup levels achieved
MW-14	4	-0.1581	328.43	0.0548	8.25	2025	7	Concentrations are low and highly variable, but generally declining
Sample Size		3	3	3.0000		3	3	
Maximum		-0.1490	512.0	0.4879		2032	14	
Minimum		-0.2479	309.9	0.0548		2024	6	
Median		-0.1581	328.4	0.3625		2025	7	
Average		-0.1850	383.5	0.3017		2027	9	
Standard Deviation		0.0446	91.2	0.1820		4	4	
95% Confidence Interval		0.1109	226.6	0.4520		9	9	

Restoration timeframe: **2027 (+/- 9) years** **9 (+/- 9) years**

Table 1
Regression Summary of Calculated Restoration Timeframes
Blaine Marina, Inc.
Blaine, Washington

GRO Regression Summary

Well		Slope (1/yr)	Y-intercept	R2	ln(CUL)	X-intercept	Restoration Timeframe (yrs)	Notes
MW-7	1	-0.3214	660.34	0.7882	8.72	2027	9	Target of additional infiltration trenches
MW-12	2	--	--	--	--	--	--	Cleanup level already achieved
MW-13	3	--	--	--	--	--	--	Cleanup level already achieved
MW-14	4	--	--	--	--	--	--	Cleanup level already achieved

Restoration timeframe:	**2027**	**9**

Table 1
Regression Summary of Calculated Restoration Timeframes
Blaine Marina, Inc.
Blaine, Washington

DRO Regression Summary

Well		Slope (1/yr)	Y-intercept	R2	ln(CUL)	X-intercept	Restoration Timeframe (yrs)	Notes
MW-5	1	-1.5936	3230.9	0.7409	8.25	2022.2	4	Spike in concentrations in December 2022; data point not used for regression
MW-7	2	-0.7563	1538.7	0.4964	8.25	2023.6	6	Spike in concentrations/sheen observed in December 2022; data point not used for regression
MW-8	3	--	--	--	--	--	--	Cleanup level achieved
MW-9	4	-0.7180	1464.1	0.1354	8.25	2027.6	10	Data is variable, but generally declining
MW-12	5	--	--	--	--	--	--	Cleanup level achieved
MW-13	6	--	--	--	--	--	--	Cleanup level achieved
MW-14	7	-0.1241	259.51	0.0291	8.25	2024.6	7	Data is low and highly variable, but generally declining
Sample Size		4	4	4		4	4	
Maximum		-0.1241	3231	0.7409		2028	10	
Minimum		-1.5936	260	0.0291		2022	4	
Median		-0.7372	1501	0.3159		2024	6	
Average		-0.7980	1623	0.3505		2025	7	
Standard Deviation		0.5233	1058	0.2843		2	2	
95% Confidence Interval		0.8326	1683	0.4524		3	3	

Restoration timeframe: **2025 (+/- 3) years** **7 (+/- 3) years**