SITE CHARACTERIZATION INVESTIGATION
CULTURAL IMMERSION PARK
4400/4402 THANE ROAD, JUNEAU, ALASKA

FILE #1513.38.125

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Prepared for:

City and Borough of Juneau, Docks & Harbors
155 S. Seward Street
Juneau, Alaska 99801

Prepared by:

NORTECH

Accounting Office
2400 College Road
Fairbanks, Alaska 99709
p. 907.452.5688
f. 907.452.5694

3105 Lakeshore Dr, Ste A106
Anchorage, Alaska 99517
p. 907.222.2445
f. 907.222.0915

Managing Office
5438 Shaune Dr, Ste B
Juneau, Alaska 99801
p: 907.586.6813
f: 907.586.6819

www.nortechengr.com

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1.0 EXECUTIVE SUMMARY

The City and Borough of Juneau (CBJ) Docks and Harbors (CBJ-DH) owns the properties located at 4400 and 4402 Thane Rd, in Juneau Alaska (herein Site). Potential petroleum soil contamination was identified at the Site in 2019 within a test pit excavation completed as part of a septic drain field geotechnical investigation. ***NORTECH*** confirmed groundwater contamination by diesel range organics (DRO) above applicable cleanup levels in 2020.

The Alaska Department of Environmental Conservation (ADEC) requested that CBJ-DH complete a Site Characterization Investigation of the Site with intent to delineate the extents of soil and groundwater contamination at the Site. CBJ contracted ***NORTECH*** to develop and implement the Site Characterization Investigation. In April, 2023, ***NORTECH*** oversaw the installation and sampling of soil borings and groundwater monitoring wells at the Site in accordance w/ an ADEC approved Site Characterization Workplan.

This investigation included the installation of 12 soil borings and five groundwater monitoring wells at the Site. Field screening was conducted of soils throughout the length of each soil boring and one laboratory soil sample was collected from each soil boring at the location of the highest field screening result. Groundwater monitoring wells were also installed in five of the twelve boring locations and sampled as part of the investigation. ***NORTECH*** also completed a wellhead elevation survey of the monitoring wells. All soil and groundwater samples were analyzed for diesel range organics (DRO), gasoline range organics (GRO) and volatile organic compounds (VOC). Selected soil and groundwater samples were additionally analyzed for polycyclic aromatic hydrocarbon (PAH) contaminants.

DRO was detected in five soil borings (SB1 through SB5), with concentrations in samples SB1 through SB4 exceeding the ADEC Migration to Groundwater Cleanup Level (MTG-CL). GRO was detected in two boring samples below MTG-CL. A total of five PAH analytes (1-methylnaphthalene, acenaphthene, fluorene, phenanthrene and pyrene) were detected in one or more soil samples, all in concentrations below MTG-CLs. No VOC analytes were detected in any soil samples. Field screening and laboratory analysis show that soil contamination extends below the current water table depth indicating that a smear zone is present beneath the Site.

DRO was detected in one well (MW1 and duplicate MW11) in concentrations below the ADEC Groundwater Cleanup Level (GW-CL). DRO was not detected in any of the other wells. GRO was not detected in any of the water samples. Similarly, no VOC or PAH contaminants were detected in any water samples.

An estimated volume of between 250 and 470 cubic yards soil contamination remains in place at the Site. No definitive source for the contamination has been noted. Laboratory results indicate soil contamination has not impacted Site groundwater in concentrations above Table C Cleanup Levels. The Conceptual Site Model indicates that open exposure pathways are unlikely to impact human health or the environment. ***NORTECH*** recommends that CBJ Docks and Harbors consider either full site remediation, or negotiating institutional control measures with ADEC.

2.0 BACKGROUND

2.1 Site Location and Description

The Site is located at 58°15'44.44" north latitude and 134°19'47.77" west longitude, in Thane, Alaska, approximately three miles southeast of Juneau, Alaska. The Site is comprised of three land parcels which are legally described as Alaska Tidelands Survey (ATS) 1328 TR B1, ATS 1328 Tract B2, and ATS 1570 Tract B3B. Two addresses, 4400 and 4402 Thane Road are associated with these land parcels (Figure 2). The City and Borough of Juneau, Docks and Harbors (CBJ-D&H) is the owner of these properties. Collectively, the three land parcels total 2.05 acres in area.

Parcels 1328 TR B1 and 1328 TR B2 have been leased by CCTHITA. They plan to develop the properties as a Cultural Immersion Park (herein Immersion Park). These parcels are associated with the former Thane Ore House building with a physical address of 4400 Thane Road. The former Ore House building was demolished via controlled burning in 2017 and only the concrete building foundation remains.

Parcel 1570 TR B3B is associated with the former Echo Bay Mining Company warehouse (herein warehouse property) and has a physical address 4402 Thane Road. This property is leased to Alaska Juneau Treadwell Mining Properties (AJT) and subleased by AJT to CCTHITA. The warehouse property is developed with one primary building (the warehouse) and two smaller storage shed structures. The warehouse building was constructed in 1982 by Echo Bay Mining Company who operated a mine assay laboratory at the Site and used the building for the storage of mining core samples and equipment.

2.1.1 Site Climate

Juneau has a maritime climate marked by relatively long and cold winters and mild summers. Juneau has an average yearly low temperature of 36 degrees (°) Fahrenheit (F), with an average low of 24° F in January. The yearly average high temperature is 48.1° F, with an average high of 63° F in August. Juneau has an average yearly temperature of 42° F and receives an average equivalent rainfall of 62 inches of precipitation a year.

2.1.2 Site Geology

The City and Borough of Juneau is located within the Coast Range Physiographic Province which includes numerous mountainous islands of the Alexander Archipelago and the mainland coastal mountains. Bedrock in Juneau area is primarily comprised of Cretaceous to Permian aged, steeply dipping metamorphic marine and volcanic marine accretionary sediments (slate, phyllite and greenschist) with granitic intrusive rocks exposed in the higher mountain peaks. Quaternary aged glacial sedimentary deposits are present throughout the region. In general, these deposits are shallow on the slopes, but much deeper in the valley bottoms and along the coastal margins.

The Site is located within the Juneau gold belt, an extensive gold-laden area that was mined from 1869-1944. The Site is located on a low-lying terraced bench at the base of Mount Roberts along the shore of Gastineau Channel. The “Soils of the Juneau Area” soil survey shows the Site is situated on the mapped soil unit ML, (Made Land). Previous investigations at the Site show the terraced bench is comprised of fine grained mine tailings, primarily sand, originating from the surrounding gold mining operations from the early 20th century. A thin organic soil

horizon overlies the mine tailings. Marine very fine sandy silt sediments containing abundant shell fragments lie directly beneath the tailings.

2.1.3 Site Groundwater and Surface Water

Groundwater beneath the Site exists within an unconfined aquifer within the tailing deposits. The groundwater elevation is directly influenced by precipitation, surface infiltration, and runoff from the mountain slopes to the northeast. During periods of high precipitation and/or seasonal snow melt, significant recharge to the aquifer occurs and the water table rises to less than five feet below the ground surface. Groundwater beneath the Site flows in a south direction at a hydraulic gradient of 0.02875 feet per foot.

The nearest surface water body to the Site is the Gastineau Channel. Gastineau Channel is a deepwater marine channel located south of the Site. Two narrow tidal embayments of Gastineau Channel exist to the west of the Site. Gastineau Channel is tidally influenced and as such, the distance between the Site and this water body varies between less than 100 to more than 600 feet depending on the tidal stage. Sheep Creek is the nearest non-marine surface water course and is located approximately 1000 feet south-east of the Site. Numerous ephemeral creeks and springs exist north of the Site emanating from the slopes of Mount Roberts. Surface water drainage from Thane Road travels down-hill and through the Site in the direction of the Gastineau Channel. However, due to the very porous nature of the sandy tailings on which the Site is situated, most incoming precipitation is expected to infiltrate directly into the ground.

2.2 Site History

Between 1912 and 1920, the Site and the surrounding area was used as a tailings disposal site that received milling residuals. As a result, the adjacent property at 4404 Thane Road was listed on the ADEC Contaminated Sites Program (CSP) Database under name – “Alaska Gastineau Mine Tailings”; ADEC File Number 1513.38.013. After site investigations completed by ***NORTECH*** (described in Section 3.2), the contaminated site “Alaska Gastineau Mine Tailings” was given a “Cleanup Complete” status.

The Immersion Park property was formerly leased from CBJ D&H to George Jefferson who operated a restaurant and event center at the former Ore House building which was constructed in 1982. The building continued operating in the same capacity until approximately 2010 or 2011. The Ore House building was demolished via controlled burn in 2017. At present, only the concrete foundation of the former building remains at the Site. This property is currently leased to CCHITA.

The warehouse property is developed with one primary building (the warehouse) and two smaller storage shed structures. The warehouse building was constructed in 1982 by Echo Bay Mining Company who operated a mine assay laboratory at the Site and used the building for the storage of mining core samples and equipment. In 1998, AJT Mining Company purchased the Warehouse building. Between 2002 and 2010, the warehouse building was sub-leased to R&S Pumping who operated a septic pumping service and portable toilet rental and servicing company at the Site. Between 2010 and 2016, the warehouse building was sub-leased to G3 Design. The upstairs portion of the building was used as an apartment and the downstairs portion of the building was used as offices. The garage portion of the structure was used for metal fabrication and classic automotive restoration.

2.3 Prior Site Activities

2.3.1 2013

In 2013, ***NORTECH*** completed an environmental site assessment at the "Alaska Gastineau Mine Tailings" Site which includes the subject property. The investigations included sampling of the mine tailing soils and portions of the adjacent properties as well as the collection of marine biota samples (worms, clams, and mussels) for metals analysis. The findings of the investigations concluded that metals were present within the tailings, but that concentrations were below the ADEC Method II Cleanup Levels. Although no site-specific sediment cleanup criteria were established for the site, the biotic sampling did not indicate a conclusive trend or elevated levels of metals documented in marine ecological receptors.

2.3.2 2017

NORTECH completed a Phase I Environmental Site Assessment (ESA-I) for at the Site in 2017. ***NORTECH*** identified at the time of the assessment a fenced area containing two above ground storage tanks (ASTs) north of the former restaurant building (Figure 2). One AST was a 55-gallon drum which showed evidence of fuel release to the ground surface. ***NORTECH*** noted visible staining of the soils throughout the area and a slight fuel odor. The staining and odor were most likely the result of a past release from the AST and/or the drum in the same area. ***NORTECH*** recommended further characterization of the type and extent of the possible petroleum release in this area at the Site.

2.3.3 2018

NORTECH completed a Phase II ESA at the Site in 2018 to assess the potential release of fuel in from the ASTs. A total of 15 shallow soil borings were installed in the vicinity of the former ASTs. ***NORTECH*** collected soil field screening samples from each boring at depths ranging from 2.0 feet to 3.5 feet below ground surface (bgs). Water was encountered in some borings as shallow as 2 feet bgs.

Field screening results ranged from 3.5 to 3597 parts per million (ppm). A primary and duplicate sample were collected at the location of the highest field screening sample and submitted for DRO and BTEX laboratory analysis. The analysis results showed DRO concentrations ranged from 453 mg/kg to 506 mg/kg for the most impacted area. The BTEX analysis showed no detectable concentrations of any analytes in both primary and duplicate samples.

NORTECH estimated 110 square feet of soils in the area of the former AST had been impacted. ADEC provided Case Closure/No Further Action required for the Site on June 4, 2018.

2.3.4 2019

In July 2019, Garness Engineering Group, Ltd. (GEG) was conducting a Site investigation for potential sewage leach field locations at the Site of the future Immersion Park. Ten test pits were excavated as part of this investigation. During the excavation of test pit TP10, evidence of petroleum impacted soils was discovered at a depth of 7.0 feet below ground surface. According to Mr. Corey Wall with Jensen-Yorba-Wall, none of the other test pits exhibited any indications of petroleum contamination. Figure 3 shows the location of the GEG test pits.

The Central Council of Tlingit and Haida Indian Tribes of Alaska (CCTHITA) retained ***NORTECH*** to conduct environmental sampling at the Site in accordance with Alaska Department of Environmental Conservation (ADEC) regulations.

NORTECH conducted a Site visit on July 26, 2019 with Wayne Jensen of Jensen Yorba Wall, Inc., CCTHITA's contracted Architect, to evaluate the Site and determine potential future environmental work at the Site. A total of ten test pits had been advanced to various depths throughout property in order to determine soil types for potential locations of future septic and water systems. GEG had installed groundwater sampling ports in four of the test pits including TP-10. A potential source of the impacted soil could not be identified and on behalf of the CCTHITA, ***NORTECH*** notified ADEC of the potential spill that day.

In October 2019, ***NORTECH*** completed groundwater sampling event which included sampling ports TH#2, TH#3 and TH#4. The wellhead elevation were surveyed and water level measurements collected at this time showed the groundwater generally flowed to the south towards Gastineau Channel. Groundwater samples from each sampling port were submitted to a laboratory and analyzed for diesel range organics (DRO), gasoline range organics (GRO), and for benzene, toluene, ethylbenzene and total xylene (BETX) contaminants. The sample from sampling port TH#3 was also analyzed for volatile organic compounds (VOC) and polycyclic aromatic hydrocarbon (PAH) contaminants.

The laboratory results showed DRO contaminants present in the TH-3 and a duplicate sample collected from this location in concentrations exceeding the ADEC groundwater cleanup level. All other analytes tested were below the laboratory limits of quantification (LOQ).

2.4 Known Nearby Related Concerns

A search of the ADEC CSP Database identified one Contaminated Sites within one-quarter of a mile from the subject Site, the Alaska Gastineau Mine Tailings. This Site lies contiguous to the subject Site to the south and east and incorporates a portion of the Site. The current status of this contaminated site is listed as Cleanup Complete in the database.

3.0 SCOPE OF WORK

In a letter dated July 13, 2022, ADEC CS program requested additional soil and groundwater sampling to be conducted at the Site in order to delineate the vertical and horizontal extents of soil and groundwater contamination at the Site. In discussions with CBJ D&H, and ADEC, ***NORTECH*** developed the workplan to complete this site characterization effort. The following three tasks were identified to complete this investigation as outlined below and discussed in further detail in Section 5.0 below:

1. Soil Delineation

- Install four soil borings via direct push drilling methods surrounding the known area of contamination at the Site
    - Field screen soils from boring
    - Laboratory analysis of selected samples
        - DRO
        - GRO
        - VOC
        - PAH (20% of project total, highest field screening results)

- Step-out and install additional soil boring(s) as necessary if soil field screening results from previous boring(s) indicate contamination is present
    - Continue until field screening results indicate clean limits have been reached in each direction.

2. Groundwater Delineation

- Install groundwater monitoring well immediately adjacent to existing monitoring port TH3
- Install at least one up-gradient sentinel well
    - At location of the nearest clean up-gradient soil boring as determined via field screening results
- Install at least two down-gradient wells
    - At locations of the nearest down-gradient clean soil boring as determined via field screening results, or
    - Farthest down-gradient locations of contamination above the beach and the high
- Well monitoring and Sampling
    - Sample wells
        - Monitor water depth and well volume
        - Purge well with submersible pump
        - Collect samples
    - Laboratory analysis of samples
        - DRO
        - GRO
        - VOC
        - PAH (20% of project total, highest field screening results)
    - Wellhead elevation Survey

3. Documentation and Reporting

- Document field activities via
    - Field notes
    - Photographic documentation
- Investigation Report

3.2 Lines of Authority

CBJ Docks and Harbors (CBJ D&H) is the property owner and the responsible party (RP) for this Site. The Central Council of Tlingit and Haida Indian Tribes of Alaska (CCTHITA) currently leases the properties.

CBJ D&H hired ***NORTECH*** to complete the Site Characterization investigation. ***NORTECH*** contracted Clear View Drilling, Wrangell, Alaska to install the soil borings and groundwater monitoring wells for this investigation. SGS North America was contracted by ***NORTECH*** to provide laboratory analytical testing of the soil and groundwater samples collected during the investigation.

Alena Voigt is the ADEC-CS case manager for this Site.

4.0 METHODOLOGY

Using direct push methods, Clear View Drilling LLC. (Clear View) advanced soils borings throughout the Site. ***NORTECH*** field screened using Photoionization detector (PID) and the head space method to determine total volatile organic compounds (tVOCs) within screened soils. If field screening indicated contamination may be present, soil borings were advanced in a

step out method as described in the ADEC approved workplan. Groundwater monitoring wells were installed in select borings and both soil and groundwater were submitted to SGS Laboratory in Anchorage, Alaska for analysis of selected analytes. Laboratory results were compared to 18 AAC 75 Migration to Groundwater Cleanup Levels.

4.1 Contaminants of Potential Concern and Pertinent Cleanup Levels

DRO is the primary contaminant of concern (COC) based on the analysis results of samples previously collected at the Site. As per Appendix F of the ADEC *Field Sampling Guidance for Contaminated Sites and Leaking Underground Storage Tank Sites* (FSG), January 2022, the following analytes are potential contaminants of concern for #2 diesel fuel:

- Diesel Range Organics (DRO)
- Gasoline Range Organics (GRO)
- Volatile Organic Compounds (VOC) (includes Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX))
- Polycyclic Aromatic Hydrocarbons (PAH)

Soil Cleanup Levels for the Site will be according to 18 AAC 75, Table B1, Method Two, Migration to Groundwater (MTG) Soil Cleanup Levels (herein MTG soil cleanup levels). Groundwater cleanup levels for this Site will be according to 18 AAC 75, Table C Groundwater Human Health Cleanup Levels (herein groundwater cleanup levels). Table 1 below provides a listing of the COCs, the analysis methodologies that will be used to test for these analytes and their respective cleanup levels for soil and groundwater.

Table 1
Pertinent ADEC Cleanup Levels

Analyte	Analysis Method	MTG Soil Cleanup Level (mg/Kg)	Groundwater Cleanup Level (ug/L)
GRO	AK101	260	2200
DRO	AK102	230	1500
Benzene	EPA 8260	0.022	4.6
Ethylbenzene	EPA 8260	0.13	15
Toluene	EPA 8260	6.7	1100
Xylenes (total)	EPA 8260	1.5	190
VOCs	EPA 8260	Refer to Table B1	Refer to Table C
PAHs	EPA 8270	Refer to Table B1	Refer to Table C

MTG – Migration to Groundwater

4.2 Investigation-derived Waste Management

Investigation derived waste (IDW) consisted of used disposable sampling materials (i.e. used gloves, plastic spoons, paper towels, field-screening sample bags and plastic soil cores), used personal protective equipment, and monitoring well purge water. IDW was evaluated for waste category in accordance with the Resource Conservation and Recovery Act (RCRA). Solid wastes that were not hazardous wastes were disposed of off-site with municipal waste. No hazardous wastes were generated during the investigation.

Purge water and decontamination water were collected into five gallon buckets with lids and kept in a secure location until laboratory results were obtained. As water was below Table C Cleanup Levels, IDW water generated during field efforts was run through a granular activated carbon (GAC) filter prior to being discharged to the ground surface at the Site.

5.0 FIELD ACTIVITIES

On April 24, 2023, Ron Pratt and Heather Gulley of ***NORTECH*** mobilized to the Site to oversee the implementation of the ADEC approved Site Characterization Workplan. Cufff Blakely and Megan Blakely of Clear View Drilling were on Site to conduct drilling associated with soil borings and installation of groundwater monitoring wells.

Soil borings SB-1 through SB-05 were installed, field screened and soil sampled on April 24. Monitoring Well MW1 was also constructed and installed at the location of SB-01 on April 24. Borings SB-05 through SB12 were installed, field screened and soil sampled on April 25. Monitoring Wells MW2, MW3, MW4 and MW5 were also constructed and installed on April 25. Well MW2 was installed at the location of SB-12, MW3 at the location of SB-09, MW4 at SB-10 and MW5 at SB-11 (Figure 3 Appendix 1).

NORTECH collected a total of 95 discrete soil field screening samples from 12 soil borings. In general at least two screening samples were collected from each five foot soil core advanced. Field screening results were generally below 3.0 ppm with 13 total samples exceeding 5.0 ppm and seven samples exceeding the project fsal of 20ppm. The seven samples exceeding the project fsal were collected from three soil borings, SB-01, SB-02 and SB-04 (Figure 3, Appendix 1). All other soil borings field screened below the fsal. Table 2 in Appendix 2 summarizes field screening readings.

On April 26, Ms. Gulley and Mr. Pratt returned to the Site to complete field mapping of the Site, to conduct a wellhead elevation survey, and to develop the new monitoring wells. Site mapping and surveying were completed using a variety of field mapping techniques and equipment. In general, horizontal mapping was conducted using 300-foot measuring tapes, a right-angle mirror and a compass employing swing-tie surveying techniques. Vertical elevation surveying was completed using Spectra Precision HV101 Laser. The laser was set up at a location that provided direct line-of-site access to each of the wells. Two temporary reference points were also established and surveyed at the Site.

Well development was completed using a surge block and a submersible pump. Procedurally, one well volume of water was purged from the well with a submersible pump. A surge block was then lowered into the well and gently pulsed up and down through the screened interval to develop the well and help remove fine sediments from the well screen. A second well volume was then removed from the bottom of the well followed by a second round of surging. A minimum of three additional well volumes of water were then purged from each well to remove any remaining sediments.

On April 27, Mr. Pratt returned to the Site to complete sampling of the groundwater monitoring wells. Each well was opened, measured with the interface probe, the well volume was calculated, and then the well was purged of three well volumes prior to sample collection. The submersible pump and any other reusable monitoring/sampling equipment was decontaminated prior to moving to the next well. Dedicated tubing was installed and left in each well for use during future monitoring events. Decontamination of equipment included washing with an

Alconox soap solution, rinsing with clean tap water and a final rinse with distilled water. Both purge water and decontamination water were collected into lidded five gallon buckets and securely stored until laboratory results were available.

All water samples were collected directly into clean sample jars provided by the laboratory. Samples were collected in order of volatility, assigned a unique sample name, and placed in a cooler with gel-ice until they could be transported to SGS Anchorage under laboratory chain-of-custody to the laboratory for analysis.

6.0 SAMPLE RESULTS

6.1 Soil Sample Results

A total of 14 laboratory soil samples (12 primary samples and two duplicates) were collected during the investigation. One sample was collected from each soil boring advanced. The soil samples were collected at the interval of the highest field screening result from each boring. Each sample was analyzed for GRO, DRO and VOCs. Four samples (SB-01, SB-02, SB-04, and SB-41) were additionally analyzed for PAHs.

DRO was detected in a total of five borings (SB-01 through SB-05) with concentrations that ranged between 29.5 mg/kg and 2150 mg/kg. Four samples (SB-01 through SB-04) and the sample duplicate (SB-41) had DRO concentrations exceeding the migration to groundwater (MTG) cleanup level (CL) of 230 mg/kg (Table 3, Appendix 2). GRO was detected in a total of two samples with concentrations of 3.18 mg/kg and 5.66 mg/kg, both well below the MTG-CL of 260 mg/kg.

A total of five PAH analytes (1-methylnaphthalene, acenaphthene, fluorene, phenanthrene and pyrene) were detected in one or more soil samples, all in concentrations which were below Cleanup Levels. No VOC analytes were detected in submitted soil samples. Table 3 in Appendix 2 summarizes soil laboratory results.

6.2 Groundwater sample results

A total of 6 laboratory groundwater samples (five primary samples and one duplicate) were collected during the investigation. One sample was collected from each monitoring well installed at the Site. Each sample was analyzed for GRO, DRO and VOCs. Two samples (MW-2 and MW-5) were additionally analyzed for PAHs.

DRO was detected in a one primary sample and the sample duplicate (MW1 and MW11). DRO concentrations ranged from 0.574 mg/L and 0.688 mg/L, both below the CL of 1.5 mg/L. DRO was not detected in any of the remaining water samples in concentrations above the laboratory limits of quantification (LOQ). No GRO, VOC of PAH analytes were detected in submitted water samples in concentrations above the laboratory limits of quantification (LOQ). Table 4 in Appendix 2 summarize the results groundwater samples that were collected. The complete laboratory report is included as Appendix 4.

6.3 Quality Control Summary

The goal of the project was to produce data of adequate quality for comparison to 18 AAC 75 cleanup levels in order to determine the limits of potential soil and water contamination on Site. The primary tool used to assess the quality of the data was the ADEC laboratory data review

checklist (LDRC). The laboratory report Case Narrative was reviewed against the ADEC LDRC for potential quality control issues and is included in Appendix 4.

The project laboratory implements on-going quality assurance/quality control procedures to evaluate conformance to ADEC data quality objective (DQOs). Internal laboratory controls to assess data quality for this project include surrogates, method blanks, matrix spike/matrix spike duplicates, method blank/method blank duplicate, and laboratory control sample/laboratory control sample duplicates to assess precision, accuracy, and matrix bias. If a DQO was not met, the laboratory provided a brief description within the Case Narrative of the analysis report concerning the problem.

Although several discrepancies, errors, and/or QC failures were identified in the review of the Case Narrative, none of the identified QC discrepancies adversely affect the data quality or usability. Discrepancies, errors, and QC issues are discussed in the LDRC. ***NORTECH*** considers the data collected during the field efforts described in this report to be of sufficient quality to be used for their intended purposes, and all analytical results are deemed valid for the purposes of this investigation.

NORTECH also completed a review of all the laboratory analysis results where the listed limits of quantification (LOQ) for non-detected analytes exceeded the ADEC Cleanup Level (CL) for that analyte. In these instances, the limits of detection (LDD), or 1/2 the LOQ, were compared to the CL. In most instances, the LDD was below the CL with the following exceptions.

Three soil analytes (1,2,3-trichloropropane, 1,2-dibromoethane and dibromochloromethane) and one water analyte (1,2,3-Trichloropropane) had LODs that exceeded their respective CLs. None of the aforementioned analytes are common constituents of refined petroleum products, nor are they contaminants of concern at the Site or reasonably expected to be present at the Site at any concentration.

NORTECH collected a total of two soil duplicate pairs during the investigation and one groundwater duplicate pair. Table 5 (Appendix 2) provides a quality control summary of the duplicate pair analysis results including a calculated relative percent difference (RPD) for each analyte detected in either the primary or duplicate samples. All RPDs were within ADEC recommended limits (less than 50% for soil and less than 30% for water).

7.0 ANALYSIS AND DISCUSSION

7.1 Soil

The soil analysis results confirm that soils between approximately five feet to 10 feet bgs within the grass island surrounded by the asphalt paved driveway loop west of the warehouse building has been impacted by petroleum contamination (Figure 5, Appendix 1). DRO was detected in each of the five borings advanced within this area (SB01 through SB04) in concentrations above the MTG-CL. Samples from soil borings outside this area were below MTG-CL for all tested analytes (Table 3, Appendix 2).

The highest DRO concentration (2150 mg/kg) was found in SB02. SB02 was also the only soil boring to yield a field screening reading above the project fsal in the upper five feet of the soil surface (see Boring Log for SB02 in Appendix 4). The impacted area is shown in Figure 5, Appendix 1. Clean soil limits, or the extent of the impacted area, are defined by samples SB06

(north), SB05 (east), SB10 (south), and SB09 (west). Based on laboratory sample results, ***NORTECH*** estimates between 270 and 450 cubic yards (CY) of impacted soil remain on Site.

Field screening results from soil borings SB01, SB02 and SB04 in the five to ten foot soil cores showed elevated results indicating contamination was present in soils collected beneath the current water table depth.

7.2 Groundwater

The groundwater analysis results confirm that petroleum contamination has not impacted shallow groundwater beneath the Site in concentrations exceeding Table C Cleanup Levels. DRO was detected in MW1 (and the duplicate sample MW11) in concentrations of 0.688 mg/L and 0.574 mg/L, respectively. MW-1 is located downgradient of the highest soil contamination observed on Site (2150 mg/Kg) and within a boring shown to be impacted by DRO (594 mg/Kg). This indicates that while soil is impacted by DRO in concentrations above MTG-CL, the soil is not impacting the groundwater in concentrations above Table C Cleanup Levels. No other contaminants were detected in either MW1 or MW11, and the remaining wells were non-detect for all tested analytes.

7.3 Groundwater Gradient

The wellhead survey elevations were used in conjunction with the static water level measurements collected during this investigation for developing a model of the subsurface groundwater elevation and for calculating the groundwater gradient at the Site. The groundwater gradient map (Figure 4, Appendix 1) was created using Surfer 8 modelling software. The gradient was calculated by dividing the groundwater elevation difference between the highest and lowest wells by the linear distance between these two wells. As can be seen on Figure 4, groundwater flows to the south towards Gastineau Channel at a calculated gradient of 0.02875 feet/foot.

Based on the groundwater flow survey, MW-2 is the upgradient most well and can be considered the sentinel well. MW-1 is located within the soil impacted area and can be considered the characterization well, representing the highest contaminant concentrations within Site groundwater. Wells MW-3 through MW-5 are downgradient wells and can be used to determine the limits of groundwater contamination on Site.

7.4 Conceptual Site Model

According to the Conceptual Site Model, the potentially open exposure pathways are:

- Incidental Soil Ingestion
- Dermal Absorption
- Ingestion of Groundwater
- Inhalation of Outdoor Air

Impacted soils are present at a depth of between five feet to 10 feet bgs, and not at the surface (upper two feet). Exposure to impacted soils, both incidental soil ingestions and dermal absorption, are only likely during intentional digging or excavation at the Site. General users, including future visitors to the Immersion Park, are unlikely to be exposed to impacted soils at the Site.

Ingestion of groundwater is also unlikely. Currently there is no usable or permitted drinking water well on Site. Soil contamination was originally identified during CCTHITA's efforts to determine suitable areas to install a septic leach field and a drinking water well. Based on the information gained from those investigations, CCTHITA was not able to identify a suitable location for a drinking water well. If a suitable location for a drinking water well cannot be identified, a drinking water well will not be installed on Site. Therefore, future exposure to contaminants in groundwater are unlikely. Due to the limited area of impacted soils, and as contamination is located two or more feet below ground surface, outdoor inhalation of air is unlikely to cause an exposure concern.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this investigation and the available historic data, ***NORTECH*** has developed the following conclusions for this site:

- CBJ D&H is the property owner and responsible party for this Site
- Potential petroleum contamination was identified at the Site in 2019 while excavating a test pit during septic-drain field geotechnical investigation
    - No definitive or suspected source of the contamination has been noted
- DRO groundwater contamination above cleanup levels was confirmed during sampling of water sampling points installed in 2019
- 2023 Site characterization Investigation included
    - Installing 12 soil borings to provide delineation of soil contamination
        - Soil samples were collected from each boring and analyzed for GRO, DRO, VOCS, and four were analyzed for PAHs
        - DRO concentrations exceeded MTG-CL in four primary soil samples SB01-SB04
            - Concentrations range from 2150 mg/Kg to 439 mg/Kg in these samples
        - DRO concentrations in all other primary samples were below MTG-CL
        - ***NORTECH*** estimates between 250 to 470 CY of impacted soils remain on Site
        - Contaminated soil on Site has been horizontally and vertically delineated
    - Five groundwater monitoring wells were installed in select soil borings
        - Water was analyzed for GRO, DRO, VOCs, and PAHs
        - All tested wells were below Table C Cleanup Levels for tested analytes
            - DRO was detected in primary sample MW-01 and duplicate MW-11 in concentrations below Table C
            - All other tested wells were non-detect for tested analytes
- DRO is the primary contaminant of concern at the Site
    - Source of the DRO contamination was not identified
- Groundwater beneath Site flows to the south towards Gastineau Channel at a gradient of 0.02875 feet/foot

Soil contamination is located four or more feet below ground surface. Laboratory samples indicate that soil contamination is currently impacting Site Groundwater, and the Conceptual Site Model indicates potentially open exposure pathways are unlikely to pose a risk to human health or the environment. Based on these findings, ***NORTECH*** recommends that CBJ Docks and Harbors either consider Site remediation via excavation or negotiating institutional control measures with ADEC.

9.0 LIMITATIONS

NORTECH provides a level of service that is performed within the standard of care and competence of the environmental engineering profession. However, it must be recognized that limitations exist within any site investigation. This report provides results based on a restricted work scope, from the analysis and observation of a limited number of samples and for Site conditions which were present at the time of investigation. Therefore, while these limitations are considered reasonable and adequate for the purposes of this report, actual site conditions may differ and change over time. Specifically, the unknown nature of exact subsurface physical conditions, sampling locations, and analytical procedures' inherent limitations, as well as financial and time constraints are limiting factors.

10.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

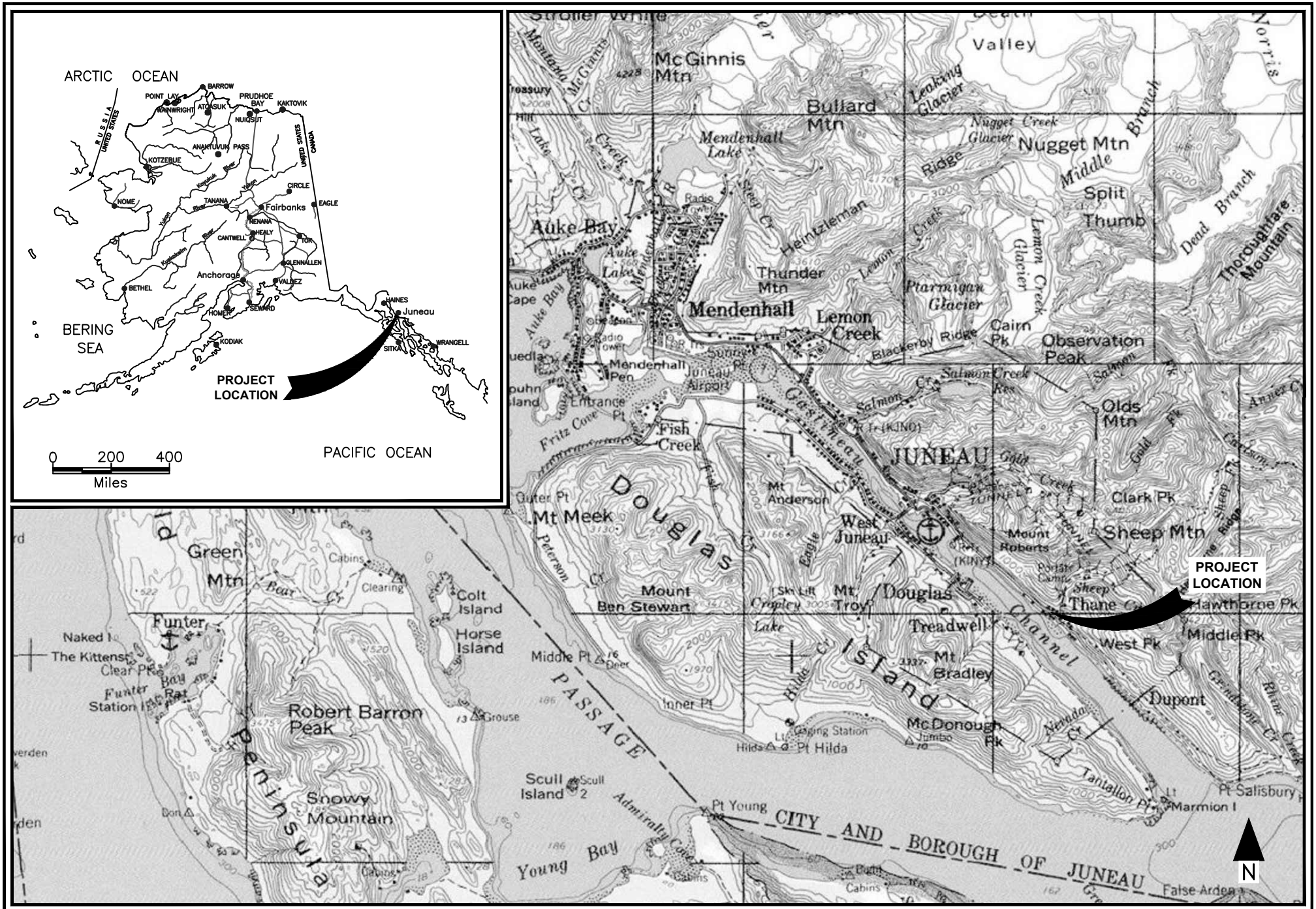
Ronald J. Pratt
Senior Environmental Scientist

Reviewed by:

Jason Ginter, PMP
Principal, Juneau Technical Manager

Appendix 1

Figures



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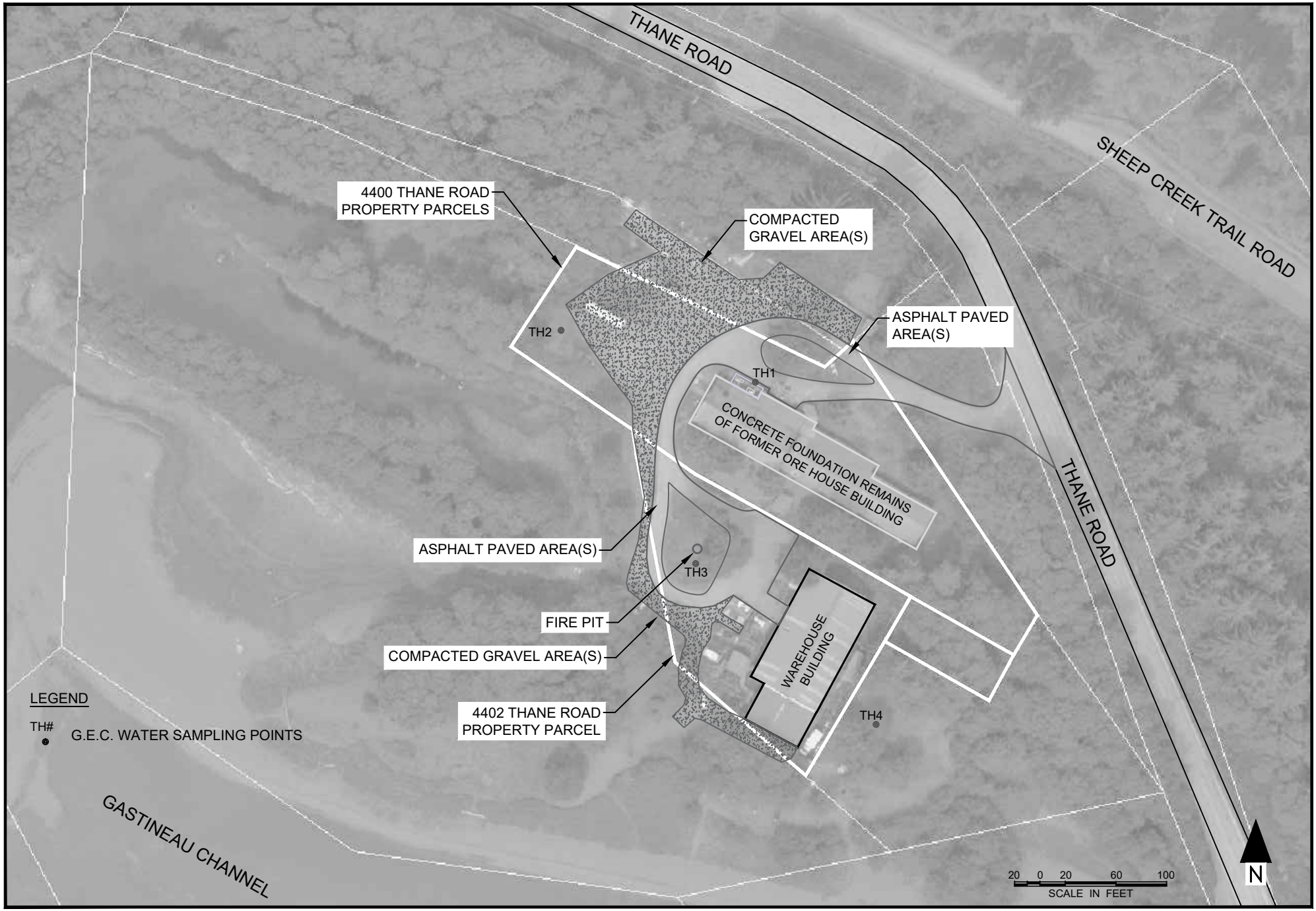
Location Map
CBJ D&H Immersion Park Site Characterization Investigation
4400/4402 Thane Road, Juneau, Alaska

DATE: 05/11/2023	SCALE: 1" = 3 Miles
DESIGN: JLS	PROJECT: 22-2653
DRAWN: RJP	DWG: 222653b(01)

FIGURE 1



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Vicinity Map
CBJ D&H Immersion Park Site Characterization Investigation
4400/4402 Thane Road, Juneau, Alaska

DATE: 05/11/2023	SCALE: 1" = 100'
DESIGN: JLS	PROJECT: 22-2653
DRAWN: RJP	DWG: 222653b(02)

FIGURE 2

Analyte	GRO	DRO	Benzene	Ethyl-benzene	Toluene	Xylenes (total)
Unit	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg
18AAC75 MTG-CL	260	230	22	130	6700	1500
Sample ID	Soil Sampling Results Summary					
SB01*1	3.59 U	594	18.0 U	35.9 U	35.9 U	108 U
SB41*1	2.99 U	527	14.9 U	29.9 U	29.9 U	89.7 U
SB02	5.66	2150	16.5 U	33.0 U	33.0 U	98.9 U
SB03	2.55 U	495	12.8 U	25.5 U	25.5 U	76.5 U
SB04	3.18	439	12.9 U	25.7 U	25.7 U	77.2 U
SB05	2.86 U	29.4	14.3 U	28.6 U	28.6 U	85.9 U
SB06	2.53 U	NA	12.6 U	25.3 U	25.3 U	75.9 U
SB07	2.97 U	95.3U	14.9 U	29.7 U	29.7 U	89.1 U
SB08	3.13 U	93.7U	15.7 U	31.3 U	31.3 U	93.9 U
SB09	2.67 U	87.8U	13.3 U	26.7 U	26.7 U	80.0 U
SB10*2	2.33 U	21.8 U	11.7 U	23.3 U	23.3 U	69.9 U
SB100*2	2.51 U	24.1 U	12.6 U	25.1 U	25.1 U	75.3 U
SB11	2.71 U	21.6 U	13.6 U	27.1 U	27.1 U	81.4 U
SB12	2.68 U	22.1 U	13.4 U	26.8 U	26.8 U	80.3 U

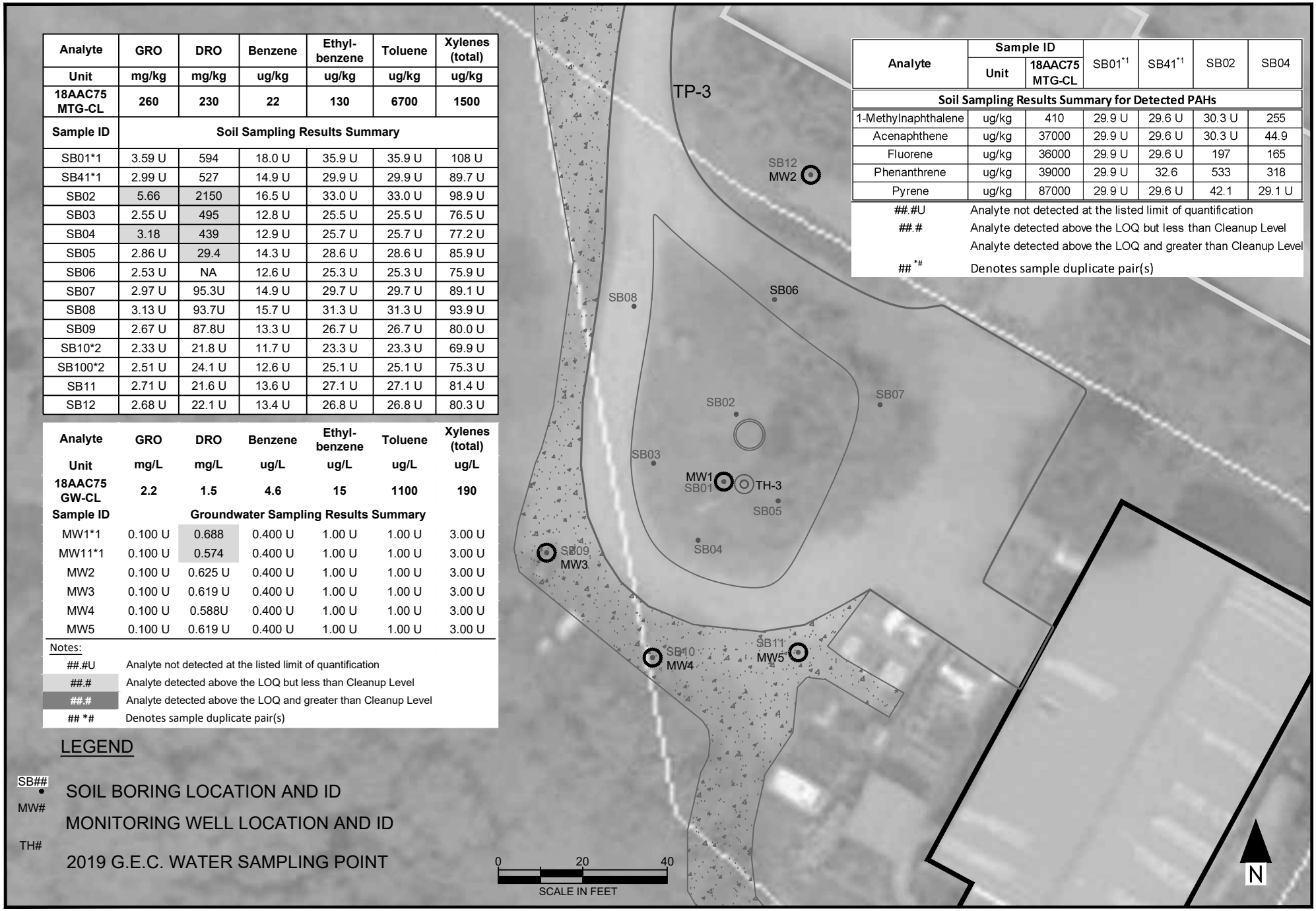
Analyte	GRO	DRO	Benzene	Ethyl-benzene	Toluene	Xylenes (total)
Unit	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L
18AAC75 GW-CL	2.2	1.5	4.6	15	1100	190
Sample ID	Groundwater Sampling Results Summary					
MW1*1	0.100 U	0.688	0.400 U	1.00 U	1.00 U	3.00 U
MW11*1	0.100 U	0.574	0.400 U	1.00 U	1.00 U	3.00 U
MW2	0.100 U	0.625 U	0.400 U	1.00 U	1.00 U	3.00 U
MW3	0.100 U	0.619 U	0.400 U	1.00 U	1.00 U	3.00 U
MW4	0.100 U	0.588U	0.400 U	1.00 U	1.00 U	3.00 U
MW5	0.100 U	0.619 U	0.400 U	1.00 U	1.00 U	3.00 U

Notes:

##.#U	Analyte not detected at the listed limit of quantification
##.#	Analyte detected above the LOQ but less than Cleanup Level
##.#	Analyte detected above the LOQ and greater than Cleanup Level
## *#	Denotes sample duplicate pair(s)

Analyte	Sample ID		SB01*1	SB41*1	SB02	SB04
	Unit	18AAC75 MTG-CL				
Soil Sampling Results Summary for Detected PAHs						
1-Methylnaphthalene	ug/kg	410	29.9 U	29.6 U	30.3 U	255
Acenaphthene	ug/kg	37000	29.9 U	29.6 U	30.3 U	44.9
Fluorene	ug/kg	36000	29.9 U	29.6 U	197	165
Phenanthrene	ug/kg	39000	29.9 U	32.6	533	318
Pyrene	ug/kg	87000	29.9 U	29.6 U	42.1	29.1 U

##.#U	Analyte not detected at the listed limit of quantification
##.#	Analyte detected above the LOQ but less than Cleanup Level
##.#	Analyte detected above the LOQ and greater than Cleanup Level
## *#	Denotes sample duplicate pair(s)



LEGEND

SB## SOIL BORING LOCATION AND ID

MW# MONITORING WELL LOCATION AND ID

TH# 2019 G.E.C. WATER SAMPLING POINT

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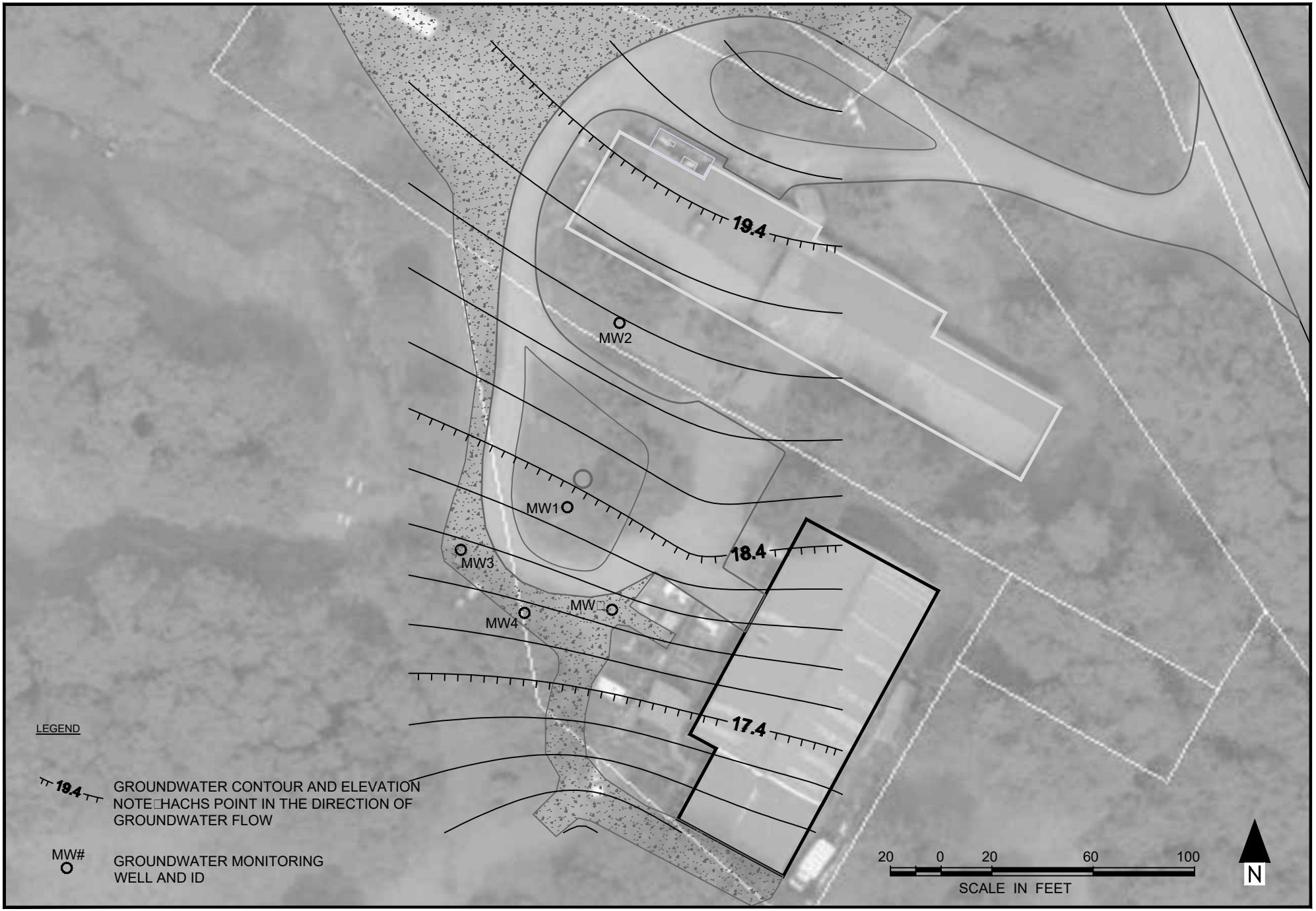
Sample Locations and Laboratory Results Diagram
CBJ D&H Immersion Park Site Characterization Investigation
4400/4402 Thane Road, Juneau, Alaska

DATE: 05/11/2023 | SCALE: 1" = 30'
DESIGN: JLS | PROJECT: 22-2653
DRAWN: RJP | DWG: 222653b(03)

FIGURE 3



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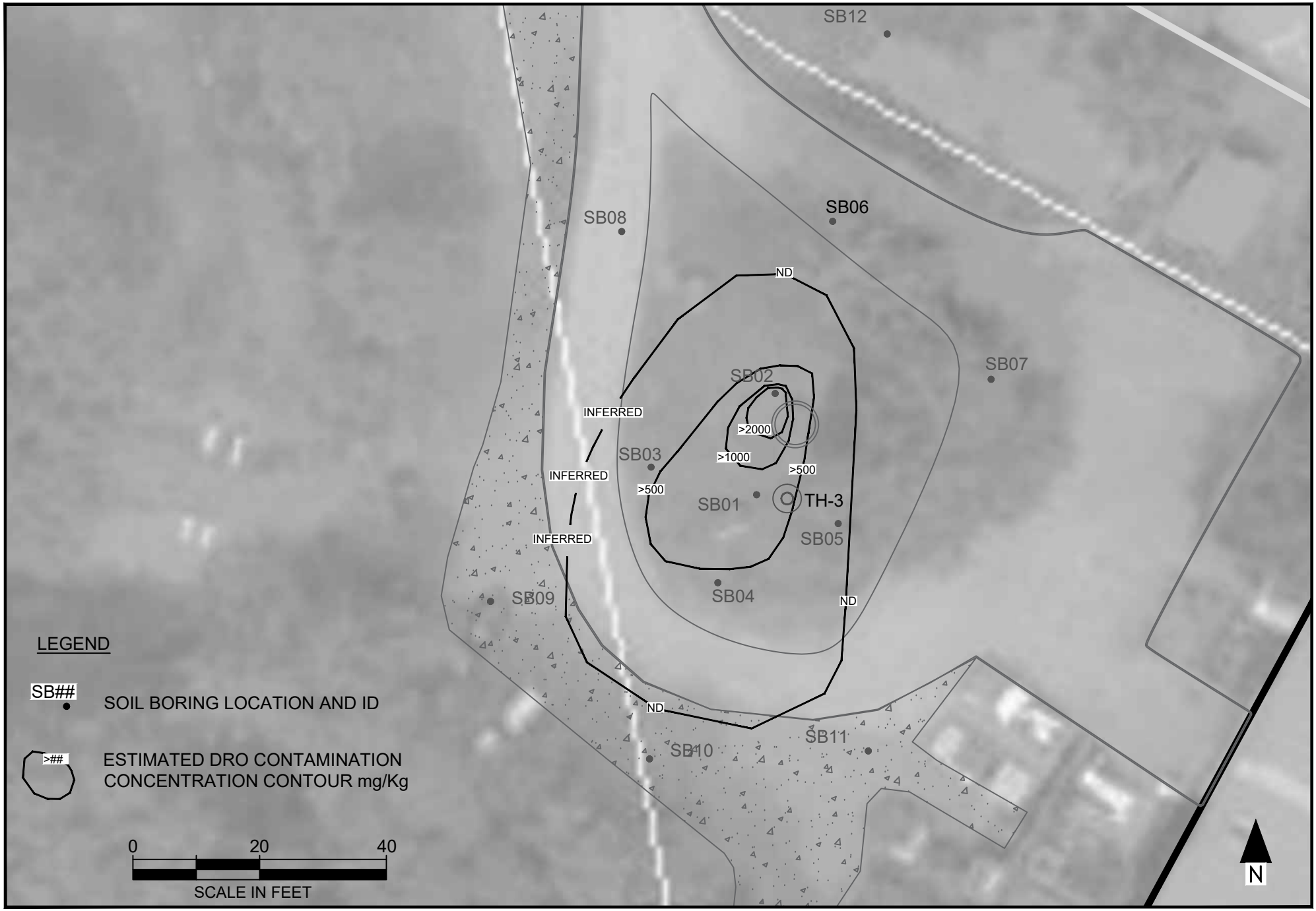
Groundwater Gradient Map (4/27/2023)
CBJ D&H Immersion Park Site Characterization Investigation
4400/4402 Thane Road, Juneau, AK.

DATE: 05/11/2023	SCALE: 1" = 50'
DESIGN: JLS	PROJECT: 22-2653
DRAWN: RJP	DWG: 222653b(04)

FIGURE 4



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Estimated Limits of Soil Contamination
CBJ D&H Immersion Park Site Characterization Investigation
4400/4402 Thane Road, Juneau, Alaska

DATE: 05/17/2023	SCALE: 1" = 20'
DESIGN: JLS	PROJECT: 22-2653
DRAWN: RJP	DWG: 222653b(05)

FIGURE 5

Appendix 2

Tables

Table 3

Soil Sample Results Summary (GRO, DRO, BETX and detected PAH)

Analyte	Sample ID		SB01[*1]	SB41[*1]	SB02	SB03	SB04	SB05	SB06	SB07	SB08	SB09	SB10[*2]	SB100[*2]	SB11	SB12
	Unit	18AAC75 MTG-CL														
Petroleum Fractions (GRO and DRO) and BTEX																
GRO	mg/kg	260	3.59 U	2.99 U	5.66	2.55 U	3.18	2.86 U	2.97 U	3.13 U	2.67 U	2.33 U	2.51 U	2.75 U	2.71 U	2.68 U
DRO	mg/kg	230	**594**	**527**	**2150**	**495**	**439**	29.4	95.3U	93.7U	87.8U	21.8 U	24.1 U	23.9 U	21.6 U	22.1 U
Benzene	ug/kg	22	18.0 U	14.9 U	16.5 U	12.8 U	12.9 U	14.3 U	14.9 U	15.7 U	13.3 U	11.7 U	12.6 U	13.8 U	13.6 U	13.4 U
Ethylbenzene	ug/kg	130	35.9 U	29.9 U	33.0 U	25.5 U	25.7 U	28.6 U	29.7 U	31.3 U	26.7 U	23.3 U	25.1 U	27.5 U	27.1 U	26.8 U
Toluene	ug/kg	6700	35.9 U	29.9 U	33.0 U	25.5 U	25.7 U	28.6 U	29.7 U	31.3 U	26.7 U	23.3 U	25.1 U	27.5 U	27.1 U	26.8 U
Xylenes (total)	ug/kg	1500	108 U	89.7 U	98.9 U	76.5 U	77.2 U	85.9 U	89.1 U	93.9 U	80.0 U	69.9 U	75.3 U	82.5 U	81.4 U	80.3 U
Detected PAHs																
1-Methylnaphthalene	ug/kg	410	29.9 U	29.6 U	30.3 U	NA	255	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	ug/kg	37000	29.9 U	29.6 U	30.3 U	NA	44.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	ug/kg	36000	29.9 U	29.6 U	197	NA	165	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	ug/kg	39000	29.9 U	32.6	533	NA	318	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	ug/kg	87000	29.9 U	29.6 U	42.1	NA	29.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

##.#U	Analyte not detected at the listed limit of quantification
##.#	Analyte detected above the LOQ but less than Cleanup Level
##.#	Analyte detected above the LOQ and greater than Cleanup Level
## [*#]	Denotes sample duplicate pair(s)
NA	Analyte was not analyzed for

Table 4

Groundwater Sample Results Summary (GRO, DRO, BETX)

Analyte	Sample ID		MW1[*3]	MW11[*3]	MW2	MW5	MW3	MW4
	18AAC75 GW CL	Unit						
Petroleum Fractions (DRO GRO and BTEX)								
GRO	2.2	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
DRO	1.5	mg/L	0.688	0.574	0.625 U	0.619 U	0.619 U	0.588U
Benzene	4.6	ug/L	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
Ethylbenzene	15	ug/L	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Toluene	1100	ug/L	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Xylenes (total)	190	ug/L	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U

Notes:

##.#U	Analyte not detected at the listed limit of quantification
##.#	Analyte detected above the LOQ but less than Cleanup Level
##.#	Analyte detected above the LOQ and greater than Cleanup Level
## [*#]	Denotes sample duplicate pair(s)

Table 5
QC Duplicate Pair Analysis Summary (Detected Analytes)

Soil Duplicate Pair 1					
Analyte	**SB01**	**SB41**	**Dif**	**Average**	**RPD**
DRO	594	527	67	560.5	11.95%
Phenanthrene	ND	32.6	na	na	na
Groundwater Duplicate Pair 3					
Analyte	**MW1**	**MW11**	**Dif**	**Average**	**RPD**
DRO	0.688	0.574	0.114	0.631	18.07%

Notes:

RPD	Relative Percent Difference
ND	Analyte not detected at laboratory limits of quantification
na	Calculation is not applicable

Appendix 3

Site Photographs

Photo 1: *Looking south at soil boring SB01 being advanced next to the 2019 G.E.C. water sampling point TH3 (white pipe sticking up from ground left of the drill rig). SB01 was subsequently converted into monitoring well MW1.*

Photo 2: *Looking south at soil boring SB02 being advanced next to the fire pit.*

Photo 3: *Looking north at a soil core retrieved from soil boring SB02.*

Photo 4: *Looking down at the opened soil core retrieved from boring SB02 (0 to 5 feet). Note the coarse sandy tailing soil material.*

Photo 5: *Looking east at soil boring SB07 being advanced. Note the hole for boring SB06 is visible in the foreground.*

Photo 6: *Looking north at soil boring SB12 being advanced north of the paved driveway. SB12 was subsequently converted into monitoring well MW2, the up-gradient sentinel well.*

Photo 7: *Looking down at a soil core retrieved from boring SB12 (5 to 10 feet). Note the very fine sandy silt with shell fragments is a native marine sediment which directly underlies the sandy tailings soil material.*

Photo 8: *Looking west while swing tie mapping of boring/well locations.*