



K'alo-Stantec

K'alo-Stantec Limited

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December 13, 2022

File: 123514183

Attention: Todd Martin

Senior Environmental Specialist
Ovintiv Canada ULC
500 Centre St. S
Calgary, AB T2P 1A6

Dear Mr. Martin,

Reference: Land Use Permit S99A-015, G-18 Wellsite, Camp, and Remote Sump, within the Sahtu Settlement Area, Northwest Territories

1 INTRODUCTION

K'alo-Stantec Limited (K'alo-Stantec) was retained by Ovintiv Canada ULC (Ovintiv) to provide a regulatory response for the S99A-05 G-18 wellsite, camp, and remote sump (the Site) within the Sahtu Settlement Area (SSA), Northwest Territories (NWT). This response was requested to address findings from the Government of Northwest Territories (GNWT) 2022 Site inspection and soil sampling¹.

The Site is located 3.4 km southeast of Tate Lake at 64°27'17".306 latitude and 125°17'33".14824 longitude (NAD 27 datum) within the SSA of the NWT (**Figure A.1, Attachment A**). The Site consists of the wellsite, a campsite located approximately 112 m northeast of the wellsite, and a remote sump site located approximately 75 m southwest of the wellsite (**Figure A.2, Attachment A**). The Site was permitted under Sahtu Land and Water Board Class A Permit S99A-015 and associated Water License S99L1-009 on January 4th, 2000, under exploration license #392. The G-18 well was drilled and abandoned during February and March 2000. Previous regulatory inspection reports from 2013², 2019³, and 2022¹ have reported concerns regarding the integrity of the remote sump. An October 2019 regulatory letter included soil sample results from the July 2019 inspection and soil sampling⁴. A total of nine soil samples from locations around the remote sump were collected and analyzed for detailed salinity parameters. Results from the soil samples indicated sodium adsorption ratio (SAR) exceedances in samples collected downgradient of the sump from a wallow pit (sample 1363877-8 and 1363877-9 shown on **Figure A.2, Attachment A**). The SAR exceedances are attributed to elevated sodium and chloride concentrations.

¹ Government of Northwest Territories, June 20, 2022. *S99A-015 Oil and Gas Drilling – Wellsite and Sump Environmental Inspection Report*.

² Aboriginal Affairs and Northern Development Canada, November 20, 2013. *Land Use Permit S99A-015 G-18 Remote Sump*.

³ Government of Northwest Territories, July 16, 2019. *S99A-015 Oil and Gas Drilling – Wellsite; Remote Sump for Wellsite G-18*.

⁴ Government of Northwest Territories, October 9, 2019. *S99A-015 Oil and Gas Drilling – Wellsite; Remote Sump for Wellsite G-18*.

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2 REMEDIAL PLAN

In response to the findings from the inspection reports, K'alo-Stantec has completed a records review of the Site and a Limited Phase I ESA to identify areas of potential environmental concern (APECs) and potential contaminants of concern (PCOCs) resulting from historical oil and gas operations at the Site. The results were used to identify where further assessment may be required to address the inspection report concerns and data gaps associated with the identified APECs and PCOCs. Findings from the Limited Phase I ESA are summarized in Table 1.

Table 1 Summary of APECs and PCOCs

APEC	Location	Matrix	PCOCs
APEC 1: Well Centre within the wellsite	Well head	Soil Surface Water	Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Petroleum Hydrocarbons (PHCs), salinity, metals
APEC 2: Remote drilling waste disposal site and remote sump cell	Approximately 75 m southwest of the wellsite.	Soil Surface Water	Salinity, metals, BTEX, PHCs
APEC 3: Camp site and assumed camp sump (unknown location)	Approximately 112 m northeast of the wellsite within the camp site area. Exact location is unknown.	Soil Surface Water	Salinity, metals, BTEX, PHCs
APEC 4: Cleared area	Cleared area between the remote sump and wellsite	Soil Surface Water	Salinity, metals, BTEX, PHCs

2.1 2023 Timeline and outcomes

Based on the findings of the Limited Phase I ESA and soil samples collected during the 2019 inspection, the following remedial action plan has been developed to address the identified data gaps and APECs.

2.1.1 2023 Site Assessment Program

During the summer of 2023, Oviniv plans to complete a site monitoring program to assess the current conditions at the Site, such as tension cracks, evidence of subsidence, bare areas, or stressed vegetation. An electromagnetic (EM) survey will be conducted at all APECs during the summer field program to determine if there are areas of elevated apparent conductivity to guide soil sampling and remediation and restoration activities and assess for potential leaching of the sump material. Based on the preliminary EM results and field observations (i.e., bare areas, tension cracks, mineral or salt deposits), soil and surface water samples will be collected from the APECs and submitted for the PCOCs identified in Table 1.

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Select control locations will also be assessed for soil and surface water chemistry, vegetation health and species composition and terrain conditions to inform further remedial and restoration activities and provide background reference chemistry.

Results from the 2023 Site Assessment Program will be summarized and submitted to the GNWT in December 2023 along with an updated remediation and restoration plan based on the findings.

2.1.2 Soil Criteria

The territorial *Environmental Protection Act* authorizes the GNWT to take all necessary measures to ensure the preservation, protection, or enhancement of the environment. This includes the ability to develop, coordinate, and administer environmental guidelines.

The Environmental Guideline for Contaminated Site Remediation (EGCSR) was issued in November 2003⁵. The guideline adopted the criteria outlined in the Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (CSQG)⁶ and the CCME Canada Wide Standards for the Assessment of Petroleum Hydrocarbons in Soil⁷. The CCME guidelines are risk-based and are typically the preliminary means for evaluating soil quality.

The analytical results for soil will be compared with the following guidelines:

- GNWT Environmental Guideline for Contaminated Site Remediation⁵
- CCME guidelines for soil, various factsheets⁶
- Alberta Environment (AENV; now Alberta Environment and Parks, AEP) Salt Contamination Assessment & Remediation Guidelines (SCARG)⁸

⁵ GNWT (Government of Northwest Territories), 2003. *Environmental Guideline for Contaminated Site Remediation*. November 2003

⁶ CCME, 2020a. *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*. Available from: <http://ceqg-rcqe.ccme.ca/>. Last checked: August 2021

⁷ CCME, 2008. *Canada Wide Standards for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale*. January 2008. PN 1399. ISBN 978-1-896997-77-3
http://www.ccme.ca/files/Resources/csm/phc_cws/pn_1399_phc_sr_std_1.2_e.pdf.

⁸ AENV (Alberta Environment) (now Alberta Environment and Parks, AEP). 2001. *Salt Contamination Assessment & Remediation Guidelines*. May 2001



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Where no GWNT or CCME guidelines are available, the analytical results will also be compared to the Alberta Environment and Parks (2019) *Tier 1 Soil and Groundwater Remediation Guidelines* and the AENV SCARG⁸. Note that while EC and SAR will be compared with AENV guidelines, these parameters are not themselves PCOCs; rather, EC and SAR are indicator parameters and their levels in the environment can be used to make inferences about inorganic parameters, such as sodium, chloride, and sulphate, that do not have guidelines.

The soil quality guidelines were developed considering land uses, with different guidelines for agricultural, residential/parkland, commercial and industrial land uses. Based on the current and future uses of the Site, K'alo-Stantec will compare the analytical results with the residential/parkland guidelines. In addition to land use, the guidelines are dependent on soil type (i.e., coarse- versus fine-grained) and depth.

2.1.3 Water Criteria

The analytical results for standing water samples will be compared with the CCME Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (PAL)⁹. The CCME CWQG are risk-based and are typically used to evaluate surface water quality results. These guidelines are not considered regulatory criteria or limits, and consequently guideline comparisons will be provided for context only.

3 LIMITATIONS

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of selected environmental conditions associated with the identified portion of the property that was assessed at the time the work was conducted and is based on information obtained by and/or provided to Stantec at that time. There are no assurances regarding the accuracy and completeness of this information. All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the portion of the identified property that was assessed at the time the work was conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Stantec cannot comment on other areas of the property that were not assessed.

⁹ CCME, 2020b. *Canadian Water Quality Guidelines for the Protection of Aquatic Life*. Available from: <http://ceqg-rcqe.ccme.ca/>



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Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report.

This report is limited by the following:

- *Availability of historical information and records.*
- *Site visit was not conducted as part of this scope.*
- *Availability of an operator and/or landowner for interviews pertaining to the wellsite activity.*

The locations of any utilities, buildings and structures, and property boundaries illustrated in or described within this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not guaranteed. Before starting work, the exact location of all such utilities and structures should be confirmed and Stantec assumes no liability for damage to them.

The conclusions are based on the site conditions encountered by Stantec at the time the work was performed at the specific assessment locations, and conditions may vary among assessment locations. Factors such as areas of potential concern identified in previous studies, site conditions (e.g., utilities) and cost may have constrained the assessment discussed in this report. Due to the nature of the investigation and the limited data available, Stantec does not warrant against undiscovered environmental liabilities nor that the assessment results are indicative of the condition of the entire Site. As the purpose of this report is to identify site conditions which may pose an environmental risk; the identification of non-environmental risks to structures or people on the Site is beyond the scope of this assessment.

Should additional information become available, which differs significantly from our understanding of conditions presented in this report, Stantec specifically disclaims any responsibility to update the conclusions in this report.

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Sincerely,

K'alo-Stantec Limited

This report was prepared by:

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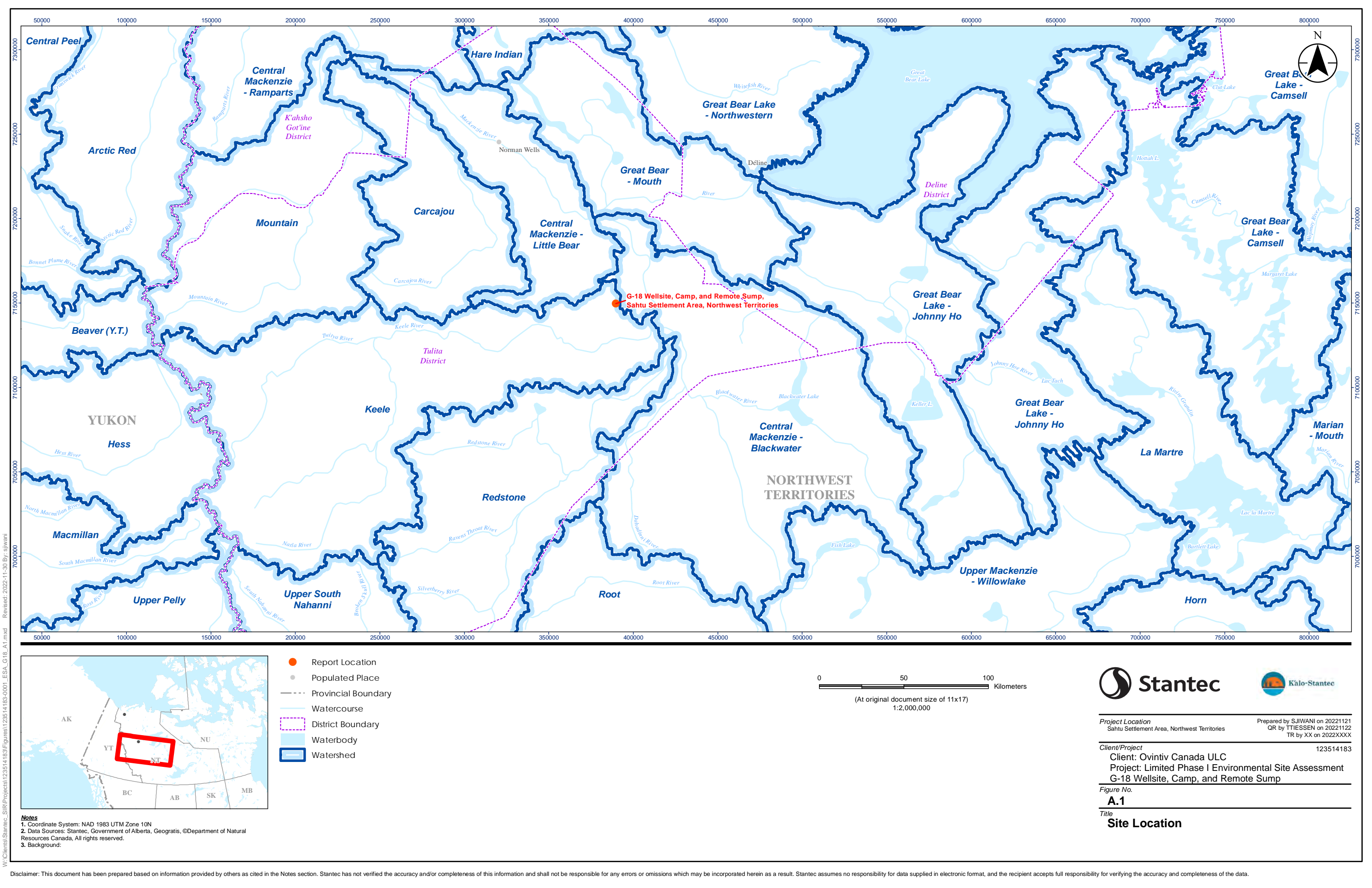
Attachments: A Figures

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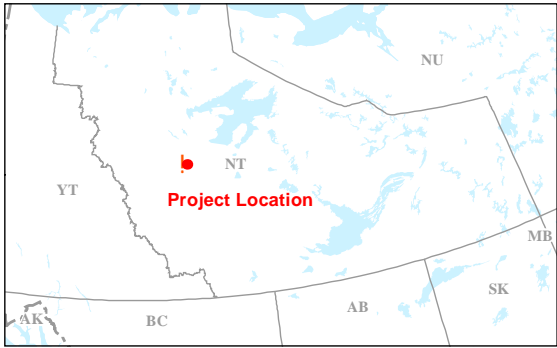
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ATTACHMENT A

FIGURES



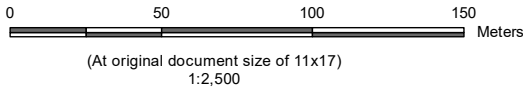
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Notes
1. Coordinate System: NAD 1983 UTM Zone 9N
2. Data Sources: Stantec, Government of Alberta, Geogatis, ©Department of Natural Resources Canada, All rights reserved.
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Site Areas of Potential Environmental Concern (APEC):

- APEC 1 - Well Site
- APEC 2 - Remote Sump Site
- APEC 3 - Campsite
- APEC 4 - Cleared Area



Project Location
Sahtu Settlement Area, Northwest Territories

Prepared by SIJWANI on 20221121
QR by TTIESSEN on 20221122
TR by XX on 2022XXXX

Client/Project
Client: Ovintiv Canada ULC
Project: Limited Phase I Environmental Site Assessment
G-18 Wellsite, Camp, and Remote Sump

Figure No.

A.2

Title

Site Plan