



To: Michael Ukrainetz,
Infrastructure Development Branch
Community Services, Government of Yukon

Date: May 4, 2021

Cc: Republic Architecture Inc.

Memo No.:

From: Erin O'Brien, Paul Gardner

File: ENW.PENW03102-01

Subject: 1207 Fifth Avenue Dawson City, Yukon – Summary of Contaminated Sites Findings

This 'Issued for Review' document is provided solely for the purpose of client review and presents our interim findings and recommendations to date. Our usable findings and recommendations are provided only through an 'Issued for Use' document, which will be issued subsequent to this review. Final design should not be undertaken based on the interim recommendations made herein. Once our report is issued for use, the 'Issued for Review' document should be either returned to Tetra Tech Canada Inc. (Tetra Tech) or destroyed.

1.0 INTRODUCTION

This memo provides a summary of the key findings presented in the Phase II Environmental Site Assessment (ESA) for the above captioned property (the Site) prepared by Tetra Tech Canada Inc. (Tetra Tech) on November 17, 2020 and presented to Government of Yukon, Community Services, Land Development Branch (YG-CS). Refer to the Phase II ESA report for additional details. It is Tetra Tech's understanding that the information presented herein will be provided to Republic Architecture Inc. as part of their feasibility study for the various options for Dawson City's proposed Recreational Centre.

2.0 SUMMARY OF KEY CONTAMINATED SITES FINDINGS

Summary of Background, Objectives and Methods

Since circa 1970s, the Site, which is owned by the City of Dawson, has been operating as a recreation vehicle (RV) park. At the time of Tetra Tech's field investigation (September 2020), the Site was occupied by the Goldrush Campground – an 82-spot campsite and (recreational vehicle) RV park; however, the campground was closed for the season. According to the City of Dawson Zoning Bylaw No. 2018-2019, the Site is zoned as R1 – single-detached/duplex residential. Tetra Tech understands that YG-CS is considering developing the Site for use as a community centre.

Tetra Tech's Phase II ESA followed the report titled *Phase I Environmental Site Assessment, Lots 1-20, Block Q Ladue Estate, 8338A CLSR, Dawson City, Yukon (Gold Rush Campground)* prepared by Golder Associates Ltd. (Golder) for Department of Community Services, Infrastructure Development Branch on July 31, 2020 (Phase I ESA). The Phase I ESA identified two on-site areas of potential environmental concern (APECs) based on a review of the current and historical use of the Site and surrounding areas. The APECs and potential contaminants of concern (PCOCs) are outlined in the table below.

Table 1: 2020 Phase I ESA APEC and PCOCs

APEC	Rationale	PCOCs
APEC 1 Former land use for waste disposal activities	The current tenant and former tenant reported that waste disposal may have occurred on-Site prior to circa 1970s. Possible large equipment and associated fuel and lubricant may have been buried in place with fill material.	Metals, LEPH/HEPH, PAH, VOC, VPH, BTEXS, MTBE
APEC 2 Site-wide fill material	Large quantities of fill material of unknown origin were reportedly brought on-Site to infill a swamp. The quality of the fill is unknown; however, it was reported to be locally-sourced gravel and channel rock.	Metals, LEPH/HEPH, PAH, VOC, VPH, BTEXS, MTBE

Notes: LEPH – Light Extractable Petroleum Hydrocarbons PAH – Polycyclic Aromatic Hydrocarbons
 HEPH – Heavy Extractable Petroleum Hydrocarbons VOC – Volatile Organic Compounds
 VPH – Volatile Petroleum Hydrocarbons BTEXS – benzene, toluene, ethylbenzene, xylene, styrene
 MTBE – methyl tert-butyl ether

The objective of the Phase II ESA was to assess the PCOCs in soil and groundwater in APECs 1 and 2 relative to the applicable *Yukon Contaminated Sites Regulation* (YCSR) standards. During the Phase II ESA soil and/or groundwater quality were assessed through the analytical testing of subsurface soil samples collected at seven testpits, and groundwater samples collected from three groundwater wells. Analytical results were compared to the YCSR residential land use soil standards (RL) and groundwater standards protective of drinking water (DW) and freshwater aquatic life (AW). An institutional facility such as a community centre would be classified as residential land use under the YCSR.

Phase II ESA Findings:

- Prior to drilling and test pitting, Arcrite Northern Ltd. conducted a geophysical scan of the Site to identify and help prevent striking subsurface utilities; and to identify subsurface anomalies which could be indicative of buried large equipment (APEC 1) and therefore assessed as part of the test pitting program. None of the anomalies assessed as part of the test pitting program identified buried equipment.
- Soil samples collected from the testpits (TP20-01, TP20-03 through TP20-05, and TP20-07 through TP20-09) were analyzed for PCOCs consisting of metals, hydrocarbons and/or glycols. Reported concentrations for hydrocarbons and glycols were less than the reportable method detection limits. Reported concentrations of select metals at select locations were greater than the applicable standards. Chromium concentrations were greater than the YCSR RL standard at TP20-01 and TP20-03 through TP20-05. Following chromium speciation, the reported concentrations of the hexavalent species were less than the YCSR RL standards at the four locations tested and reported concentrations of the trivalent species were less than the YCSR RL at TP20-03. However, reported concentrations of the trivalent species were greater than the YCSR RL standard for groundwater flow to surface water used by freshwater AW for samples collected from TP20-01, TP20-04 and TP20-05. In addition, reported concentrations of nickel at TP20-05 at 0.75 m in the fill unit, and at 1.25 m (in the duplicate pair) in the silt and organics unit were greater than the YCSR RL standard. The source of the metals exceedances may in part be due to poor quality fill identified throughout the Site and/or elevated background concentrations for chromium and nickel. Trivalent chromium concentrations in soil exceeded the YCSR RL standard for groundwater flow to surface water used by freshwater AW. For comparison purposes, the BC *Contaminated Site Regulation* standard for this site-specific factor is 60 mg/g for hexavalent chromium (a known toxic substance) and > 1,000 mg/g for trivalent chromium. The speciated chromium at the Site was shown to be entirely trivalent.
- Groundwater samples collected from the Site were analyzed for metals, hydrocarbons, and glycols. Reported concentrations of glycols at the three monitoring wells were less than the MDL. Concentrations of dissolved, arsenic, barium, chromium, cobalt, lead and/or manganese were greater than the YCSR DW and/or AW standards in one or more location. All other dissolved metals concentrations were less than the YCSR AW and DW standards. Hydrocarbon concentrations were less than the YCSR AW and DW standards; however, there were detectable concentrations of ethylbenzene, toluene and select polycyclic aromatic hydrocarbon (PAH) parameters.

Recommendations:

- Conduct at least one more groundwater monitoring event be conducted during the spring as water quality may fluctuate seasonally and since clear groundwater could not be sampled from the monitoring wells. This sampling is scheduled to occur in May 2021. The intent of the groundwater monitoring event is to further characterize the subsurface groundwater conditions on-Site and assess whether metals concentrations on-Site are greater than the YCSR standards or if they were caused by silty groundwater samples.
- Monitoring events should include soil vapour modelling of detectable volatile hydrocarbon concentrations for residential indoor and outdoor exposure per BC ENV *Technical Guidance 4 – Vapour Investigation and Remediation (2017)*.
- Potential drinking water wells should be tested for potable water quality including metals and hydrocarbons prior to use to confirm water quality is suitable for consumption. Given that the Dawson City has a potable water source, it is unlikely a drinking water well would be installed on the Site.
- Conduct additional soil sampling in proximity to the identified soil exceedances to delineate the chromium and nickel exceedances in soil found at these locations.

3.0 CONTAMINATED SITES RISKS

- The Phase II ESA confirmed the presence of poor-quality fill throughout the Site. Metals contamination in soil was identified but not delineated. Per communication with the Department of Environment, the elevated chromium concentrations in Dawson City is a known issue. The soil contamination may be mitigated through either a “Background Study” or through a Human Health and Ecological Risk Assessment (HHERA). Alternatively, removal of contaminated soils or hotspots may be required.
- Based on the limited groundwater data obtained to date, there are metals exceedances in groundwater. The groundwater contamination may require remediation likely in the form of additional investigation and a HHERA. Based on the subsurface conditions, groundwater yields are expected to be low for any shallow (<2 m) excavations but water infiltrating an excavation will likely need to be treated to remove the contaminants prior to discharge.
- Detectable concentrations of volatile parameters were identified in soil and/or groundwater. As such, soil vapour modelling should be undertaken to evaluate the vapour intrusion risk to indoor air quality for the potential development. Based on the available data, the risk is considered low and it is likely that potential vapour intrusion risk could be mitigated through either source removal and/or an engineered solution such as installation of a vapour barrier.

4.0 CLOSURE

This report has been prepared based on the scope of services and for the use of the Government of Yukon, Community Services, Land Development Branch, which includes distribution as required for the purposes for which this assessment was commissioned. The assessment has been carried out in accordance with generally accepted engineering practices. No other warranty is made, either express or implied. Professional judgement has been applied in developing the recommendations in this report.

We trust this report meets your present requirements. If you have any questions or comments please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

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Attachments: Limitations on the use of this Document

LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL - YUKON GOVERNMENT

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This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the use of TETRA TECH's Client, its officers, employees, agents, representatives, successors and assigns (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

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Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems, as per agreed project deliverable formats. TETRA TECH makes no representation about the compatibility of these files with the Client's future software and hardware systems.

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Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be brought to the attention of TETRA TECH within a reasonable time.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, and subject to the standard of care herein, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage, except where TETRA TECH has subcontracted for such information.

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This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.