TETRA TECH

TECHNICAL MEMO

ISSUED FOR REVIEW

To:	Greg Sheppard	**Date:**	October 31, 2025
c:		**Memo No.:**	001
From:	Kaya Sokukawa Julie Kostecki Anders Frappell	**File:**	704-ENG.ROCK03543-01
Subject:	Iqaluit Nukkiksautiit Project 2025 Geotechnical Investigation – Testpit Program Summary		

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

Tetra Tech Canada Inc. (Tetra Tech) was retained by Nunavut Nukkiksautiit Corporation (NNC) to provide engineering services for the design of an impoundment hydropower facility in the Kuugaluk area, approximately 60 km north of Iqaluit. The goal of the Iqaluit Nukkiksautiit Project ("the Project") is to provide the City of Iqaluit with a reliable renewable energy source that meets current and future electrical load demands.

Phase 1 of the site investigation was completed in August and September of 2025. The objective of the site investigation was to identify and map surficial geology deposits and bedrock surfaces, delineate permafrost features, and supplement the preliminary site investigation to provide supportive evidence and data for the planning of future exploration programs. The investigation consisted of a geophysical program and a testpit program.

The purpose of this document is to summarize the efforts of the testpit program portion of the site investigation. For information regarding the geophysical program, please refer to RPT-INP Geophysics IFR, dated October 31, 2025.

2.0 2025 TESTPIT CAMPAIGN

2.1 Summary of Work

The testpit program was completed from August 31 to September 8, 2025 using shovels to dig a total of 20 testpits to a maximum depth of 1.2 m, which corresponds to the maximum reach of the shovels. Material characteristics were recorded during and after testpit excavation by visual observation and field tests such as field texturing and the ribbon test which identifies clay. Temperatures were recorded with a Klein Dual Laser Infrared Thermometer to measure the temperature of permafrost.

Table 2-1 summarizes the completed work and Figure 2-1 illustrates the general layout for the Project proposed design testpit locations and bedrock sample locations. Testpits were titled "TP" for "testpit" or "BP" for "borrow pit" denoting the location of the testpit as a potential material borrow source.

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Table 2-1: Summary of Completed Work

Testpit ID	Completion Date	Coordinates		Maximum Depth (m)	Comments
		Easting	Northing		
BP101	Sept. 1, 2025	548171	7118048	1.20	Maximum reach of shovel
BP102	Sept. 1, 2025	548474	7118473	1.10	Refusal on frozen ground
BP103	Sept. 2, 2025	548875	7119008	0.60	Refusal on frozen ground
BP104	Sept. 2, 2025	550109	7118498	0.75	Refusal on frozen ground
BP105	Sept. 1, 2025	547749	7117959	1.20	Maximum reach of shovel
BP106	Sept. 2, 2025	549301	7118881	1.20	Maximum reach of shovel
BP107	Sept. 2, 2025	548984	7119054	0.75	Excessive sloughing
BP108	Sept. 2, 2025	547597	7118958	0.85	Refusal on frozen ground
BP109	Sept. 2, 2025	547515	7119066	1.20	Maximum reach of shovel
BP110	Sept. 2, 2025	547276	7119074	0.70	Refusal on boulders
BP111	Sept. 4, 2025	549046	7117323	0.89	Refusal on frozen ground
TP25-01	Sept. 3, 2025	546953	7119128	1.20	Maximum reach of shovel
TP25-02	Sept. 3, 2025	546915	7119550	0.30	Excessive Sloughing
TP25-03	Sept. 3, 2025	546942	7119764	1.20	Excessive sloughing
TP25-04	Sept. 3, 2025	546969	7120037	1.00	Refusal on frozen ground
TP25-05	Sept. 5, 2025	547177	7117996	0.71	Refusal on hard ground (potentially frozen)
TP25-06	Sept. 3, 2025	546979	7120096	1.06	Refusal on frozen ground
TP25-07	Sept. 4, 2025	545650	7117855	1.15	Refusal on cobbles
TP25-08	Sept. 3, 2025	548070	7118685	1.20	Maximum reach of shovel
TP25-09	Sept. 5, 2025	548029	7118580	1.20	Maximum reach of shovel

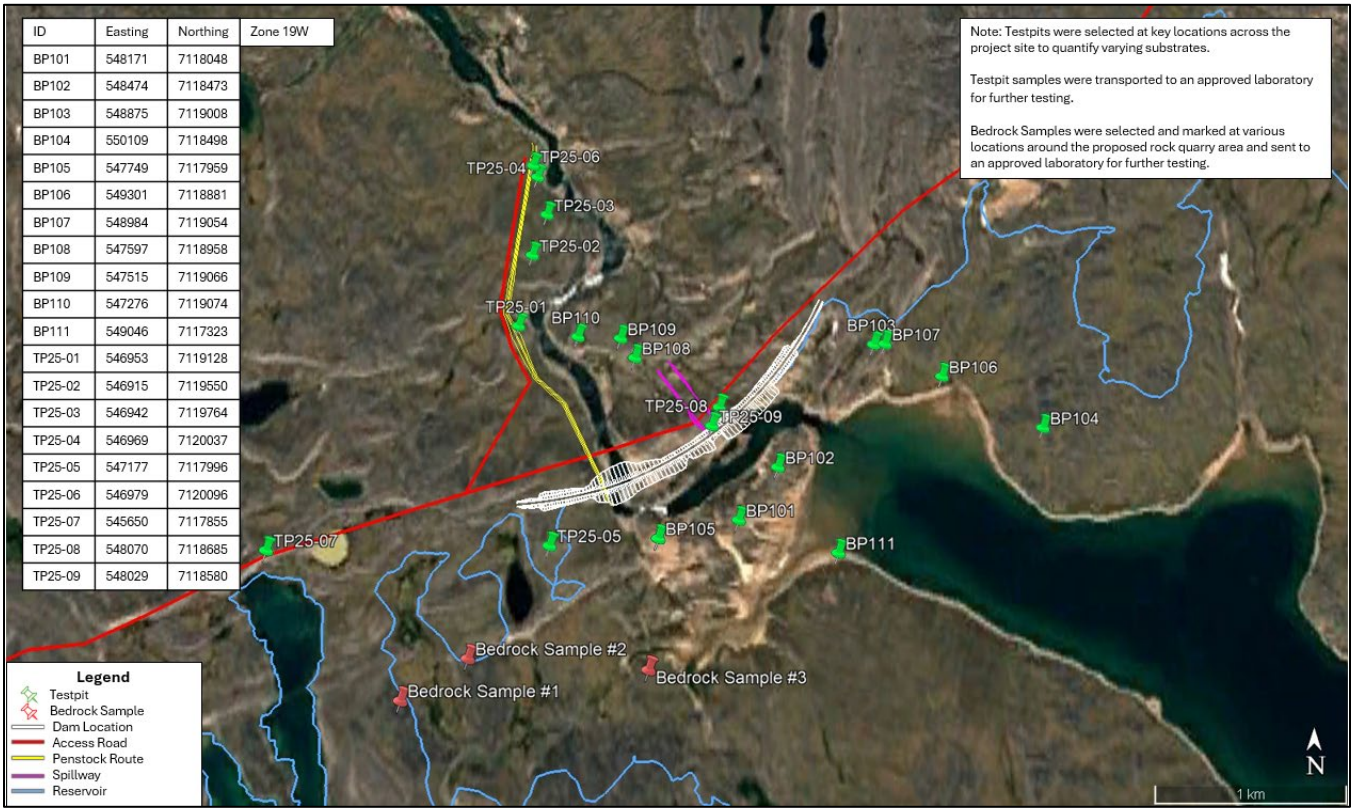


Figure 2-1: General Layout

Soil materials encountered were logged and representative samples were collected and sent for further laboratory testing. Additionally, three bedrock samples were retrieved from the proposed rock quarry location and sent to an approved laboratory for Acid Rock Drainage (ARD) testing.

The requested laboratory testing program consists of 26 moisture content, 11 sieve analyses and five Atterberg limits, as presented in Table 2-2. Since the laboratory testing program is currently ongoing, changes to the program might occur. Results will be reported once complete.

Table 2-2: Laboratory Testing Program

Testpit ID	Sample ID	Depth		Type of Test			
		From	To	Moisture Content	Sieve	Atterberg Limits	ARD
BP101	G1	0.5	0.7	X	X		
BP102	G1	0.7	0.9	X	X	X	
BP103	G1	0.5	0.5	X	X		
BP104	G1	0.3	0.5	X			
	G2	0.7	0.7	X		X	
BP105	G1	1.0	1.2	X	X		
BP106	G1	0.2	0.4	X			
	G2	1.0	1.2	X	X		
BP107	G1	0.6	0.8	X			
BP108	G1	0.8	0.9	X	X		
BP109	G1	0.4	0.6	X			

Testpit ID	Sample ID	Depth		Type of Test			
		From	To	Moisture Content	Sieve	Atterberg Limits	ARD
	G2	1.0	1.2	X	X		
BP110	G1	0.5	0.5	X			
BP111	G1	0.4	0.6	X		X	
	G2	0.8	0.9	X	X		
TP25-01	G1	0.3	0.5	X			
TP25-02	G1	0.3	0.3	X	X		
TP25-03	G1	0.4	0.6	X		X	
TP25-04	G1	0.4	0.6	X			
TP25-05	G1	0.4	0.6	X		X	
TP25-06	G1	0.3	0.5	X	X		
TP25-07	G1	0.5	0.7	X	X		
TP25-08	G1	0.4	0.6	X			
	G2	1.0	1.2	X			
TP25-09	G1	0.3	0.5	X			
	G2	1.0	1.2	X			
Rock Quarry	G1	Surface					X
	G2	Surface					X
	G3	Surface					X

In addition to the testpit program, a drone survey was undertaken in the project area. Five drone flights were completed collecting high-resolution LiDAR that will be used for further terrain analysis.

Figure 2-2 illustrates the drone survey locations and Figure 2-3 and Figure 2-4 presents the preliminary drone survey results from the main area and the proposed rock quarry area.

Main area = white; Upstream Bedrock Canyon = red; Downstream Bedrock Canyon = green; Access Road/Thermokarst Expansion Risk Area = yellow; Proposed Rock Quarry Area = purple.

Figure 2-2: Drone Survey Flight Areas

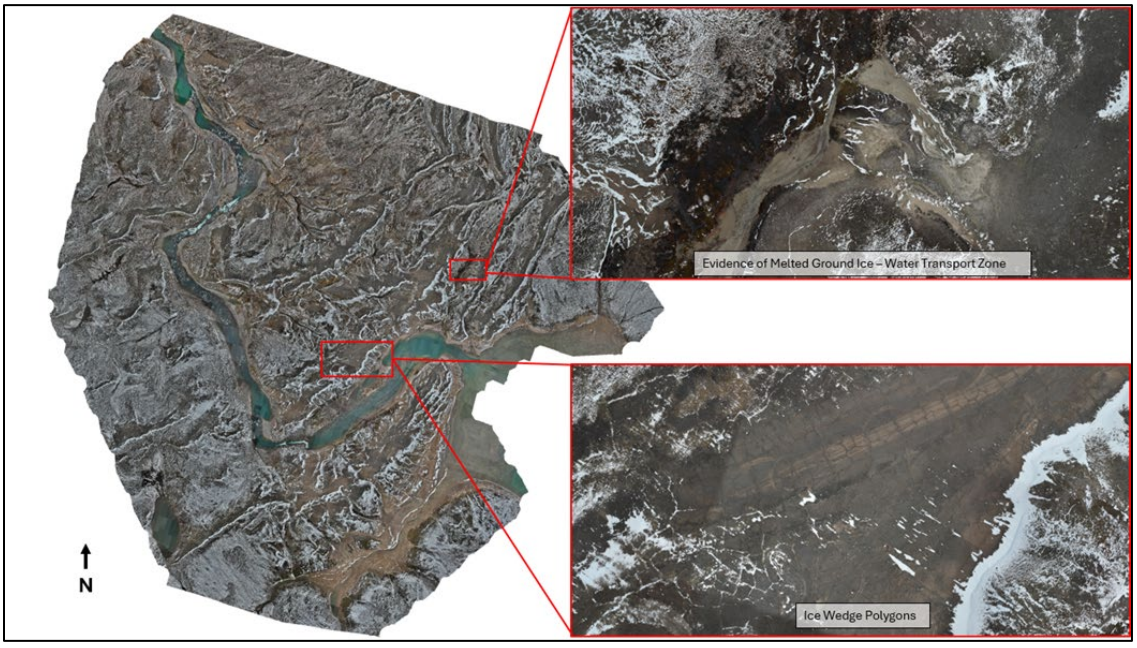


Figure 2-3: Drone Survey - Main Area; Evidence of melted ground ice (top) and ice wedge polygons (bottom)

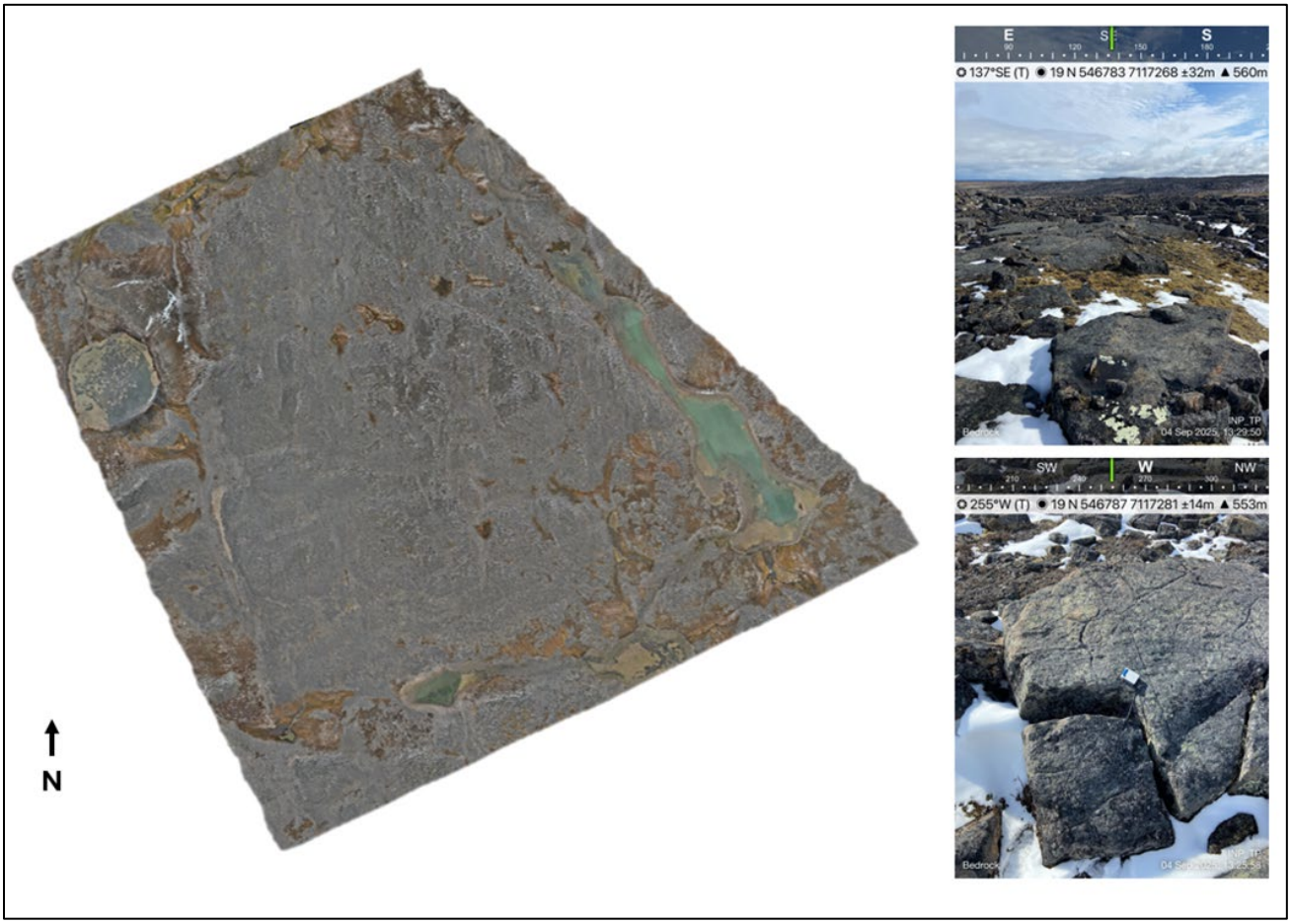


Figure 2-4: Drone Survey - Proposed Rock Quarry Area – Bedrock outcrop (above), example of bedrock character (below).

2.2 Preliminary Results

It should be noted that the results presented in this report are preliminary and will be updated following reception of the laboratory test results.

As shown on Figure 2-5, the primary constituents on site are mainly silt and clay at low lying areas, sand and gravel comprising moraine deposits, and sand that lines the lake shore. The boundaries of the material distribution are estimated based on the testpit logs, visual observation, and aerial photographs. These boundaries will be refined as the project progresses.

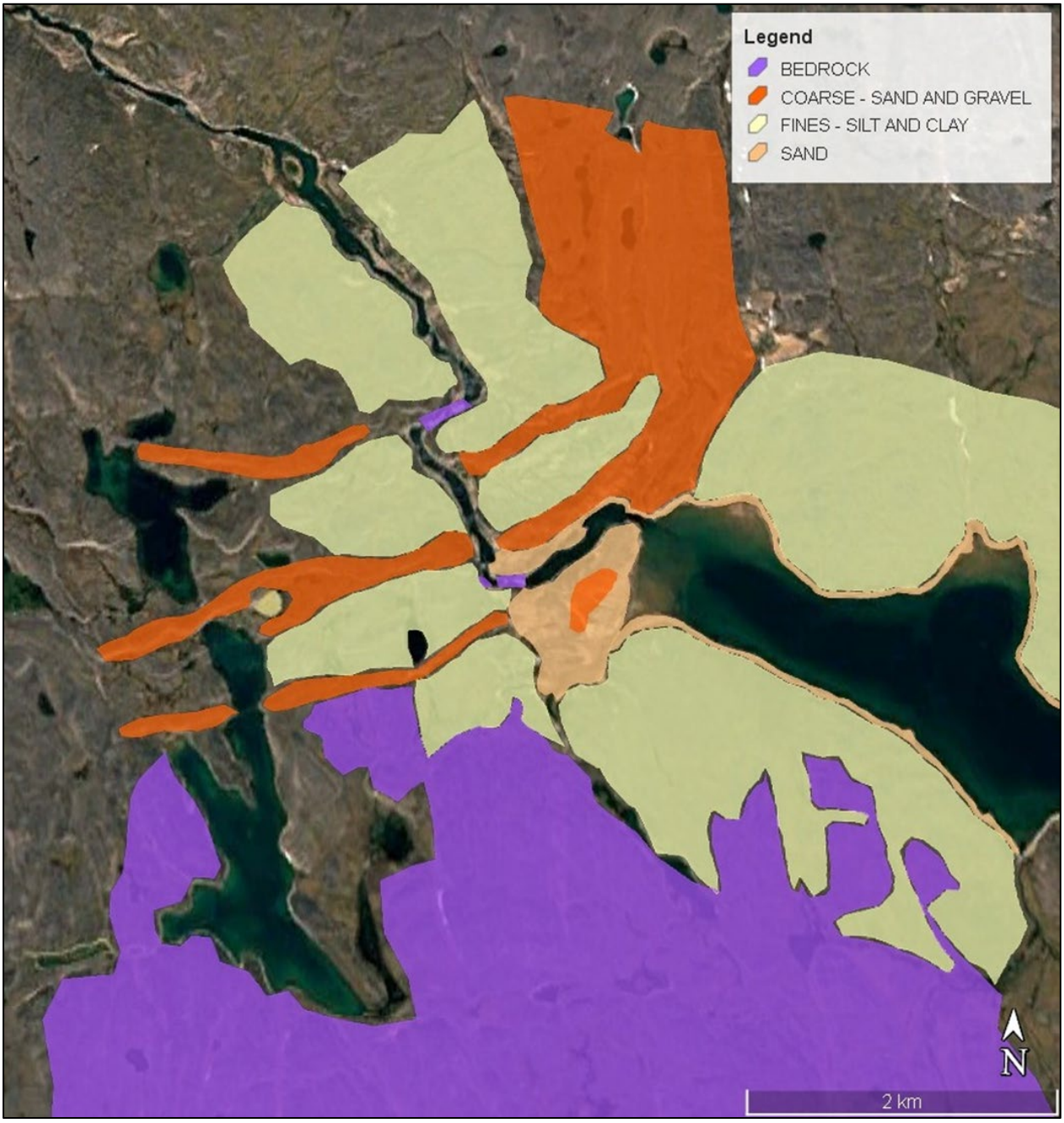


Figure 2-5: Primary material distribution across the site area

2.3 Testpit Logs

Preliminary logs based on visual observations are presented below.

These logs will be updated following reception of the laboratory test results.

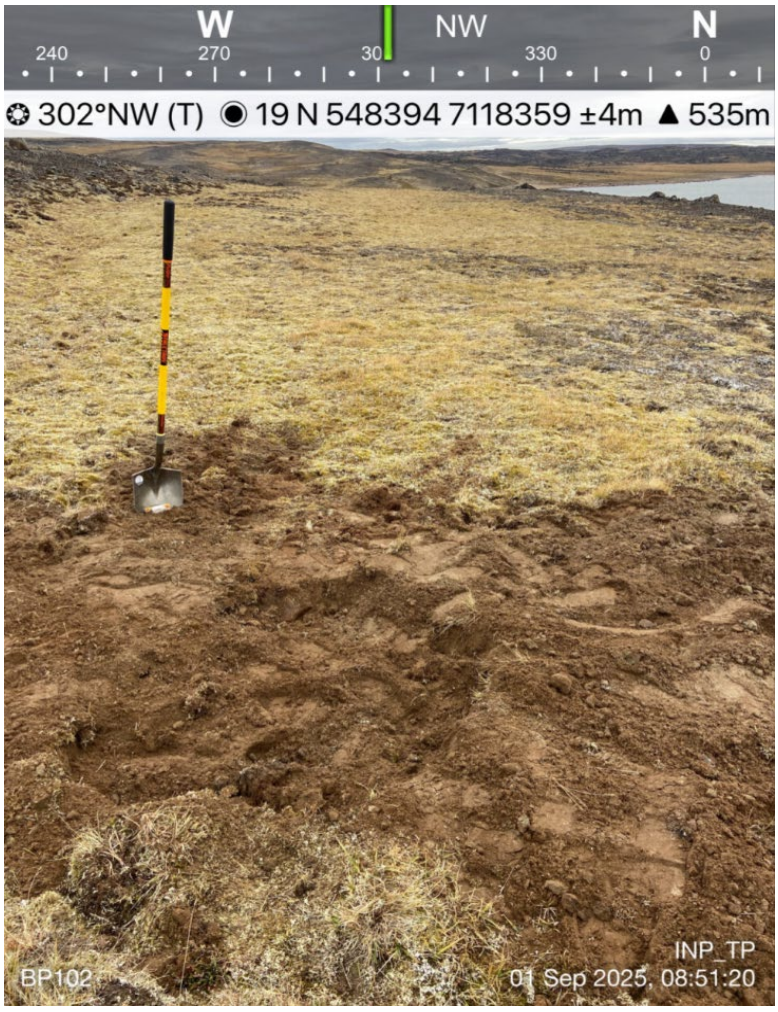
BP101

Date	ID	Location				Logged by	
01-09-25	BP101	Easting:	548171	Elev. (m):	557	KS	
		Northing:	7118048	UTM:	19W		
Depth (m)		Layer Description				Sample Taken	
From	To					#	Depth (m)
0	1.2	SAND - some gravel, some cobbles, damp, brown; fine to coarse gravel, cobbles up to 200 mm diameter				G1	0.5
		End of Tespit at 1.2 m. Testpit terminated at maximum reach of shovel. Active layer temperature: N/A					
Photo							

BP102

Date	ID	Location				Logged by	
01-09-25	BP102	Easting:	548474	Elev. (m):	529	KS	
		Northing:	7118473	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.4	TOPSOIL - organics, sandy, some silt; fine grained sand				-	-
0.4	1.1	SAND and SILT - trace clay, damp, grey, low plastic; fine grained sand				G1	0.7
		End of Testpit at 1.1 m. Testpit terminated due to refusal on frozen ground. Active layer temperature: -1.7˚C					

Photo



BP103

Date	ID	Location				Logged by	
02-09-25	BP103	Easting:	548875	Elev. (m):	547	KS	
		Northing:	7119008	UTM:	19W		
Depth (m)		Layer Description				Sample Taken	
From	To					#	Depth (m)
0	0.6	GRAVELLY SAND - trace to some cobbles, trace fines, dry, brown; fine to coarse sand; fine to coarse gravel; subangular to subrounded gravel; subangular to subrounded cobbles				G1	0.5
		End of Testpit at 0.6 m Testpit terminated due to refusal on frozen ground. Active layer temperature: -2.9˚C					

Photo

BP104

Date	ID	Location				Logged by	
02-09-25	BP104	Easting:	550109	Elev. (m):	541	KS	
		Northing:	7118498	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.1	Topsoil - organics				-	-
0.1	0.7	CLAY - some silt, trace cobbles, trace organics, organic odour, moist, brown; subrounded cobbles				G1	0.3
0.7	0.75	CLAY and SILT - trace sand, trace gravel, compact, ice, grey; fine to coarse sand; fine to coarse gravel; subangular to angular gravel				G2	0.7
		End of Testpit at 0.75 m. Testpit terminated due to refusal on frozen ground. Active layer temperature: -5.4˚C					

Photo

BP105

Date	ID	Location				Logged by	
01-09-25	BP105	Easting:	547748.7	Elev. (m):	540	KS	
		Northing:	7117959	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	1.2	SAND - some silt, damp, brown; fine to medium sand				G1	1
		End of Testpit at 1.2 m. Testpit terminated at maximum reach of shovel. Active layer temperature: N/A					

Photo

BP106

Date	ID	Location				Logged by	
02-09-25	BP106	Easting:	549301	Elev. (m):	521	KS	
		Northing:	7118881	UTM:	19W		
Depth (m)		Layer Description				Sample Taken	
From	To					#	Depth (m)
0	0.6	SAND - trace fines, trace gravel, trace cobbles, dry to damp, brown; fine to coarse sand; fine to coarse gravel; subangular to subrounded sand; subangular to subrounded cobbles; cobbles up to 200 mm diameter				G1	0.2
0.6	1.2	SAND - some fines, trace gravel, wet, low plastic, brown; fine to coarse sand; coarse gravel; subangular to subrounded sand; subangular to subrounded gravel				G2	1
		End of Testpit at 1.2 m. Testpit terminated at maximum reach of shovel. Active layer temperature: N/A					
Photo							

BP107

Date	ID	Location				Logged by	
02-09-25	BP107	Easting	548984	Elev. (m)	547	KS	
		Northing	7119054	UTM	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.4	GRAVELLY SAND - some fines, moist to wet, brown; fine to coarse sand; fine gravel				-	-
0.4	0.75	GRAVELLY SAND - trace fines, trace cobbles, trace boulders, wet, brown; coarse sand; fine to coarse gravel; subangular to subrounded sand; subangular to subrounded gravel; boulders up to 400 mm diameter				G1	0.6
		End of Testpit at 0.75 m. Testpit terminated due to excessive water/sloughing. Active layer temperature: N/A					

Photo

BP108

Date	ID	Location				Logged by
02-09-25	BP108	Easting:	547597	Elev. (m):	520	KS
		Northing:	7118958	UTM:	19W	

Depth (m)		Layer Description	Sample Taken	
From	To		#	Depth (m)
0	0.1	TOPSOIL - organics, brown	-	-
0.4	0.85	SILTY SAND - trace organics, compact, damp to moist, brown-grey; fine sand	G1	0.8

End of Testpit at 0.85 m.
Testpit terminated due to refusal on frozen ground.
Active layer temperature: -5.3˚C

Photo

BP109

Date	ID	Location				Logged by	
02-09-25	BP109	Easting:	547515	Elev. (m):	530	KS	
		Northing:	7119066	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.85	SAND - trace fines, dry, brown; fine to coarse sand; subangular to subrounded sand				G1	0.4
0.85	1.2	SAND - trace to some gravel, trace fines, dry, brown; coarse sand; fine to coarse gravel; subangular to subrounded sand; subangular to subrounded gravel; gravel up to 20 mm diameter				G2	1
Testpit terminated at 1.2 m. Testpit terminated at maximum reach of shovel. Active layer temperature: N/A							
Photo							

BP110

Date	ID	Location				Logged by	
2025-09-02	BP110	Easting:	547276	Elev. (m):	524	KS	
		Northing:	7119074	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.5	SAND - some gravel, trace fines, dry, brown; coarse sand; fine to coarse gravel; angular to subrounded sand; angular to subrounded gravel				G1	0.45
0.5	0.7	BOULDERS - trace sand, trace gravel; subangular to subrounded cobbles; subangular to subrounded boulders; boulders up to 400 mm diameter				-	-
		End of Testpit at 0.7 m. Testpit terminated due to refusal on boulders. Active layer temperature: N/A					
Photo							

BP111

Note: This testpit was titled as a duplicate of BP105 in the field. Renamed BP111.

Date	ID	Location				Logged by	
2025-09-04	BP111	Easting:	549046	Elev. (m):	521	KS	
		Northing:	7117323	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.6	SILTY SAND - trace fines, dry to moist, brown; fine sand; subangular to subrounded sand				G2	0.4
0.6	0.89	SILTY CLAY - trace sand, moist, low plastic, brown-grey; fine sand				G1	0.8
		End of Testpit at 0.89 m. Testpit terminated due to refusal at frozen ground. Active layer temperature: -3.3˚C					
Photo							

TP25-01

Date	ID	Location				Logged by	
2025-09-03	TP25-01	Easting	546953	Elev. (m)	535	KS	
		Northing	7119128	UTM	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.05	GRAVEL - cobbly, bouldery; coarse gravel				-	-
0.05	1.2	SILTY SAND - some gravel, trace fines, trace cobbles, trace boulders, dry, brown; fine to coarse sand; angular to subrounded sand; angular to subrounded gravel; subangular to subrounded cobbles; subrounded boulders; boulders up to 400 mm diameter				G1	0.3
		End of Testpit at 1.2 m. Testpit terminated at maximum reach of shovel. Active layer temperature: N/A					

Photo

TP25-02

Date	ID	Location				Logged by	
2025-09-03	TP25-02	Easting:	546915	Elev. (m):	519	KS	
		Northing:	7119550	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.1	TOPSOIL - organics				-	-
0.1	0.3	SILTY SAND - wet, brown; fine to medium sand				G1	0.25
		End of Testpit at 0.3 m. Testpit terminated due to excessive sloughing. Active layer temperature: N/A					
Photo							

TP25-03

Date	ID	Location				Logged by	
2025-09-03	TP25-03	Easting:	546942	Elev. (m):	503	KS	
		Northing:	7119764	UTM:	19W		
Depth (m)		Layer Description				Sample Taken	
From	To					#	Depth (m)
0	0.1	TOPSOIL - organics				-	-
0.1	1.1	SILTY SANDY CLAY - moist, low plastic, brown-red; fine to medium sand				G1	0.4
1.1	1.2	SAND - brown, wet; medium to coarse				-	-
		End of Testpit at 1.2 m. Testpit terminated due to excess water/sloughing. Active layer temperature: N/A					
Photo							

TP25-04

Date	ID	Location				Logged by
2025-09-03	TP25-04	Easting:	546969	Elev. (m):	488	KS
		Northing:	7120037	UTM:	19W	

Depth (m)		Layer Description	Sample Taken	
From	To		#	Depth (m)
0	0.1	TOPSOIL - organics	-	-
0.1	0.9	SILT - trace sand, trace clay, dry to damp, porous, brown; fine sand	G1	0.4
0.9	1	SILT - trace sand, trace clay, moist, grey-brown; fine sand	-	-

End of Testpit at 1.00 m.
Testpit terminated due to refusal on frozen ground.
Active layer temperature: -3.8˚C

Photo

Photo 1

Photo 2

TP25-05

Date	ID	Location				Logged by	
2025-09-05	TP25-05	Easting:	547177	Elev. (m):	558	KS	
		Northing:	7117996	UTM:	19W		
Depth (m)		Layer Description				Sample Taken	
From	To					#	Depth (m)
0	0.1	TOPSOIL - organics				-	-
0.1	0.7	SILTY CLAY - trace sand, moist, low plastic, grey-brown; fine sand. Note: interaction resulted in liquefaction.				G1	0.4
0.7	0.71	SILTY CLAY - note: possibly frozen.				-	-
		End of Testpit at 0.71 m. Testpit terminated due to refusal. Active layer temperature: 0.5˚C Note: @ 0.7 m depth soil horizon encountered was similar to frozen soils in consistency.					

Photo

TP25-06

Date	ID	Location				Logged by	
2025-09-03	TP25-06	Easting:	546979	Elev. (m):	491	KS	
		Northing:	7120096	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.1	TOPSOIL - organics				-	-
0.1	1.06	SILT - some sand, trace clay, damp, brown; fine sand				G1	0.3
		End of Testpit at 1.06 m. Testpit terminated due to refusal on frozen ground. Active layer temperature: -4.5˚C					
Photo							

TP25-07

Date	ID	Location				Logged by	
2025-09-04	TP25-07	Easting:	545650	Elev. (m):	552	KS	
		Northing:	7117855	UTM:	19W		
Depth (m)		Layer Description				Sample Taken	
From	To					#	Depth (m)
0	1.15	GRAVELLY SAND - trace to some fines, trace cobbles, trace boulders, damp, brown; fine to coarse sand; fine to coarse gravel; subangular to subrounded sand; subangular to subrounded gravel; cobbles up to 170 mm diameter				G1	0.5
		End of Testpit at 1.15 m. Testpit terminated due to refusal on cobbles. Active layer temperature: N/A					

Photo

TP25-08

Date	ID	Location				Logged by	
2025-09-03	TP25-08	Easting:	548070	Elev. (m):	546	KS	
		Northing:	7118685	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.55	SAND - some gravel, trace fines, dry to damp, brown; fine to coarse sand; fine to coarse gravel; sub angular to subrounded sand; subangular to subrounded gravel				G1	0.4
0.55	0.9	SAND - trace fines, dry to damp, brown; fine to coarse sand				-	-
0.9	1.2	SILT - trace clay, dry, grey				G2	1
		End of Testpit at 1.2 m. Testpit terminated at maximum reach of shovel. Active layer temperature: N/A					

Photo

TP25-09

Date	ID	Location				Logged by	
2025-09-05	TP25-09	Easting:	548029	Elev. (m):	545	KS	
		Northing:	7118580	UTM:	19W		
Depth (m)		**Layer Description**				**Sample Taken**	
From	**To**					**#**	**Depth (m)**
0	0.85	SAND - some gravel, some fines, dry, brown; fine to coarse sand; fine gravel; subangular to subrounded sand; subangular to subrounded gravel				G1	0.3
0.85	1.2	GRAVEL - some sand, trace fines, trace cobbles, dry, brown; fine to coarse gravel; fine to coarse sand; subrounded gravel; subrounded sand; cobbles up to 80 mm diameter				G2	1
		End of Testpit at 1.2 m. Testpit terminated at maximum reach of shovel. Active layer temperature: N/A					

Photo

3.0 CLOSURE

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

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1.2 ALTERNATIVE DOCUMENT FORMAT

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.

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Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

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. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

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

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. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

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, 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.

1.6 GENERAL LIMITATIONS OF DOCUMENT

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 document, 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 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historical environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional exploration and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function. Where temporary or permanent drainage systems are installed within or around a structure, these systems must protect the structure from loss of ground due to mechanisms such as internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design details regarding the geotechnical aspects of such systems (e.g. bedding material, surrounding soil, soil cover, geotextile type) should be reviewed by the geotechnical engineer to confirm the performance of the system is consistent with the conditions used in the geotechnical design.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.