TETRA TECH

TECHNICAL MEMO

ISSUED FOR REVIEW

To:	Kim Staples-Lakhani	**Date:**	October 18, 2024
c:	Graham Wilkins	**Memo No.:**	1
From:	Francis Edomwonyi Andrew Horwood	**Tetra Tech File:**	704-TRN.VHWY03330-01
Subject:	Kugaaruk Sealift Improvements Project Recommended Construction Equipment List		

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.

This memo includes a recommended equipment listed in Table 1 which are required to construct the sealift improvement project described on the attached Figure 1. The equipment list includes the equipment type, quantity, size, and brand of equipment that would be suitable for this project. We note that training is required for much of the equipment, both in terms of operation and maintenance.

Table 1: Recommended Equipment

Equipment Type	Qty	Size	Brand / Model	Operator Training Required	Maintenance Training Required	Comments
Vibratory Soil compactor	1	19 ton	CAT CS19	Yes	Yes	Community does not own a soil compactor
Wheel Loader, Front End Loader	1	20 ton	CAT 962	Yes	Yes	Community owns 2 CAT 938G (20 ton) in working condition and suitable for this project
Motor Grader	1	20 ton	CAT 150	Yes	Yes	Community owns 1 CAT 150 (20 ton) in working condition and suitable for this project
Crawler Dozer with tilting Blade	1	25 ton	D6N	Yes	Yes	Community owns 1 CAT D6N XL (25 ton) – awaiting spare parts and suitable for this project
Excavator with additional rock drill attachment	1	35 ton	CAT 335	Yes	Yes	Community owns 1 Hitachi ZAXIS 135 (35 ton) that need to be repaired, if possible. Rock drill attachment shall be compatible with excavator brand
Dump Trucks	3	15 - 30 ton	Sterling, Ford, International, Volvo, Mack, or similar	Yes	Yes	Community does not own any dump trucks. Three dump trucks are recommended to enable an efficient (continuous operation from loading to dumping and back to loading) cycle time between the crusher/borrow and Road/Pad/Ramp

Tetra Tech Canada Inc.
Suite 1000 – 10th Floor, 885 Dunsmuir Street
Vancouver, BC V6C 1N5 CANADA
Tel 604.685.0275 Fax 604.684.6241

Equipment Type	Qty	Size	Brand / Model	Operator Training Required	Maintenance Training Required	Comments
Crushing Plant Comprising of a jaw crusher, impact crusher, 3 deck screener, and associated conveyor belts	1	100 ton/hour	Supplier options include: Front Line, Prater, and Foreman Equipment	Yes	Yes	Prior to purchase, industry experts and suppliers shall be consulted for advice on the preferred crushing plant components and configuration. Community owns one (1) screener
Water Truck	1	15 m³	Sterling, Ford, International, or similar	Yes	Yes	Community does not own a water truck
Nuclear densometer	1	N/A	Troxler	Yes	Yes	Community does not own a nuclear densometer

Notes:

- Consideration should be given to the purchase of equipment from a single brand as there is likely to be overall life cycle cost savings due to efficiencies in maintenance, training, and operations.
- Drilling and blasting equipment has been excluded from the recommended equipment list as the training and storage requirements for explosives are extensive and may not be required on this project.

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

Respectfully submitted,
Tetra Tech Canada Inc.

Prepared by:
Francis Edomwonyi, P.Eng.
Project Manager
Northern and Pacific Transportation
Direct Line: 306.347.4045
Francis.Edomwonyi@tetratech.com

Reviewed by:
Andrew Horwood, B.Tech, AScT
Arctic Transportation Manager
Direct Line: 778.861.9353
Andrew.Horwood@tetratech.com

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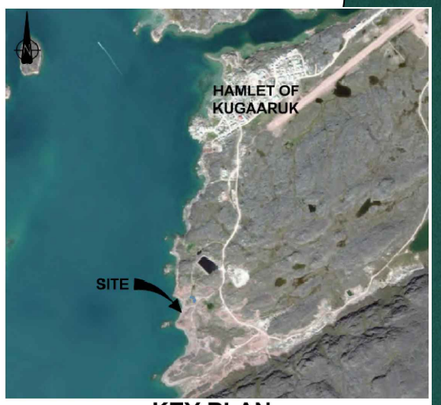
Enclosure: Figure 1 – Site Plan Proposed Scope Locations
Limitations on the Use of this Document



KEY PLAN
NTS

SCOPE 1:
-EXPAND BARGE LANDING AREA TO 45m WIDE TO ACCOMMODATE 2 BARGES
-BOULDER REMOVAL AND BEDROCK BLASTING

SCOPE 2:
-EXPANDED LAYDOWN AREA FROM CURRENT 0.5 ha TO 1.0 ha
-DRAINAGE IMPROVEMENTS TO PERIMETER OF LAYDOWN AREA

SCOPE 3:
WIDEN ACCESS ROAD FROM 8m TO 10m

SCOPE3:
IMPROVE STEEP VERTICAL GRADES (APPROX.-10-12%) ON MAIN ROAD

SCOPE 4 (OPTIONAL):
SECURITY OFFICE INSULATED WITH GENERATOR POWERED HEATING AND LIGHTING

SCOPE 5 (OPTIONAL):
-SECURITY FENCE SURROUNDING LAYDOWN AREA

SCOPE 6:
-ROAD AND CAUTION SIGNAGE IN BOTH ENGLISH AND INUKTITUT.
LOCATION TBD.

TO KUGAARUK

TO KUGAARUK

LAGOON

EDGE OF BOULDERS

BOULDERS

BEDROCK

BEDROCK/BOULDERS

45.0 m

O.L.W.M.

O.H.W.M.

LEGEND

- EW — EXISTING POND LIMITS
- O.H.W.M. — ORDINARY HIGH WATER MARK
- O.L.W.M. — ORDINARY LOW WATER MARK (APPROX.)
- POWER POLE (LOCATION APPROX.)
- EXISTING ROAD EDGES
- EXISTING BEDROCK AND BOULDERS (TO REMAIN)
- EXISTING BEDROCK AND BOULDERS (BLAST)
- TOP EDGE OF SLOPE 2021 CONSTRUCTION
- EDGE OF GRAVEL 2021 CONSTRUCTION
- PROPOSED EXPANDED BARGE LANDING & LAYDOWN AREAS (APPROX.)
- X — PROPOSED FENCE (APPROX.)

NOTES
TOPOGRAPHIC SURVEY AND BATHYMETRY COMPLETED BY SUBARCTIC GEOMATICS LTD. IN JULY 2019

AS-BUILT SURVEY COMPLETED BY SUBARCTIC GEOMATICS LTD. IN JULY 2021

0 — 50
Scale: 1: 1 500 (metres)

ISSUED FOR REVIEW

CLIENT
HAMLET OF KUGAARUK

EXPANDED KUGAARUK BARGE LANDING SITE

SITE PLAN
PROPOSED SCOPE LOCATIONS

TETRA TECH

PROJECT NO.	DWN	CKD	REV
TRN.VHWY03149	AD	MK	0

OFFICE: VANC
DATE: June 11, 2024

Figure 1

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

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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

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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.

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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.