



March 9, 2020

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Land Use Permit S20S-002: 12 Mile Creek Bridge Geotechnical Program – Permafrost Mitigation and Erosion Control Plan

The Government of the Northwest Territories (GNWT) Department of Infrastructure (INF) has prepared the following Permafrost Mitigation and Erosion Control Plan (the Plan) in accordance with Land Use Permit # S20S-002 for the 12 Mile Creek Bridge Geotechnical Assessment Program (the Project).

The purpose of this plan is to outline the mitigation plan to be activated should permafrost be encountered or erosion concerns are noted during the Geotechnical Assessment Program.

BACKGROUND

The Project will occur within the Mackenzie Valley Winter Road right-of-way at the 12 Mile Creek water crossing, approximately 14 km east of Tulita, Northwest Territories. The geotechnical assessment program will include the advancement of four boreholes, two on each side of 12 Mile Creek. The boreholes will be advanced outside of the ordinary high water mark of 12 Mile Creek to a maximum depth of 30 m. Where bedrock is encountered, boreholes will be advanced 3 m into the bedrock using the core drill.

During the drilling program, the following will be completed:

- Collection of infrared (IR) temperatures of soil cuttings recovered during the drilling program.
- Documentation of visible ice content (i.e. presence of ice crystals) during the drilling program.

Upon completion of the Project, INF will evaluate the results and integrate the findings into design of the repair and/or replacement of the water crossing.



RESPONSIBLE ORGANIZATION

As the Land Use Permit holder, INF is responsible for preparing and implementing the Plan. INF's contractor, Kalo Stantec is responsible for the on-site execution of the Plan.

Table 1: Contact Information

GNWT Contact Information	Contractor Contact Information
Joe Acorn, P.Eng. Department of Infrastructure Government of the Northwest Territories Phone: (867) 767-9082, ext. 31029 Joe_Acorn@gov.nt.ca	Ed M. Grozic, M.Eng., P.Eng. Principal Consultant, Arctic Development Tetra Tech Phone: (403) 968-6858 Ed.Grozic@tetrattech.com

ACTION PLAN

INF has developed the following action plan to outline measures to be implemented during the Project. Measures to have been separated into those integrated into the project and post project monitoring. Measures include:

Table 2: Permafrost Mitigation and Erosion Control Actions

Mitigation During Project	Mitigation Post Project
<ul style="list-style-type: none">• Complete geotechnical drilling when the active layer is fully frozen. The Project will be completed in March 2020.• Complete all drilling activities greater than 30 m from the ordinary high water mark of any water crossing.• Complete all drilling activities on the existing winter road alignment to minimize disturbance to ground surface. No stripping of the natural ground surface will occur in an effort to preserve the underlying permafrost.• Backfill boreholes with drill cuttings to grade surface. Upon closure of the winter road (or when it's otherwise safe to do so), additional clean backfill material will be placed on top of the backfilled boreholes to account for settlement.	<p>The application of specific erosion control measures during the operation of the Mackenzie Valley Winter Road will be limited due to frozen conditions. If required after consultation with the Sahtu Land and Water Board (SLWB) and the GNWT Lands Inspector, INF will conduct monitoring occur mid- freshet (tentatively late April 2020) to confirm suitability of the applied mitigation measures. During these site visits, the following erosion control measures may be installed, repaired and/or replaced as needed:</p> <ul style="list-style-type: none">• Snow berms down gradient of the boreholes advanced on slopes.• Silt fencing down gradient of borehole locations in areas that may be susceptible to erosion.• Wattles down gradient of boreholes advanced on slopes (with a slope up to a maximum of 2H:1V) to reduce the potential for runoff.• Coconut matting down gradient of boreholes advanced on steep slopes. The sizing of the coconut matting will be determined in the field. <p>If additional erosion controls are installed, a second</p>



Mitigation During Project	Mitigation Post Project
	mid- freshet monitoring event will occur to confirm the operation of the installed measures.

INF will contact the GNWT Department of Lands Inspector if additional mitigation measures are required to be installed upon closure of the winter road.

RESOURCE INVENTORY

INF has confirmed that the following supplies can be sourced in Norman Wells.

- Coconut matting
- Wattles
- Silt fencing

If required, additional supplies will be sourced from contractors in Yellowknife and transported to Norman Wells via commercial aircraft.

Due to the limited size of the areas that will be disturbed during the project, it is not anticipated that heavy equipment will be required. Equipment and/or personnel will be transported to the drill sites via the winter road (during operation). After the closure of the winter road, equipment and/or personnel will be transported via all-terrain vehicles and/or helicopter to access the sites.

EMERGENCY CONTACTS

Table 3 presents the emergency contacts for the Project.

Table 3: Emergency Equipment Contacts

Contact	Phone
HRN Contracting	(867) 587-4209
Sahtu Land and Water Board	(867) 496-2778
Environmental Protection Division, Environment and Natural Resources	(867) 873-7654
Fisheries and Oceans Canada (Yellowknife)	(867) 669-4900
Environment and Climate Change Canada	(867) 669-4725
GNWT Lands (Inspector)	(867) 587-7200



CLOSURE

We trust that this Plan meets the SLWB requirements. If additional there are additional questions or concerns, please contact the undersigned,

Joe Acorn, P.Eng.

Department of Infrastructure

Government of the Northwest Territories

Phone: (867) 767-9082, ext. 31029

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