

Appendix C Quarry Operations Plan

Dhu-1 Quarry Development Project – Project Description Report

Appendix C Quarry Operations Plan

September 15, 2021

Quarry Permit Application

GNWT Application submission for: **KM 966.6 Mackenzie Valley Winter Road**

Type and quantity of material to be extracted: **600,000 m³ of Limestone Bedrock**

Background

The proposed quarry area under this Quarry Permit Application is located on the North side of Mackenzie Valley Winter Road (MVWR) at km 966.6. This proposed quarry is located approximately sixteen (16) Kilometers northwest of the Tulita Airport. The total quarry area, which will require a four (4) Kilometer access road off of the Mackenzie Valley Winter Road (MVWR), is approximately 550 m long X 600 m wide (29.0 ha) in size and is a limestone bedrock outcrop.

For the purpose of this application, the 600,000 m³ of bedrock/blast rock will be excavated by Drill and Blast Operations from within the Quarry Development Area. The proposed area to be excavated is shown on the attached plan of the site, and will be carried out within an area approximately 340 m and 310 m for a total area of approximately 13.0 hectares. Through a geotechnical investigation done, 12.5 meter competent limestone bedrock was proven in the development area. An additional area will be cleared within the development area to accommodate for the brush and overburden stockpiles. These stockpiles will have 5 meter buffers from cleared edges, stockpiles of grubbing, brush and product aggregate.

Naturally the landscape slopes downward to the South West towards an existing body of water through vegetation. INF will aim to have a positive free draining site in this direction to avoid any pooling of water and effective use of the bedrock outcrop area.

The Department will be processing and stockpiling the excavated material within the developed quarry area if permitted through the Land Use Permit, with sufficient room for accommodating the crusher plant and area to manoeuvre equipment safely.

All drilling, blasting and quarrying activities will be executed in accordance with the latest version of the NWT Mine Health and Safety Act and Regulations and in accordance with the current Land Use Permit terms and conditions and the Quarry Permit Conditions.

A pre-blast and post-blast topographic survey will be conducted to assist in determining quantities quarried. A copy of the drill hole and blast area will be provided to the Resource Management Officer/Inspector within sixty (60) days of the blast and a copy of the topographic surveys will be provided to the Resource Management Officer/Inspector within ninety (90) days of the removal or final mucking of the quarried materials for further reference.

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This proposed quarry will require clearing, grubbing and stripping to access and develop the site. Any existing cutlines will be used for the creation of the access road. From site investigation it was noted that there are sparse vegetation and minimal overburden. Where clearing is required the Resource Management Officer/Inspector will be notified prior.

All cleared trees over 125 mm in diameter will be cut and piled along the edge of the cleared area for salvaging. The remaining clearing debris and overburden will be stockpiled separately for the handling of non-salvage clearing and overburden materials.

An approximately 4 kilometer access road will be required to access for the initial quarry development of the bedrock outcrop and afterwards for quarry operations. The access road will intersect MVWR and will require crossing the Enbridge Pipeline. A preliminary alignment for the access road was chosen but a more detailed study will be done due to noted path showing signs of flooding.

In case the temporary construction camp is needed, department will contact Resource Management Officer/Inspector prior to the camp setup date. Camp will be located at one of the designated temporary camp areas as identified in Land Use Permit to be submitted and in consultation with the Resource Management Officer/Inspector. No details of the camp are available at this time.

Equipment

Although not finalized at this time it is expected that the following equipment will be used for the excavation, processing and stockpiling of materials from this Quarry:

- One (1) or two (2) Rock Drill(s) complete with air compressor(s);
- Explosive storage/mixing facility;
- Equipment for loading explosives;
- One (1) to two (2) Tracked Dozer(s)(D6 – D8) for stripping the quarry area and for pushing up materials;
- One (1) to two (2) Loader(s) for moving materials in the Quarry area, feeding the crusher plant and for loading materials into haul trucks;
- One (1) to two (2) Tracked Excavator(s) for extracting and moving materials within the Quarry area and loading haul trucks;
- Two (2) to six(6) Haul Trucks to move materials within the Quarry Development Area, including stockpiling of materials;
- One (1) to two (2) Conveyor stackers for stockpiling.
- One crusher plant c/w generator trailer, tower, and conveyor systems;
- Temporary Construction camp;
- Fuel Storage Containers/Tanks
- Pickup(s) and service vehicles; and
- Other small equipment.

Mapping

- See attached map and sketch (1:50,000 and 1:7,500 scale)
 - o Includes North arrow, area of existing/proposed quarry area.
 - o *Note:* The temporary construction camp will be located at a designated temporary camp location as identified in Land Use Permit to be submitted and in consultation with the Resource Management Officer/Inspector.
 - o *Note:* Co-ordinates of the Quarry site appears on the last page of the application form.
 - o *Note:* Drilling and blasting will be required for this quarrying operation.

Closure and Reclamation Plan

Camp Reclamation

- The establishment of a camp at this location will be set-up in consultation with the Resource Management Officer/Inspector.
- After the quarrying and/or aggregate production activities are completed, the temporary construction camp will be removed and all debris will be removed from the site.
- If approved, any sumps will be filled in, compacted and graded to match the topography of the immediate area.
- The entire camp area will be graded to loosen any compacted soils if necessary.

Abandonment of Active Quarry Face

The quarry area is expected to continue to be a source of granular materials for future excavation quantities beyond the quantities of this permit. This quarry development area is planned for future use and will not be abandoned at the end of the quarrying operations under this quarry permit.

Following completion of the excavation, processing and stockpiling activities under this quarry permit, the quarry site will be cleared of all equipment and debris and the area will be:

- Graded;
- All cut faces will be neatly graded to a slope no greater than 2m horizontal to 1m vertical to ensure stability of the cut areas and to enable future work to take place at this site. No debris or organic materials will be placed over the quarry face to enable future excavation to take place at this site without contaminating and wasting of valuable granular materials. This material will be considered as stockpiled material and will be available for further use by the Department during and beyond the Permit period;
- A rock berm will be placed on top of any exposed cut face exceeding three (3) metres in height and in areas where the slope of the blasted rock at the face is steeper than one (1) metre horizontal to one (1) metre vertical.

- Any stockpiled overburden and other clearing debris removed during the site preparation/stripping activities will be left in stockpile for future reclamation activities. This material will not be considered to be part of the Quarry Permit quantities and will not be reported as stockpiled material at the time of closing off of the Quarry Permit.
- All over-sized rock will be placed into stockpile for future use as rip rap or erosion control materials and will be reported as quarried.
- All stockpile faces will be neatly graded to a slope no greater than 1m horizontal to 1m vertical to ensure stability of the stockpiled material and to provide a safe work area.
- No revegetation or other activities will be undertaken at the end of the excavation and removal of pit run gravel and sand under this quarry permit.

Waste Disposal

The amount of waste produced is expected to be minimal.

All household or food wastes will either be incinerated on site using an Resource Management Officer/Inspector authorized incinerator or removed/hailed from the site and disposed of at the nearest authorized waste disposal facility (Norman Wells);

All combustible wastes will either be incinerated on site using an Resource Management Officer/Inspector authorized incinerator or removed/hailed from the site and disposed of at the nearest authorized waste disposal facility (Norman Wells);

Any non-combustible waste produced on site will be removed/hailed from the site and disposed of at the nearest authorized waste facility (Norman Wells);

Any grey or black water produced on site will be deposited into a sump, if permitted to do so by a Resource Management Officer/Inspector, or will be hauled/trucked from the site and disposed of at the nearest authorized liquid waste facility (Norman Wells);

It is generally GNWT policy to assign the responsibility of disposing of all camp and construction related wastes associated with regular operations and maintenance activities (i.e. quarrying/quarry development, aggregate production (crushing), hauling, construction, roadway maintenance, etc.) to the contractor/subcontractor involved with each specific activity or project. The Department does however oversee the responsibility for waste disposal and will take appropriate measures to see that the site is cleaned up in accordance with all pertinent regulations, codes, bylaws and permit terms & conditions.

It is generally GNWT policy to assign the responsibility of disposing industrial wastes associated with regular operations and maintenance activities (i.e. old culverts, scrap materials, etc.) to the contractor/subcontractor involved with each specific project. The Department does however

oversee the responsibility for waste disposal and, if necessary (i.e. in the event that any exceptional or hazardous products require disposal) will take appropriate measures to see that the site is cleaned up in accordance with all pertinent regulations, codes, bylaws and permit terms & conditions.

All construction equipment and materials, including culverts, remain the property of the contractor/subcontractor and they will be responsible for their proper disposal. The Department will ensure that all waste materials are removed from the site at the end of the quarrying and aggregate processing operations.

Any clearing debris that is not salvageable, will be disposed of in accordance with the terms and conditions of the Land Use and Quarry Permits or will be windrowed for future use in the reclamation of the depleted sections of the Quarry area.

Stockpile Removal

Any stockpiled materials will be appropriately handled per instructions of the Land Use Permit to be submitted.

Road Closure

No public roads are anticipated to be closed as a result of these quarrying activities. In the event that a road closure is required during the blasting activities, it is a GNWT contract requirement for contractors to notify the Department of Infrastructure (INF) and the R.C.M.P. twenty-four (24) hours prior to blasting. A public notification of possible delays at the site location will be included on the Highway Information Toll Free Line.

Temporary notification signage for trucks entering the highway will be placed along the Mackenzie Highway (NWT No.1) a minimum of 500 metres in advance of the access road to the Quarry Development Area (in both directions) during the quarrying, processing and stockpiling of the granular materials.

No quarry access road closures are required at the end of this quarrying operation. The Quarry area will be further developed by the GNWT under future Quarry Permit Applications. Ongoing access will be required to access the stockpiled materials until the entire Quarry Development Area is depleted and the stockpile area is no longer required.

Soil Remediation

In accordance with the Land Use Permit to be submitted, the Department stipulates that Spill Report Guidelines remain accessible on site at all times.

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GNWT personnel and its Pit Operator (s) - subcontractors will be oriented and become familiar with the safety and reporting requirements, procedures and guidelines in the event of a spill (i.e. fuel spill). Guidelines also dictate what measures are to be taken to remove any contaminated substances from the work area and deposited of in an approved disposal area.

Any spill areas will be cleaned up, to the satisfaction of the Resource Management Officer/Inspector, and the contaminated materials will be removed from the site and disposed of at an approved waste disposal site.

To avoid an accidental fuel or oil spill, the Department requests that the Contractor /subcontractor position a container lined with absorbing mats at the fuel storage facilities that can easily be slid underneath the equipment fuel tank during refuelling operations or other spill protection purposes.

This container shall have a minimum area of 0.25 m² and a minimum capacity of 25 litres.

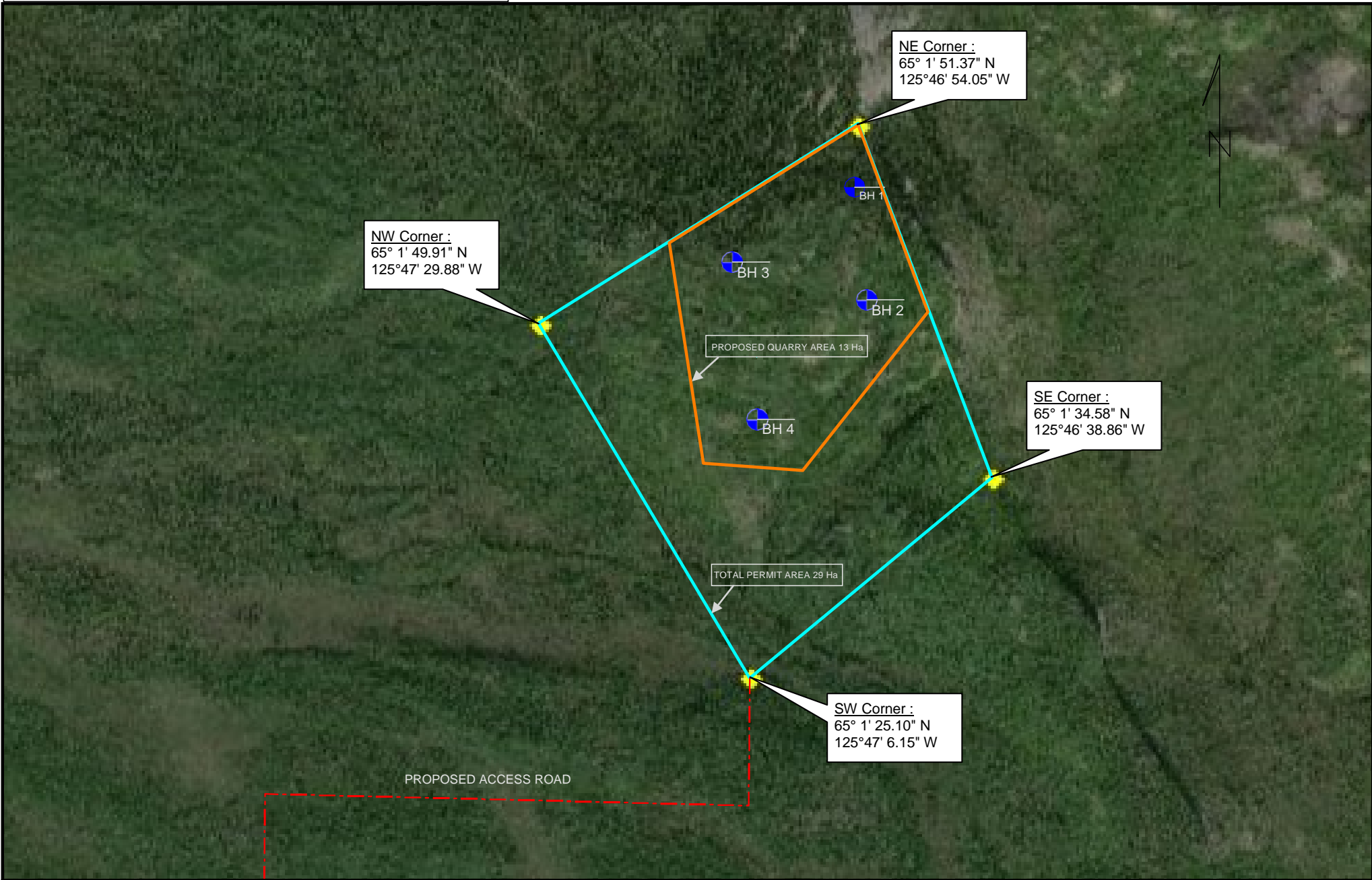
This container will be used to capture any potential spillage during the filling of the storage tanks, refuelling equipment, changing of filters or maintenance of equipment and the refilling apparatus and hoses.

As indicated in the Abandonment of Active Quarry Face section of this plan, upon completion of the work, all equipment and construction debris will be removed from the site and the site will be cleaned up, graded and left in a neat and tidy manner.

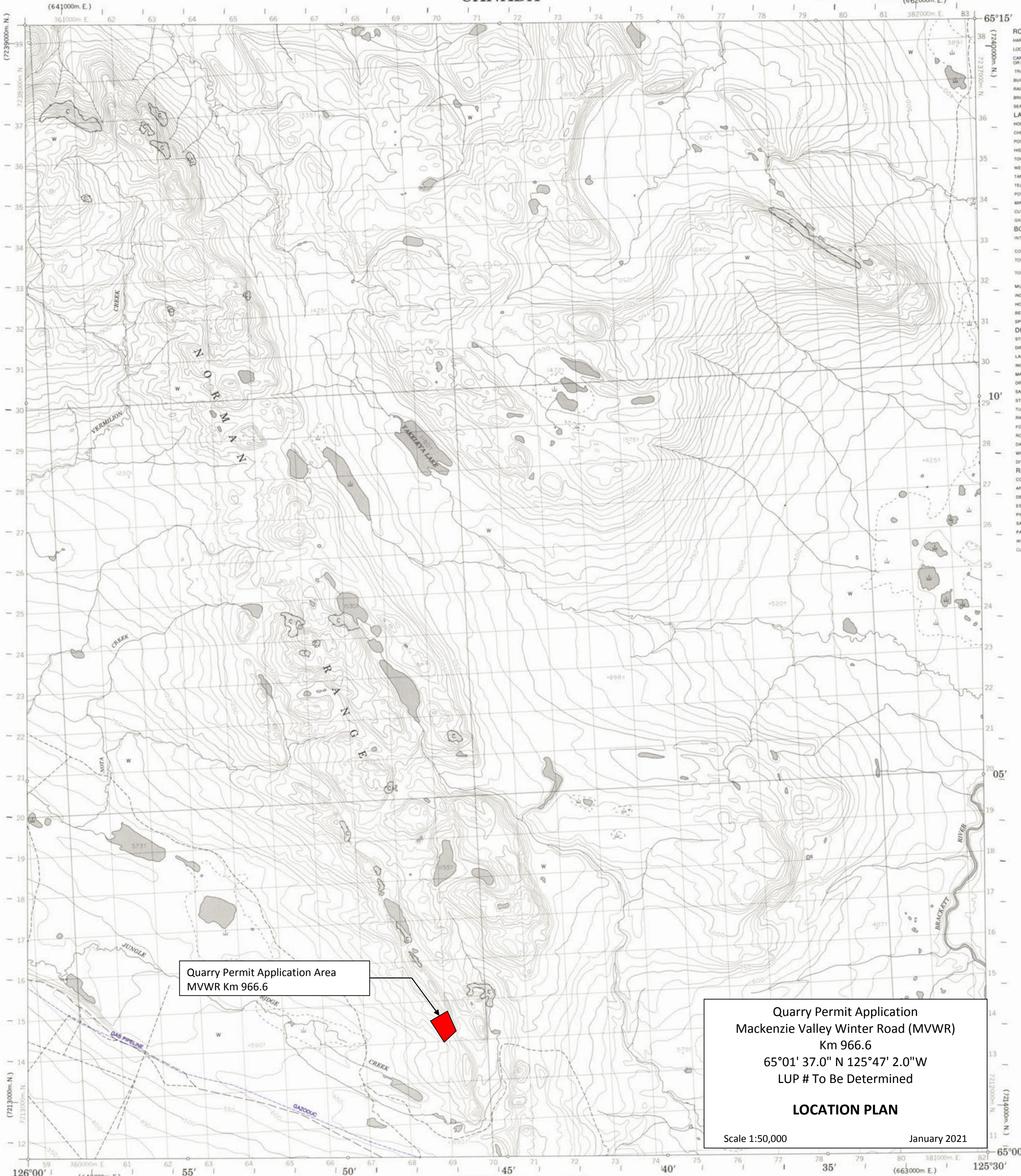
Any abandoned or depleted areas of the Quarry will be bermed off with a rock berm. Any rock left remaining at the face of the cut will be graded to the appropriate slope of 1 metre horizontal to 1 metre vertical as an effort to stabilize any loose rock and leave the area in a safe condition.

Once the Quarry area is depleted or no further rock materials are required from this site, the access road will be removed from the Mackenzie Valley Winter Road shoulder to the edge of the right-of-way, including any culverts and the area will be graded to be consistent as the surrounding area.

Any roadway remaining between the edge of right-of-way and the quarry area will be scarified to loosen the packed materials and any stockpiled overburden will be spread between the edge of the right-of-way and the edge of the quarry to allow for natural re-vegetation.



Designed By: Yervand Hovhannisyan		Title: Quarry Permit Application Mackenzie Valley Winter Road Km 966.6 Right LUP # To Be Determined Site Plan	
Drawn/Drafted By: Yervand Hovhannisyan			
Approved By: T. Brookes			
Scale: 1:7,500	Date: March 2021	Event No.: -	Drawing No: Quarry Development Plan

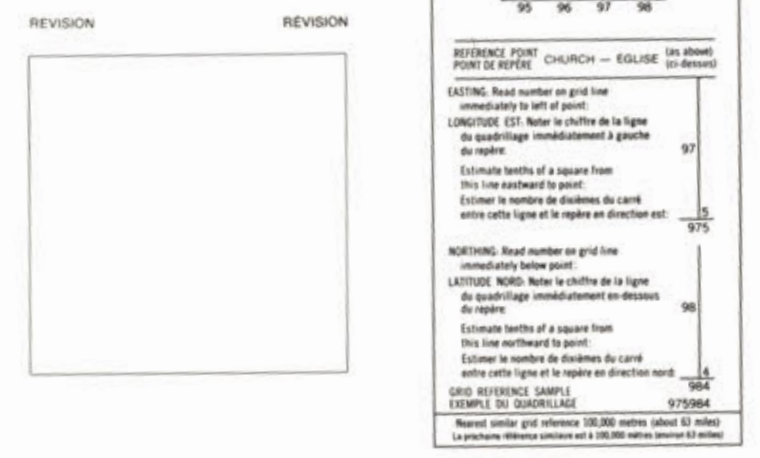
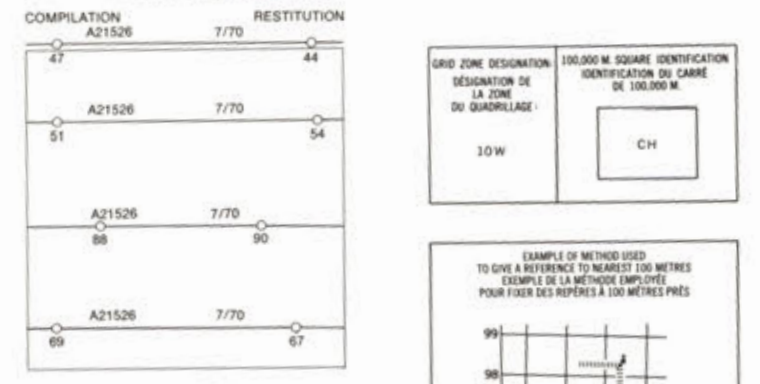


Quarry Permit Application Area
MVWR Km 966.6

Quarry Permit Application
Mackenzie Valley Winter Road (MVWR)
Km 966.6
65°01' 37.0" N 125°47' 2.0" W
LUP # To Be Determined
LOCATION PLAN
Scale 1:50,000 January 2021

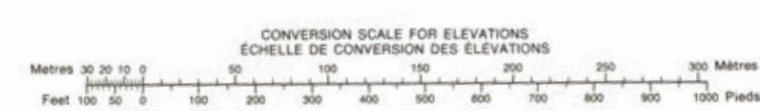
LEGEND - LÉGENDE

ROADS AND RELATED FEATURES	ROUTES ET OUVRAGES CONNEXES
HARD SURFACE, ALL WEATHER	SURFACE DURE, TOUTES SAISONS
LOOSE SURFACE	GRAVIER
CART TRACK, WINTER ROAD OR ROAD UNDER CONSTRUCTION	CHEMIN DE TERRE, D'HIVER OU CHEMIN EN CONSTRUCTION
TRAIL, CUT LINE, PORTAGE	SENTIER, PIERCE, PORTAGE
BUILT-UP AREA	AGglomération
RAILWAY, SIGNAL, STATION, STOP	CHEMIN DE FER, VOIE D'ÉVITEMENT, GARE, ARRÊT
BRIDGE	PONT
SEAPLANE BASE, ANCHORAGE	HYDROAÉROPORT, MOULAGE
LANDMARK FEATURES	POINTS DE RÉPÈRE
HOUSE, BARR	MAISON, GRANDE
CHURCH, SCHOOL	ÉGLISE, ÉCOLE
POST OFFICE	BUREAU DE POSTE
HISTORICAL SITE	LIEU HISTORIQUE
TOWERS, FIRE, RADIO	TOURS, FEU, RADIO
WELL, OIL, GAS	Puits, PÉTROLE, GAZ
TANK, OIL, GASOLINE, WATER	RÉSERVOIR, PÉTROLE, ESSENCE, EAU
TELEPHONE LINE	LIGNE TÉLÉPHONIQUE
POWER TRANSMISSION LINE	LIGNE DE TRANSPORT D'ÉNERGIE
MINE	MINE
CUTTING, EMBANKMENT	TRANCHÉE, REMBLAI
GRAVEL PIT	FOSSE DE GRAVIER
BOUNDARIES AND SURVEY CONTROL	FRONTIÈRES ET POINTS DE RÉFÉRENCES
INTERNATIONAL, PROVINCIAL, BOUNDARY MONUMENT	INTERNATIONALE, PROVINCIALE, SCIERNE FRONTIÈRE
COUNTY, DISTRICT	COMTE, DISTRICT
TOWNSHIP, PARISH - SURVEYED	CANTON, PAROISSE - ARPENTE
TOWNSHIP, DLS - SURVEYED, UNSURVEYED	NON ARPENTE
TOWNSHIP, DLS - SURVEYED, UNSURVEYED	CANTON, DLS - ARPENTE, NON ARPENTE
SECTION CORNER	SECTION ANGULAIRE
MUNICIPALITY	MUNICIPALITÉ
INDIAN RESERVE, PARK, ETC	RÉSERVE INDIENNE, PARC, ETC
HORIZONTAL SURVEY POINT	RÉPÈRE PLANIMÉTRIQUE
BENCH MARK	RÉPÈRE DE NIVELLEMENT
SPOT ELEVATION, ELEVATION APPROXIMATE	POINT COTE, ÉLEVATION APPROXIMATIVE
DRAINAGE AND RELATED FEATURES	DRAINAGE ET OUVRAGES CONNEXES
STREAM, SHORELINE, INDEFINITE	COURS D'EAU, RIVE, IMPRECISE
DIRECTION OF FLOW	DIRECTION DU COURANT
LAKE, INTERMITTENT LAKE	LAC, LAC INTERMITTENT
FLOODPLAIN	TERRAIN INONDÉ
MARSH, SWAMP (WOODED)	MARAIS, MARECAGE (BOISÉ)
DRY RIVER BED WITH CHANNELS	LIT DE COURS D'EAU TAIN AVEC CHENAUX
SAND, ABOVE, IN WATER	SABLE, AU DESSUS, DANS L'EAU
STRING BOG	MARECAGES EN EMPILAGE
TUNDRA, PONDS, POLYGONS	TUNDRA, ETANGS, SOLS POLYOGONAUX
RAPIDS, FALLS, RAPIDS	RAPIDES, CHUTES, RAPIDES
FORESHORE FLATS	ESTRANS
ROCK	ROCHE
DAM	BARRAGE
WHARF	QUAI
DITCH	FOSSE
RELIEF FEATURES	RELIEF
CONTOUR	COURBE DE NIVEAU
APPROXIMATE CONTOUR	COURBE DE NIVEAU APPROXIMATIVE
DEPRESSION	COURBE DE CUVETTE
ESKER	ESKER
PINGO	PINGO
SAND, SAND DUNES	SABLE, DUNES
PALSA BOG	PALSE
WOODED AREA	RÉGION BOISÉE
CLEARED AREA	RÉGION DÉBOISÉE



ONE THOUSAND METRE UNIVERSAL TRANSVERSE MERCATOR GRID ZONE 10 QUADRILLAGE DE MILLE MÈTRES UNIVERSAL TRANSVERSE DE MERCATOR

96 E/8	96 F/5	96 F/6
96 E/1	96 F/4	96 F/3
96 D/16	96 C/13	96 C/14



NOTE: GRID TICKS WITH NUMBERS IN BRACKETS OR WITHOUT NUMBERS INDICATE THE 1000 METRE U.T.M. GRID ZONE 9. LES TRAITS NUMÉROTÉS ENTRE PARENTHÈSES OU SANS NUMÉROS INDICENT LE QUADRILLAGE DE 1000 MÈTRES U.T.M.

