

# Quarry Operation Plan

BLACK TOP CREEK, EUREKA, NUNAVUT  
NUNA EAST LTD.



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## Introduction

### Purpose

Nuna East Ltd. (“Nuna East”), an aboriginally owned contracting firm with resources of heavy equipment and personnel, involved in the heavy construction field, mining, winter road construction and maintenance activities. Nuna has worked in the North for decades and is well versed in northern environments.

Nuna East has been awarded the Eureka Recapitalization Runway Project in Nunavut, NT. The intent of this project is to rehabilitate runway 10-28, an existing airside apron - an access road, and construct a new airside apron. The mobilization to site will take place in late August 2015 and the projected completion date is scheduled for September 2017.

The Black Top Creek Quarry site has been identified as a suitable quarry source to produce the aggregate material required for the recapitalization of the runway.

The Quarry Resource Development Plan will commit to the best management practices of the quarry resource development at the Black Top Creek. Nuna East will work in tandem with the Northern Development regulatory AANDC Land Resources Office to ensure these objectives are met during the initial start-up of the quarry operation and through to the completion of the project.

Based on WorleyParsons’ Geotechnical Report “*C71130000 – Document No: C71130000-CI-REP-0001, dated 10 January 2011*”, the fluvial delta (c, g, Fd) associated with Black Top Creek has been used as a gravel source in the past, and numerous shallow pits and low stockpiles were visible. Based on conversations with the station staff, it is our understanding that the Canadian military has developed this gravel source. At the time of the investigation, there was a large quantity of gravelly sand stockpiled on site (Figure 1). This stockpile was sampled using a backhoe.



**FIGURE 1 – BLACK TOP CREEK**



## 1.0 Description of the Deposit

### 1.1 Topographic Maps

A number of maps are included to show the location of the quarry site, existing access road route, quarry development area etc., and the location of temporary camp setup and infrastructure. NTS drawings are attached (Appendix 1).

### 1.2 Bulk Sample Test Results

According to WorleyParsons' Geotechnical Report and visual observations taken of the existing stockpiles, as well as creek bank exposures, the pit run material appears to contain less than 5% cobbles and boulders.

The fluvial delta and plain at Black Top Creek is approximately 1,000 m long by 500 m wide and judging by the visible exposures (Figure 3), the granular materials are likely several meters thick. Based on these figures it has been estimated that at least 1 million cubic meters (m<sup>3</sup>) of pit run material is present.



**FIGURE 2 – BULK SAMPLE**

<b>Table B Blacktop Creek Pit Run – Laboratory Properties</b>			
<b>Gradation</b>	<b>Petrographic Number</b>	<b>Flat and Elongated Particles</b>	<b>Aggregate Soundness (ASTM C88)</b>
1% Clay	80.7% Good	26.7 %	1.3% loss
5% Silt	11.7% Fair	(Poor)	(Good)
61% Sand	4.8% Poor		
33% Gravel	2.8% Deleterious		
	Overall Ranking = 172 (Poor)		

- The total area of the identified quarry resource is 500,000 m2.
- The total area of the proposed quarry footprint is 256,000 m2 to produce 160,900 m3 of aggregate material

**FIGURE 3 - STREAM BANK EXPOSURE AT BLACK TOP CREEK.**





## 2.0 Site Preparation

### 2.1 Access

An existing road runs from the current runway to the Black Top Creek Quarry Site. The length of the access road is approximately 3 km south east from the airstrip. Nuna East will use this access from the runway location to and from the quarry and maintain/grade the road during the construction phase. (Figure 4).

FIGURE 4 – ACCESS ROAD





## 2.2 Timber Removal

N/A

## 2.3 Vegetation Retention

N/A

## 2.4 Clearing and Grubbing

N/A

## 2.5 Salvage and Storage of Topsoil or Disposal of Overburden

N/A

## 2.6 Brush Disposal

N/A

## 2.7 Buildings or Other Facilities

Nuna East will be setting up a temporary (50 man) construction camp for the duration of the project, located at south of the runway by area called Fort Eureka. The coordinates for the camp location are 79°59'40.16"N, 85°50'1.21"W. The camp will be installed on rig matting to minimize ground disturbance. It will be equipped with a first aid room/supplies, communications, radio communications, potable water holding tank, sewage treatment plant and a gray water system. The sewage and gray water will be trucked to an approved sewage disposal site using a roll on roll off truck. An onsite incinerator will be used for food waste. The camp will be setup at the start of the project late Aug, 2015 and torn down and demobilized at the end of the project in Sep, 2017 and or Aug 2018.

A QA/QC trailer with instruments and mobile washcar with sewage holding tank will be positioned at Blacktop Creek adjacent to the crushing plant as shown in Figure 5.

Fuel will be stored in 4,995 liters double wall containment capsules at a designated laydown area near the camp location. Fuel will then be distributed using a fuel lube truck with no greater than 4,995 liters per trip.

## 2.8 Topographic Survey for Future Volume Checks

A private legal surveying company will be contracted to perform all of the survey requirements for the project including the quarry site development. They will use the most up to date technology of satellite surveying/imagery, AutoCAD and end area method for calculation of the survey volumes.



The estimated quantities for each year is estimated at:

<i>Year</i>	<i>Estimated Quantity</i>
2015	900 m3
2016	80,000 m3
2017	80,000 m3
<b>TOTAL</b>	<b>160,900 m3</b>

On completion of each construction season, the survey team will complete a final survey measurement of the materials excavated and hauled from the quarry source. The final quantities used will be submitted to INAC, Lands Resources Officer on a required monthly reporting form.

### 3.0 Quarrying Operation

#### 3.1 Quarry Development

The quarry site development will use conventional stripping methods in two 0.5 m cuts therefor, the quarry will be developed using a D8 Dozer, 980 loader and a 320 excavator. There are no drill & blast requirements. The total area that will be developed to meet the project's needs is approximately 260,000 m2.

The proposed quarry development will be a multi-year development with applications proceeding for the yearly amounts required and INAC quarrying protocols. The first year (2015) initial start-up of the quarry materials required is 900 m3.

Reclamation procedures/methods will be in place to ensure cleanup, trimming and tidiness of the quarry.

#### 3.2 Equipment

The equipment for the runway recapitalization, site infrastructure, and quarry development are as follows:

Description	Weight (Kg)
Pick-up F350	3,636
Pick-up F350	3,636
Pick-up F350 w/ Truck Cap	3,636
Flatdeck F550	3,359
Mechanic Truck F550	5,456
Lube / Fuel Truck	13,100
Roll-off / Vac Truck	11,340
Spare components for vac truck (flatdeck, potable water tank)	9,071
Winch Tractor	13,640
Scissor deck trailer	8,000



Packer CS563	11,818
Skid Steer 257B c/w forks, bucket bound on top	4,091
Dozer D6	21,047
Dozer D7	24,600
Dozer D8T	42,573
Excavator 320EL	24,730
Loader 980 H	39,909
Loader 980 G c/w forks & bucket	39,909
Loader 966	25,000
Grader 14H	20,454
Rock Truck 730	25,550
Rock Truck 730	25,550
Rock Truck 730	25,550
Jaw Plant 25" x 42"	57,240
Power Tower 6' X 8'	24,690
Stacking Conveyor with Hopper 36" x 50"	18,200
Screen Plant 6" x 20"	45,068
Cone Plant 40"	29,563
Bin wall, cross conveyor	18,000
Screen Plant (new)	44,000
20' Sea Can - hose press	9,890
Washroom / Lunchroom (Wheeled) (survival shack)	10,000
Washroom / Lunchroom (Wheeled) (survival shack)	10,000
QA/QC Trailer	8,145
Office Trailer	9,000
50 man camp	155,273
Sewage Treatment Plant	27,500
Duel Burner Incinerator	27,500
Sewage Holding Tank	5,455
Generator C18 500kw	17,000
Generator 275kw	9,000

### 3.3 Erosion Protection

Regular inspection and remedial action will be in place to capture any erosion problems that may arise during the quarry development such as ditching and maintaining proper drainage.



### 3.4 Setbacks

The quarry site has a natural sloping terrain and therefore a 100 m setback will be established between the quarry development and the existing water courses. Setbacks will be surveyed and staked before any construction can proceed. Positive drainage will be a natural progression in the quarry design and stripping/farming approach. Since these activities will be surveyed by grade calculation, slope values and positive drainage will be maintained. The pit floor will also have a positive grade applied for drainage to flow and will not create a 'ponding effect'. Grades will not exceed 4% in value to avoid any adverse flow and erosion problems.

## 4.0 Aggregate Processing

### 4.1 Crushing

It is anticipated that the crushing plant will produce 161,900 m<sup>3</sup> of aggregate. Total estimated crushing duration is 80 days: 7 days the first year, 30 days the second year, and 30 days the third year.

Three types of aggregate materials will be produced to meet the needs of the proposed work. They are as follows:

#### Material Estimated Quantity

75 mm	43,000 m <sup>3</sup>
50 mm	68,000 m <sup>3</sup>
25 mm	50,000 m <sup>3</sup>
<b>TOTAL</b>	<b>161,000 m<sup>3</sup></b>

The operations for this project will only take place in the summer months between June to September for years 2015, 2016 and 2017.

### 4.2 Storage Area Oversize Material

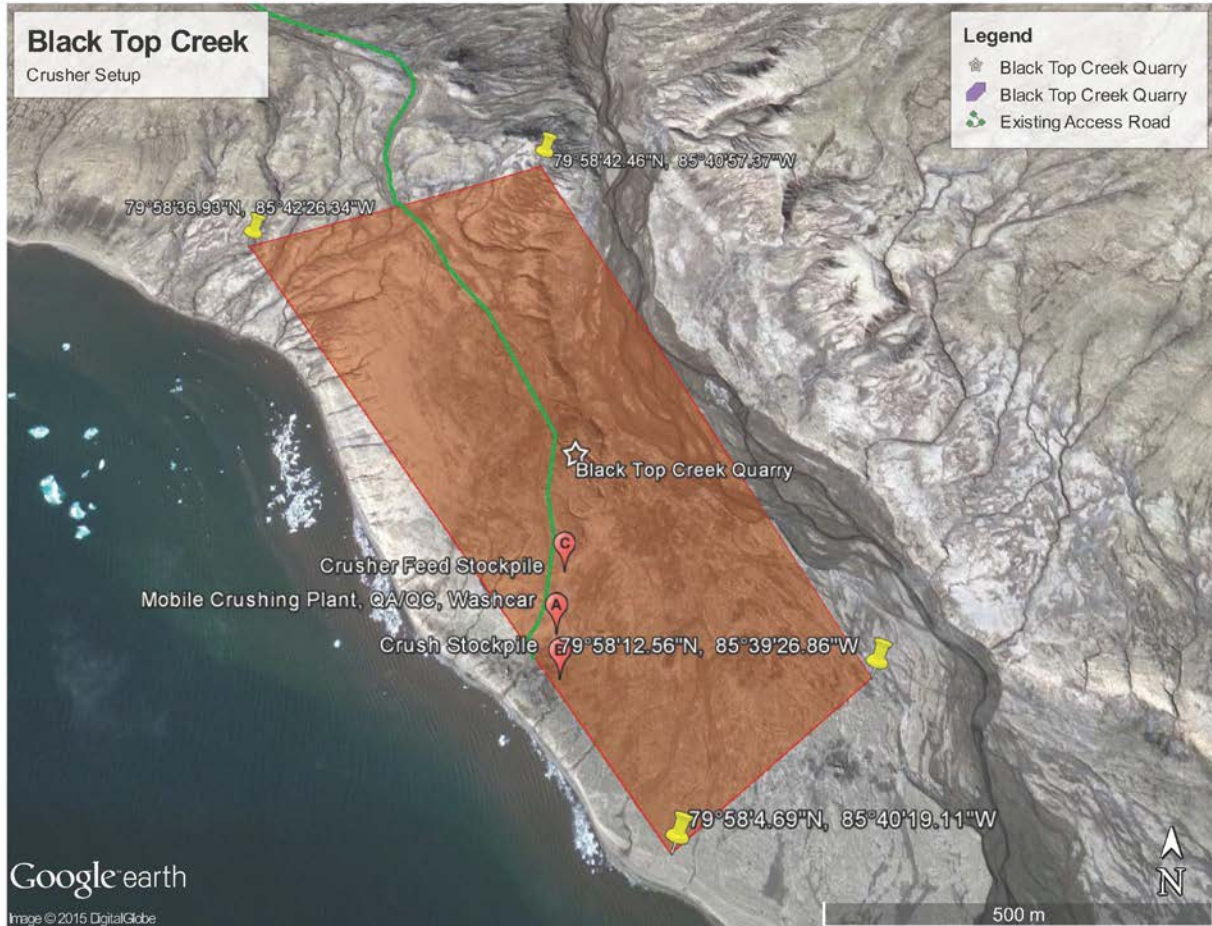
It is not expected to encounter oversized cobbles that cannot be processed during the development of the quarry. No other reject material is anticipated during the quarrying operation.

### 4.3 Storage Area for Finished Products

It is expected that all the processed quarry material will be consumed and hauled to the project location. The crushing operation will entail that when the various gradations of products being produced, at intervals, and the desired product reaches the volume required, the crusher screens will be changed to meet the next gradation. All products will be consumed and hauled away, no stockpiles of produced aggregate materials will remain at the quarry locations when the work is complete. A detailed and final quantity list of the quarry materials consumed will be provided at the end of each season.



FIGURE 5 – QUARRY SETUP



## 5.0 Reclamation

### 5.1 Desired Future Condition of the Site & Environmental Protection

Nuna East will have an ongoing cleanup plan in order to keep up with the required progression of the work. The quarry site will be kept level and tidy on completion of the quarry activities. In the event that the quarry floor soil is contaminated. The remediation plan will be to immediately clean up the area and place the contaminated soils into drums and keep stored on to a lined pad in preparation for transporting off site to a certified land fill. All contaminated drums will be labeled as such with TDG and DFO requirements.

At the completion of the quarry development, the typical cut will be an average of 1 m deep. Trimming of the slopes will be designed to 3H to 1V grades.

The grades of the pit floor will be graded with a dozer to promote free drainage. Baselines and survey elevations will be set into place in order to ensure proper drainage. This will remain consistent through the quarry development and especially when the quarry is finished for the winter seasons.



## 5.2 Water Diversion and Protection

As described previously, the quarry development will ensure positive drainage for the quarry floor. On completion of the operations and final clean-up of the quarry, the positive drainage course will be improved to enhance drainage requirements. Based on the initial development of the quarry, no disruption to drainage courses will be encountered. No 'man made materials' will be placed i.e. culverts, drainage structures, etc. into the quarry development.

## 5.3 Sloping/Benching

Nuna East will maintain a progressive maintenance program ensuring that the quarry is kept sloped and contoured throughout the project. Experienced operators will adhere to the Northern Land Use Guidelines for the reclamation of the quarry.

## 5.4 Permafrost Stabilization & Vegetation

Given the natural ground of the quarry footprint, neither the permafrost layer nor vegetation are relevant factors in this case.

## 5.5 Camp Reclamation and Waste Disposal

At the completion of the project the camp complex will be torn down with all the modules (14) transported to the high-water mark for demobilization. The site will be cleared of debris and non-burnable garbage will be hauled and disposed of in a local landfill. Food waste will be incinerated and dangerous goods will be placed in drums labeled appropriately with TDG and DFO requirements for demobilization.

## 5.6 Road Closure

The existing road from the airstrip to the quarry site will be left in place, undisturbed.



## Appendix 1: NTS Maps





This index depicts the 1:50 000 scale National Topographic System (NTS) grid for paper topographic maps. Maps are available through Certified Map Printers, who ensure high quality, local, on-demand printing of topographic maps, and through Regional Distributors of Natural Resources Canada. For details please visit our Web site at <http://maps.MNR.gc.ca/>.

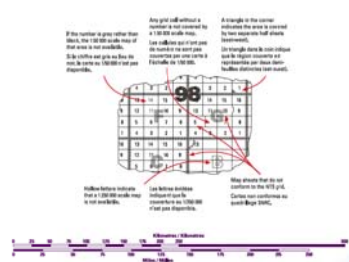
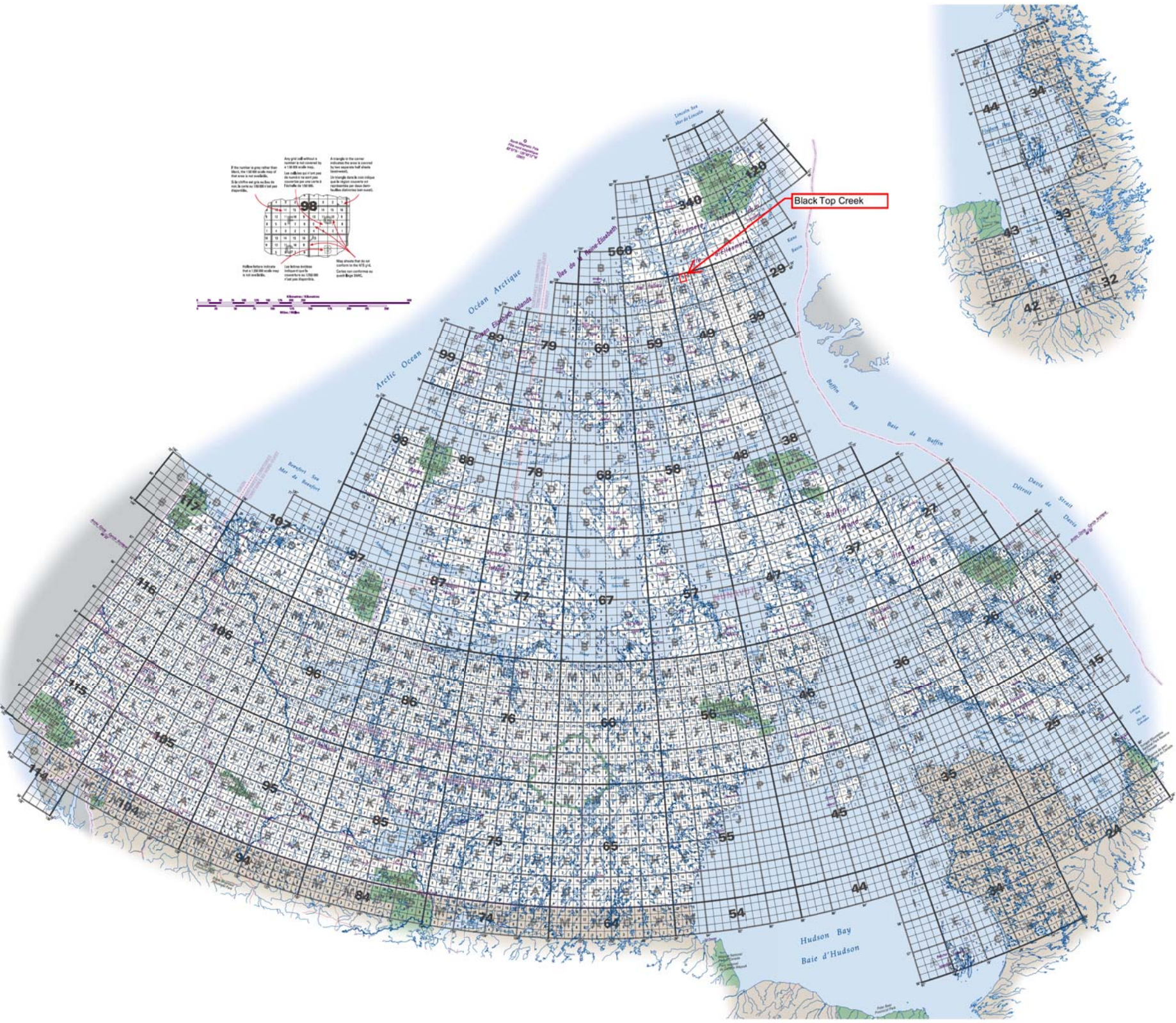
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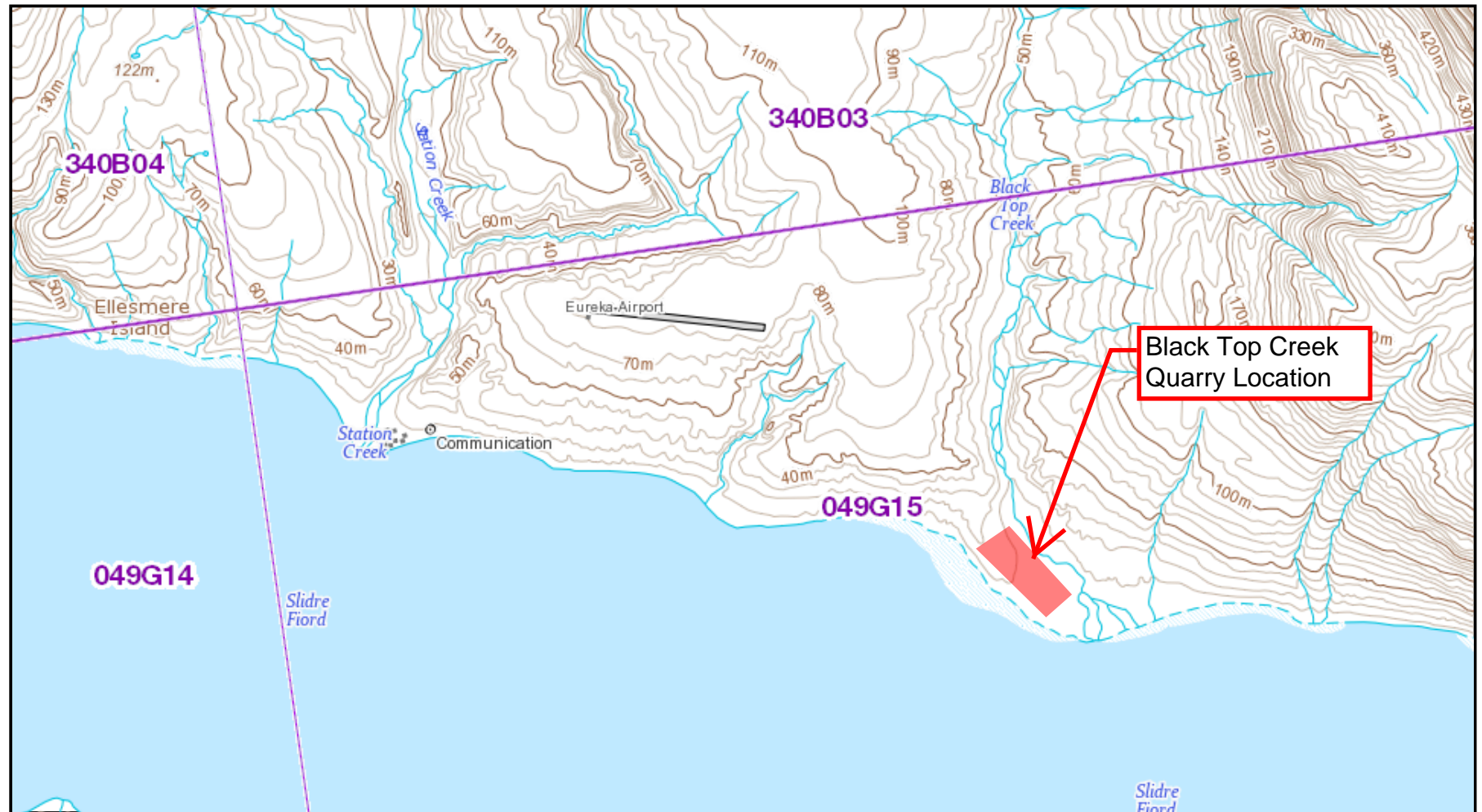
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## Toporama



0 0.5 1km



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