MULTI-LEVEL MAPPING & ROUTE ANALYSIS SLAVE GEOLOGICAL PROVINCE TRANSPORTATION CORRIDOR

Volume 1 - Executive Summary

Prepared for:

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1.0 INTRODUCTION

1.1 Project Background

The ***Multi-level Mapping and Route Analysis, Slave Geological Province Transportation Corridor*** project is an initiative of the Department of Transportation, Government of the Northwest Territories. It is in response to interest in examining the feasibility of developing an all-season road between the Yellowknife and Rae-Edzo areas in the south and Bathurst Inlet along the southern shore of the Arctic Ocean in the north (Figure 1).

For the purpose of this study, five distinct Work Areas were identified within the general transportation corridor as shown on Figure 1. The Work Areas include (approximate lengths of each route are shown in parenthesis):

(i) Work Area 1 Yellowknife area to Exeter Lake / Lac de Gras (~ 340 km),
(ii) Work Area 2 Exeter Lake / Lac de Gras to Contwoyto Lake / Lupin Mine area (~ 210 km),
(iii) Work Area 3 Contwoyto Lake / Lupin Mine area to Bathurst Inlet (~ 350 km),
(iv) Work Area 4 Rae-Edzo area to Colomac Mine / Snare Lake area (~ 200 km), and
(v) Work Area 5 Colomac Mine / Snare Lake area to Exeter Lake / Lac de Gras area (170 km)

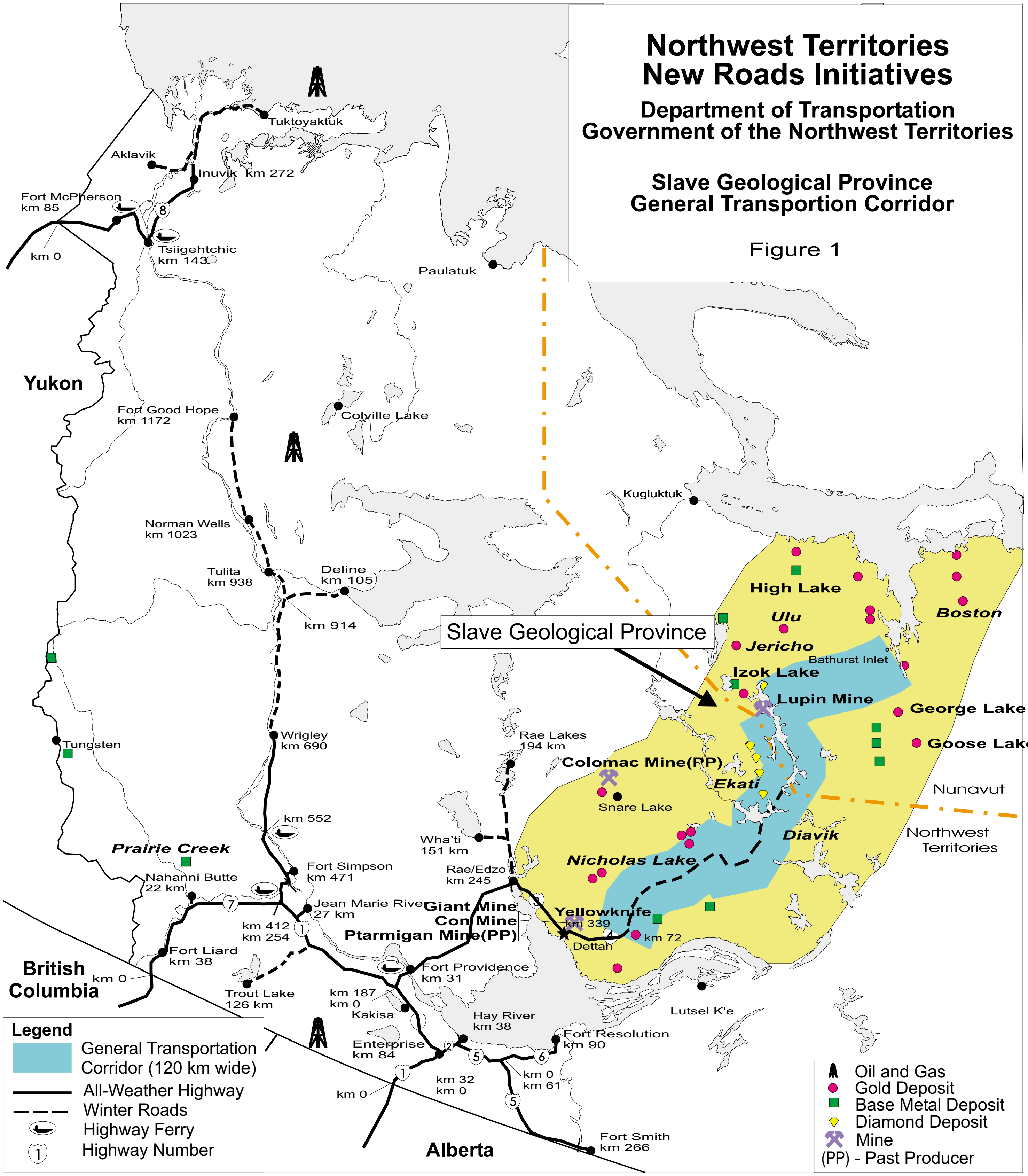
This document is meant to provide an Executive Summary (Volume 1); it provides a summary of the detailed findings presented in both the Technical Report (Volume 2) and on the 1:60 000 Strip Mosaics (Volume 3).

1.2 Project Objectives

Four specific phases were identified for the overall project. These include;

☞ Phase 1, Route Identification
- identify three to five routes within each of the five Work Areas listed above on 1:250 000 NTS maps,

☞ Phase 2, Route Evaluation
- conduct an analysis of 1:60 000 scale aerial photographs to obtain detailed information for each of the routes identified,



Northwest Territories
New Roads Initiatives
Department of Transportation
Government of the Northwest Territories
Slave Geological Province
General Transportion Corridor
Figure 1
Slave Geological Province
Tuktoyaktuk
Aklavik
Inuvik km 272
Fort McPherson km 85
km 0
Tsiigehtchic km 143
Paulatuk
Yukon
Fort Good Hope km 1172
Colville Lake
Kugluktuk
Norman Wells km 1023
Tulita km 938
Deline km 105
km 914
High Lake
Ulu
Boston
Jericho
Bathurst Inlet
Izok Lake
Lupin Mine
George Lake
Goose Lake
Wrigley km 690
Rae Lakes 194 km
Colomac Mine(PP)
Ekati
Snare Lake
Nunavut
Tungsten
km 552
Wha'ti 151 km
Diavik
Northwest Territories
Prairie Creek
Fort Simpson km 471
Rae/Edzo km 245
Nicholas Lake
Nahanni Butte 22 km
Jean Marie River 27 km
Giant Mine
Con Mine
Ptarmigan Mine(PP)
Yellowknife km 339
Dettah
km 72
km 412
km 254
Fort Liard km 38
British Columbia
km 0
Fort Providence km 31
Trout Lake 126 km
km 187 km 0
Kakisa
Hay River km 38
Lutsel K'e
Enterprise km 84
Fort Resolution km 90
km 32 km 0
km 0 km 61
km 0
Fort Smith km 266
Alberta
Legend
General Transportation Corridor (120 km wide)
All-Weather Highway
Winter Roads
Highway Ferry
Highway Number
Oil and Gas
Gold Deposit
Base Metal Deposit
Diamond Deposit
Mine
(PP) - Past Producer

☞ Phase 3, Detailed Route Evaluation
- further identification of specific routes from production and analysis of 1:10 000 and 1:20 000 scale air photos, and

☞ Phase 4, Route Refinement
- refinement of Right-of-Way (ROW) location along specific or competing routes.

This report pertains solely to the identification of routes at 1:250 000 and the subsequent analysis of 1:60 000 aerial photographs (Phases 1 and 2). It does not deal with either the Detailed Route Evaluation (Phase 3) or the Route Refinement (Phase 4) phases of the project.

1.3 Project Area Description

The Slave Geological Province lies entirely within the Precambrian or Canadian Shield, the largest physiographic region recognized in the Northwest Territories (Figure 1). It runs north/northeast from Great Slave Lake in the south to the Bathurst Inlet/Coronation Gulf area in the north. It's boundaries are defined by three distinct fault lines, including the Bathurst Fault along the east, the McDonald Fault along the south and the Wopmay Fault along the west. The Bathurst Fault is highly visible along Bathurst Inlet.

Throughout its mainland portion, the Canadian Shield rarely exceeds elevations of 600 m above sea level (masl), with maximum relief generally limited to 60 - 70 m. Two major bedrock structural subdivisions occur within the Slave Geological Province that are of importance to the transportation corridor; these include (1) Archean-age igneous intrusives and (2) Yellowknife Supergroup supracrustal strata, the former being more favorable for road construction and bed.

Bedrock materials are generally overlain by a thin cover of sandy till materials. In some areas, undulating bedrock materials predominate. Esker and to a lesser extent, kame complexes are scattered throughout the Slave Geological Province; the incidence of esker deposits is greater in the northern areas (i.e. north of Lac de Gras). Deglacially enlarged lake basins (i.e. Yellowknife and Drybones lakes) and localized ponding of ice-dammed waters generated thin glaciolacustine deposits throughout the study region. Patterned bogs, ribbed fens, and swampy terrain (of varied thickness) mantle large portions of the present landscape because of low relief and slow drainage, and thin surficial deposits overlying undulating bedrock.

2.0 METHODOLOGY

2.1 Pre-Mapping Activities

Upon award of the contract, project personnel met with the Department of Transportation, Government of Northwest Territories in Yellowknife to review the project Terms of Reference and to obtain background materials that were in the possession of the Department (i.e. 1:50 000 NTS maps, bedrock geology maps, etc). Members of the project team reviewed existing information (Douglas *et. al.* 1973, Fraser 1972 and 1992, Frith 1993, Henderson 1985, McGlynn 1977, Mollard 1997, Aylsworth and Shilts 1989, and Dredge *et. al.* 1995) and pre-selected a route to fly through Yellowknife - Exeter Lake - Contwoyto Lake - Bathurst Inlet - Burnside River - Contwoyto Lake - Snare Lake - Rae-Edzo - Yellowknife. Members of the project team flew this route on August 20, 1998. Selected oblique photographs are shown on subsequent pages.

Geometric and construction cost control parameters were reviewed prior to any mapping activities to ensure that all project personnel were consistent in mapping. The following parameters (Table 1) were considered in selecting and defining routes:

Table 1. Geometric and Construction Cost Control Parameters

Criteria	Implications
Topography	Route location should have little to no right-of-way excavation; embarkment construction should average 0.5 to 1.5 m in thickness (vertical and horizontal alignment considerations).
Bedrock surface	Route location should follow glacier-smooth surfaces with micro relief of 1.0 m or less.
Lakes	Vertical and horizontal alignment considerations.
River crossings	Route should minimize river crossings and locate crossings that are narrows and on suitable foundation conditions.
Wet organic terrain	Route location should avoid seasonally wet or permanent organic terrain wherever practical.
Granular borrow sources	Route location should consider location, volume and composition of potential sources (i.e. esker complexes)
Permafrost	Not considered a major factor in route location as entire area is zone of permafrost

2.2 Mapping and Aerial Photograph Interpretation

A combination of 1:250 000 and 1:50 000 NTS maps with 20 m and 10 m contours respectively were used in the Route Identification phase of the project. These maps show hydrology, limited surficial materials (eskers and occasional sand deposits, wetlands), and major access routes (i.e. Hwy 4, major winter highways, etc.). Project personnel began working south from the proposed Bathurst Inlet site (66º 32' 30" north latitude and 107º 31' 00" west longitude) as shown within the Nuna Logistics report (Smith and Tice 1998). Every attempt was made to conform to the geometric and construction control parameters presented above (in Table 1) as well as align proposed routes and adjoining segments "within contours" as opposed to "crossing contours".

Following the approval of the 1:250 000 Route Identification phase of the project by the Department of Transportation (September 10, 1998), 1:60 000 black and white aerial photographs from between 1953 and 1957 were obtained from the National Air Photo Library in Ottawa, Ontario. Two sets of photography were obtained; one set was required for route refinement and interpretation of surficial materials, slope, and drainage, while the other set was used to produce the north/south strip mosaics. Individual aerial photographs were interpreted to refine route placement and to delineate terrain units at the 1:60 000 scale. Minimum terrain unit size was 1 cm^2, an area equivalent to 36 ha (89 ac). No field work was undertaken to support this interpretation Each terrain unit was given a unique terrain classification call as per the following example:

Mvb(1) / Ru(2) - S(3)
6 - 9(4)
m(5)

where (1) Mvb represents morainal veneers and blankets (2) / Ru represents approximately 40 % undulating bedrock, (3) S, represents modifying process, solifluction, (4) 6 - 9, represents the slope class, 6 - 9 %, and (5) m, represents the drainage classes, moderate.

All terrain classification used coding (as shown above) as per the standards presented within the Canadian System of Soil Classification, Second Edition (1987). A terrain classification legend is provided on each strip mosaic.

A total of 64 uncontrolled north/south strip mosaics were produced following the delineation and refinement of routes on the 1:60 000 aerial photographs. Line work from the 1:60 000 aerial photographs was transferred to the uncontrolled mosaics using a combination of stereo transfer techniques. Following the creation of individual mosaics, individual routes were digitized in Microstation SE software with one kilometer interval

Due to size constraints the next 7 pages, containing pictures only, have been deleted. Sorry for any inconvenience this may cause.

markers being generated for each route. Controlled mosaics should be created for Phase 3 and 4 activities.

Summary tables were prepared to summarize landform, slope, bridge and curve information for each route. All measurements were taken directly from the uncontrolled mosaics, hence the distances should be considered "approximate". A qualitative assessment of aggregate potential (Table 2) for each segment and route was provided within the summary tables.

Table 2. Qualitative Ranking System for Aggregate Potential[1]

Rating Scale	Description
Nil	No eskers or glaciofluvial deposits were mapped within the segment/route on the 1:60 000 aerial photographs
Poor	Very few eskers or glaciofluvial deposits were noted along the segment/route on the 1:60 000 aerial photographs; eskers may be poorly spaced along route, for example, all eskers are grouped at one end of the segment/route.
Good	A significant number of eskers were noted along the segment/route on the 1:60 000 aerial photographs; these esker deposits are evenly distributed along the segment/route and are comprised mainly of sand.
Excellent	Significant esker and glaciofluvial deposits in the form of outwash plains were mapped on the 1:60 000 aerial photographs; these deposits are evenly distributed along the segment/route and are comprised of a combination of sand, gravels, cobbles and boulders .

1. All ratings have been developed from a review of the 1:60 000 black and white aerial photographs. A flight by the individuals undertaking the routing on August 20, 1998 suggested that most of the eskers are sand-based, however, no observations were made on texture of eskers at depth.

3.0 RESULTS AND DISCUSSION

3.1 Phase 1 - 1:250 000 Route Identification

Table 3 presents the total number of routes identified within each of the five Work Areas based upon the analysis of 1:250 000 and 1:50 000 NTS maps and background data and maps. These routes are depicted on Figure 2.

Table 3. Routes by Work Area based on 1:250 000 Analysis

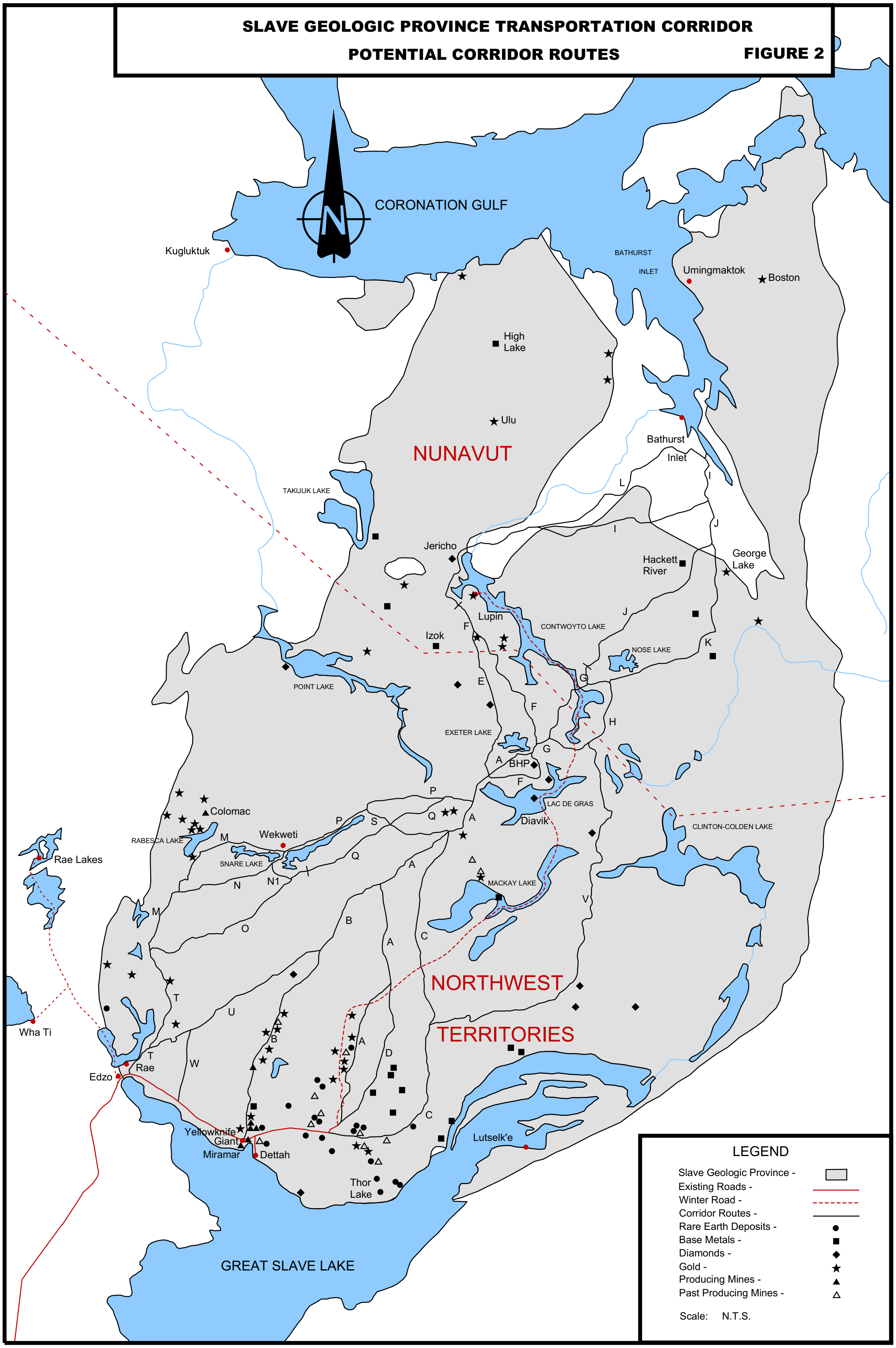
Work Area		Number of Routes	Route Identification
1	Yellowknife Area to Exeter Lake/Lac de Gras	5	A, B, C, D and V
2	Exeter Lake/Lac de Gras to Contwoyto Lake/Lupin Mine	4	E, F, G, and H
3	Contwoyto Lake/Lupin Mine to Bathurst Inlet	4	I, J, K, and L
4	Rae-Edzo to Colomac Mine/Snare Lake	6	M, N, O, T, U and W
5	Colomac Mine/Snare Lake to Exeter Lake/Lac de Gras	4	P, Q, R, and S

3.2 Phase 2 - 1:60 000 Route Evaluation

Based upon the review of 1:60 000 black and white aerial photographs and selected 1:125 000 surficial geology maps, the following recommendations have been developed for each Work Area. Distances for each route are not presented as route distance is not comparable between routes (i.e. Route ‘B’ joins Route ‘A’ to get from Yellowknife to Exeter Lake).

3.2.1 Work Area 1

The Yellowknife to Exeter Lake segment is approximately 340 km in length (direct line distance). Elevations increase from 160 m adjacent Great Slave Lake to 439 m at Exeter Lake. J.D. Mollard and Associates (1997) identified four possible routes (A, B, C and D) within the Yellowknife to Exeter segment; Route “V” was subsequently added to this Work Area. Route “A” appears to be the most favorable of the five routes as there is a greater incidence of the more favorable Archean granites and granodiorites and a higher number of esker complexes, especially within the northern segment of this proposed route. The other four routes


SLAVE GEOLOGIC PROVINCE TRANSPORTATION CORRIDOR
POTENTIAL CORRIDOR ROUTES
FIGURE 2
CORONATION GULF
Kugluktuk
BATHURST INLET
Umingmaktok
Boston
High Lake
Ulu
NUNAVUT
Bathurst Inlet
TAKIJUK LAKE
Jericho
Hackett River
George Lake
Lupin
CONTWOYTO LAKE
Izok
NOSE LAKE
POINT LAKE
EXETER LAKE
BHP
LAC DE GRAS
Diavik
CLINTON-COLDEN LAKE
Colomac
Wekweti
RABESCA LAKE
SNARE LAKE
Rae Lakes
MACKAY LAKE
NORTHWEST
TERRITORIES
Wha Ti
Edzo
Rae
Yellowknife
Giant
Miramar
Dettah
Thor Lake
Lutselk'e
GREAT SLAVE LAKE
LEGEND
Slave Geologic Province -
Existing Roads -
Winter Road -
Corridor Routes -
Rare Earth Deposits -
Base Metals -
Diamonds -
Gold -
Producing Mines -
Past Producing Mines -
Scale: N.T.S.

have more significant limitations, including a greater incidence of less favorable Yellowknife Supergroup bedrock, fewer and smaller eskers, increased number of stream crossings (i.e. Route "B" and "V"), and quite often greater distances (i.e. Route "C" and "V"). Table 4 summarizes presents a summary of the total distance (of each individual route), the number of bridge crossings, curves, a qualitative assessment of aggregate potential and the percentage of proposed route by slope class for routes within Work Area 1.

Table 4. Statistical Summary of Routes within Work Area 1[1]

Route	Total[2] Distance (km)	Number of Bridge Crossings	Bridge Crossings every (km)	Major Curve every (km)	Aggregate Potential	Percentage of Proposed Route by Slope Class			
						< 10	10 - 15	16 - 30	> 30
A	337	3	112	7	poor	83	11	3	3
B	220	7	29	5	poor	81	10	4	4
C	272	7	39	4	poor	64	18	16	3
D	140	4	35	4	poor	76	15	3	6
V	289	9	32	7	good	73	20	5	1

[1] Statistics have been rounded; distances calculated through Microstation software.

[2] Total distance represents total length of individual route segments; these measurements do not, in most cases, represent the total distance between Yellowknife/Ingraham Trail Terminus and the Exeter Lake/Lac de Gras area (only Route segment 'A' presents the total distance).

Recommendations

(1) Based upon the review of 1:60 000 aerial photographs and background data, it is recommended that Route "A" be flown to acquire 1:10 000 and 1:20 000 aerial photography for further route refinement. This combined route will allow a direct path to be established between the Ingraham Trail terminus and the Exeter Lake / Lac de Gras area. The total route would be approximately 337 kilometers in length. Approximately 94 % of the proposed path resides upon favorable topography (slopes less than 15 %). Compared to the three other major routes, Route "A" is clearly the straightest; containing a major curve only every 7.2 kilometers (on average). In addition, it is expected that Route "A" will be the least costly to construct because only three (3) bridges are required. A small segment, known as "A3" should be flown because it offers a shorter, more linear path to Starfish Lake, in addition to containing a very high percentage (98 %) of very low relief terrain along the route.

(2) It is also recommended that Route "B" be flown to acquire 1:10 000 and 1:20 000 aerial photography

for further route refinement. This route will allow a direct path to be established northward between Yellowknife and Exeter Lake / Lac de Gras (utilizing the northernmost portion of Route "A"). The combined route ('B' and northern portion of 'A') would be approximately 264 kilometers in length. Approximately 91 % of the proposed path resides upon favorable topography (slopes less than 15 %). Route "B" has a higher number of stream crossings (7) than 'A'; this is expected to make it more costly to construct. However, the initial 36 % of Route "B" (to Giauque Lake) would follow an existing hydro corridor (with service roads). This is expected to drastically reduce construction costs, as well as limit additional environmental impacts within the initial 94 kilometers of the new highway. In addition, Route "B" offers a more linear path (major curve every 4.9 kilometers) than Route 'A'.

3.2.2 Work Area 2

The Exeter Lake / Lac de Gras - Contwoyto Lake / Lupin Mine segment is approximately 210 km in length. Elevations range from a low of 439 m at Exeter Lake to 620 m atop the Peacock Hills to the north; most of the topography is less than 525 m. Four (4) possible routes (E, F, G and H) have been identified between Exeter Lake the Contwoyto Lake / Lupin Mine area. The first two routes (E and F) run north from Exeter Lake to the west of Contwoyto Lake to the Lupin Mine area; the remaining two routes (G and H) run northeast from Exeter Lake to Pellatt Lake and the south end of Contwoyto Lake (G) and from Exeter Lake towards Ghurka Lake. Table 5 summarizes presents a summary of the total distance (of individual routes), the number of bridge crossings, curves, a qualitative assessment of aggregate potential and the percentage of proposed route by slope class for routes within Work Area 2.

Recommendations

(1) It is recommended that 1:10 000 and 1:20 000 photography be acquired for Route "G". Route "G" is preferred to Route "H" as it is shorter in length (78 versus 105 km). Furthermore, Route "G" lies upon more favorable low-relief topography with 90 % of the slopes being less than 15 %; in comparison, only 74 % of the topography along Route "H" is less than 15 %. Route "G" also provides immediate access to the Contwoyto Lake Winter Road north of Pellatt Lake. Only two bridges would need to be constructed along Route "G" (as opposed to seven required for Route "H"). Both routes are considered to have poor aggregate potential.

Table 5. Statistical Summary of Routes within Work Area 2[1]

Route	Total[2] Distance (km)	Number of Bridge Crossings	Bridge Crossings every (km)	Major Curve every (km)	Aggregate Potential	Percentage of Proposed Route by Slope Class			
						< 10	10 - 15	16 - 30	> 30
E	128	1	128	4	poor	55	40	3	2
F	209	7	30	5	good	84	14	2	0
G	78	2	39	4	poor	45	50	4	1
H	100	7	14	4	good	65	10	17	9

1 Statistics have been rounded; distances calculated through Microstation software.

2 Total distance represents total length of individual route segments; these measurements do not represent the total distance between the Exeter Lake/Lac de Gras area and the Lupin Mine area.

(2) If it is warranted to have an all-season road running along the western side of Contwoyto Lake to access the Lupin Mine site, it is recommended that Route “F” be flown to acquire 1:10 000 and 1:20 000 photography. A comparison of Routes “E” and “F” suggests that Route “F” is preferred especially with regards to suitable low-relief topography. Approximately 98.4 % of Route “F” occurs on topography less than 15 %, of which 84.5 % is less than 10 %. Aggregate potential is considered good for Route “F” (as opposed to Route “E” which is considered poor). The major drawback of Route “F” however, is the number of bridges that would need to be constructed.

3.2.3 Work Area 3

The Contwoyto Lake / Lupin Mine to Bathurst Inlet segment varies from 180 - 350 km in length (depending upon which route segment is chosen). Elevations range from approximately 480 m near the southeast corner of Contwoyto Lake to sea level at Bathurst Inlet. The most rugged topography is found in the Bathurst Inlet/Bathurst Lake area where volcanic intrusions extend approximately 200 m. above sea level. Four routes (I, J, K and L) have been evaluated. Route “I” is thought to be the best route if a route is chosen to go around the north end of Contwoyto Lake to Bathurst Inlet; this route provides good access to the Lupin mine and the Jericho and Izok Lake deposits. Routes “J” and “K” are equally “good” routes if access is required form the south end of Contwoyto Lake. Route “K” is somewhat longer than “J” as it swings further to the south and east to provide access to both Hackett River and George Lake/Goose lakes projects. Table 6 presents a summary of the total distance (of individual routes), a summary of the number of bridge crossings, curves, a qualitative assessment of aggregate potential and the percentage of proposed route by slope class for routes within Work Area 3.

Table 6. Statistical Summary of Routes within Work Area 3[1]

Route	Total[2] Distance (km)	Number of Bridge Crossings	Bridge Crossings every (km)	Major Curve every (km)	Aggregate Potential	Percentage of Proposed Route by Slope Class			
						< 10	10 - 15	16 - 30	> 30
I	344	14	25	3	poor	73	6	8	13
J	171	1	171	3	good	50	22	18	10
K	162	4	40	4	good	33	42	14	11
L	179	5	36	3	good	86	7	3	3

[1] Statistics have been rounded; distances calculated through Microstation software.
[2] Total distance represents total length of individual route segments; these measurements do not represent the total distance between the Lupin Mine area and Bathurst Inlet.

Recommendations

(1) It is recommended that Route “J” and selected portions of Route “I” (kilometers 0 - 64) be flown to acquire 1:10 000 and 1:20 000 aerial photography for further route refinement. This route will allow a direct route to be established between the south end of Contwoyto Lake and the proposed Bathurst Inlet port site. This route would be approximately 235 km in length of which nearly 75 % of the proposed route has favorable topography (slopes less than 15 %) with aggregate potential being considered “good” throughout most of the route.

(2) If it is warranted to have an all-season road running from the Lupin Mine site north around Contwoyto Lake to Bathurst Inlet, then it is recommended that Route “L” be flown at 1:10 000 and 1:20 000. While Route “L” presents a viable alternative to Route “J” (to the south), the topography in and near (especially along the northern end of) Contwoyto Lake would be extremely difficult to construct a road. The topography becomes considerably more favorable east of the Peacock Hills.

3.2.4 Work Area 4

The Rae-Edzo to Colomac Mine / Snare Lake segment is approximately 200 km in length. Elevations range from 213 m southwest of Bigspruce Lake to approximately 437 m northeast of the Colomac Mine site. Six (6) routes were identified, including routes “M”, “N”, “O”, “T”, “U” and “V”. Table 7 presents a summary of the total distance (of individual routes), the number of bridge crossings, curves, a qualitative assessment of aggregate potential and the percentage of proposed route by slope class for routes within Work Area 4.

Table 7. Statistical Summary of Routes within Work Area 4[1]

Route	Total[2] Distance (km)	Number of Bridge Crossings	Bridge Crossings every (km)	Major Curve every (km)	Aggregate Potential	Percentage of Proposed Route by Slope Class			
						< 10	10 - 15	16 - 30	> 30
M	170	5	34	4	poor	78	16	4	3
N	61	2	30	5	good	70	22	3	4
O	131	4	33	6	poor	85	9	3	2
T	84	2	42	6	nil	80	15	2	4
U	194	5	39	6	poor	73	14	7	6
W	32	2	16	5	poor	75	24	1	-

[1] Statistics have been rounded; distances calculated through Microstation software.

[2] Total distance represents total length of individual route segment; these measurements do not represent the total distance between the Rae-Edzo area to Colomac Mine / Snare Lake area.

Recommendations

(1) If it is preferred to have a route between Rae-Edzo and the Colomac Mines/Snare Lake area, it is recommended that routes “T”, “O”, a portion of “N” be flown to acquire 1:10 000 and 1:20 000 aerial photography for further route refinement. Route “O” (with Route “N1” and eastern portion of Route “N”) is preferred over either Route “M” or western “N” because of its’ more linear path, fewer bridge crossings, and high percentage (85.5 %) of low relief (0 - 10 %) topography.

(2) If a route is preferred between the Rae-Edzo area northeast to the Lac de Gras, it is recommended that Route “U”/“W” be flown to acquire 1:10 000 and 1:20 000 aerial photography for further route refinement. This combined route will allow a more direct and shorter path to be established between Rae-Edzo and the Lac de Gras/Exeter Lake area than any of the other routes identified within Work Areas 4 and 5. The total route would be approximately 226 kilometers in length (194 kilometers along Route “U” and 32 kilometers along Route “W”).

3.2.5 Work Area 5

The Colomac Mine / Snare Lake to Lac de Gras/Exeter Lake segment is approximately 170 km in length. Elevations range from 355 m at both Snare and Roundrock lakes to 439 m at Exeter Lake. Four (4) routes (P, Q, R, and S) have been identified between the Colomac Mine / Snare Lake area and Exeter Lake. Routes "P" and "Q" both appear to be "good" routes, however Route "P" occurs along the north side of Snare Lake, while Route "Q" is to the south of the lake. Both offer "good" potential aggregate sources. The two smaller routes, "R" and "S" represent segments between "P" and "Q" to a more southerly junction with Route "A". Both of these routes also appear to have "good" potential for aggregate. Table 8 presents a summary of the total distance (of individual routes), the number of bridge crossings, curves, a qualitative assessment of aggregate potential and the percentage of proposed route by slope class for routes within Work Area 5.

Table 8. Statistical Summary of Routes within Work Area 5[1]

Route	Total[2] Distance (km)	Number of Bridge Crossings	Bridge Crossings every (km)	Major Curve every (km)	Aggregate Potential	Percentage of Proposed Route by Slope Class			
						< 10	10 - 15	16 - 30	> 30
P	171	2	85	6	excellent	83	12	3	2
Q	144	3	48	4	good	77	14	7	3
R	67	-	67	5	good	87	3	8	2
S	31	1	31	16	excellent	73	17	3	6

[1] Statistics have been rounded; distances calculated through Microstation software.

[2] Total distance represents total length of individual route segments; these measurements do not represent the total distance between the Colomac Mine / Snare Lake area and the Exeter Lake / Lac de Gras area.

Recommendations

(1) Within Work Area 5 (Colomac Mines/Snare Lake - Lac de Gras/Exeter Lake region) it is recommended that Route "P" be flown to acquire 1:10 000 and 1:20 000 aerial photography for further route refinement. Route "P" is preferred over routes "Q", "R", and "S" (relevant portions only) because of its' few bridge crossings, linear path, excellent potential aggregate resources, and high percentage (83.5 %) of low relief (0 - 10 %) topography.

4.0 RECOMMENDATION

The recommendations provided below are based upon the analysis of 1:250 000 and 1:50 000 NTS maps and detailed terrain mapping of 1:60 000 aerial photographs.

(1) If a route is required between the Yellowknife area in the south and the Bathurst Inlet area in the north, then it is recommended that routes ***A - F - H - G - J - I*** be followed. These routes provide the most direct and shortest distance (715 km) between the Yellowknife area and the Bathurst Inlet area, and access to Contwoyto Lake and adjacent mine sites and mineral deposits (i.e. via winter roads, barges, etc.). In addition, these routes occur on the most favorable topography, have poor to good aggregate sources (south to north, respectively), and have the fewest number of bridge crossings. A statistical summary for this proposed route is found in Table 9.

Table 9. Statistical Summary of Recommended Routes A - F - H - G - J - I [1]

Route	Distance (km)	Number of Bridge Crossings	Bridge Crossings every (km)	Major Curve every (km)	Aggregate Potential	Percentage of Proposed Route by Slope Class			
						< 10	10 - 15	16 - 30	> 30
A	337	3	112	7	poor	83	11	3	3
F[4]	55	2	27	3	good	70	29	1	0
H[4]	10	0	0	2	nil - poor	25	0	57	18
G	78	2	39	4	poor	45	50	4	1
J	171	1	171	3	good	50	22	18	10
I[2]	64	5	13	2	nil[3]	90	7	0	3
Total	**715**	**13**	**55**	**4**	**-**	**68**	**22**	**6**	**4**

[1] Statistics have been rounded; distances calculated through Microstation software.
[2] Figures presented for Route I are only between it's junction with Route J and proposed Bathurst Inlet terminal.
[3] Although Route "I" has been rated as poor for aggregate, this particular segment is considered to have no potential for aggregate (at the 1:60 000 scale).
[4] Figures presented for routes F, and H are for those segments required to join various segments and do not represent total lengths.

(2) If a route initiating at or near Rae-Edzo is desired, then routes ***T - U - B - A - F -H - G - J - I*** is recommended. These routes provide the most direct and shortest distance between the Rae-Edzo area and the Bathurst Inlet area (781 km), and access to Contwoyto Lake and adjacent mine sites (i.e. via winter roads, barges, etc.). A statistical summary of this proposed route is found in Table 10.

Table 10. Statistical Summary of Recommended Routes T - U - B - A - F - H - G - J - I [1]

Route	Distance (km)	Number of Bridge Crossings	Bridge Crossings every (km)	Major Curve every (km)	Aggregate Potential	Percentage of Proposed Route by Slope Class			
						< 10	10 - 15	16 - 30	> 30
T[2]	15	1	15	1	nil	80	15	2	4
U	194	5	39	6	poor	73	14	7	6
B[2]	52	3	17	9	good	91	4	3	2
A[2]	142	1	93	7	good	93	3	4	0
F[2]	55	2	27	3	good	70	29	1	0
H[2]	10	0	0	2	nil - poor	25	0	57	18
G	78	2	39	4	poor	45	50	4	1
J	171	1	171	3	good	50	22	18	10
I[2]	64	5	13	2	nil[3]	90	7	0	3
Total	**781**	**20**	**39**	**6**	**-**	**75**	**16**	**5**	**4**

[1] Statistics have been rounded; distances calculated through Microstation software.
[2] Figures presented for routes A, B, F, H, I and T are for those segments required to join various segments and do not represent total lengths.
[3] Although Route "I" has been rated as poor for aggregate, this particular segment is considered to have no potential for aggregate (at the 1:60 000 scale).

(3) Block photography should be acquired for a number of areas, including all major water crossings (i.e. Mara River, Snare River, etc.) and the Bathurst Inlet area where the proposed route terminates.