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INTERIM REPORT - PHASE I
COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.
PROJECT NO. 86 - 9128A

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

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INTERIM REPORT - PHASE I
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TUKTOYAKTUK, N.W.T.
PROJECT NO. 86 - 9128A

Prepared For:
GOVERNMENT OF THE NORTHWEST TERRITORIES
DEPARTMENT OF PUBLIC WORKS HIGHWAYS DIVISION
Yellowknife, N.W.T.

Prepared By:
HARDY ASSOCIATES (1978) LTD.
Calgary, Alberta

July 1986
CG14096
11/27

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1.0 INTRODUCTION

The study to develop a granular management plan for Tuktoyaktuk is being conducted in four phases, with interim reporting and reviews between each phase. In accordance with the terms of Contract No. 86.32.1D41 (259) Hardy Associates (1978) Ltd. have undertaken Phase I of this study, and are pleased to present this interim report. The report details the results of the Phase I, Office Search/Review of Files and provides recommendations for Phase II.

1.1 SCOPE OF WORK

The terms of reference for Phase I, as re-iterated in our proposal (dated May 9, 1986) are as follows:

"An extensive review and co-ordination of all reports and relevant information is required to consolidate and direct the study specifically towards the supply of community granular material.

There may be areas within a reasonable distance (50 km) from Tuktoyaktuk that have not been covered by any report. There are also known reports of specific sites that include detailed field information that may be extensive enough that no other field work is necessary.

This phase of the project should conclude with an interim report presenting preliminary recommendations regarding whether any further airphoto interpretation is required, which sites require further field investigations and the type of field investigation recommended.

Input by and consultation with local contractors, the Hamlet of Tuktoyaktuk, Inuvialuit Land Administration and other interest parties regarding the background study is required."

The ultimate objective of the study is to ensure that a 20 year supply of suitable granular material is identified and reserved for the community. The anticipated community requirements over the next 20 years are for 400,000 m^3 of general embankment material and 100,000 m^3 of base/surfacing material.

2.0 BACKGROUND INFORMATION

The following sections detail the sources of information which were utilized during this phase of the study. The information included both existing published and unpublished reports, recent 1:20,000 scale airphotographs, and a meeting with all interested parties.

2.1 EXISTING REPORTS

A list of relevant reports and publications which were reviewed is presented in Appendix "A". The majority of this information was provided by the Government of the Northwest Territories (GNWT), however some additional data was obtained from our Company files.

The reports were used to identify the locations of all previously documented potential granular borrow sources, which were plotted on maps at 1:250,000 and 1:50,000 scales. Pertinent data concerning source identification, deposit

description, and borrow pit development criteria, were tabulated to provide summary information on the deposits. The tables permit rapid comparson and cross-checking in order to target the most promising deposits with respect to supplying the required material.

Table 1 (Appendix "B") presents data on 36 deposits which have been previously identified within a 50 km radius of Tuktoyaktuk. Also included for completeness are the deposits at YaYa Lakes, which are currently being used to supply the Tuktoyaktuk community. Each deposit has been evaluated to derive an overall assessment of its prospects, using the following criteria:-

- distance from the Hamlet of Tuktoyaktuk
- ease of access to deposit
- material quality and quantity
- amount and reliability of groundtruthing and testing
- environmental considerations

The assessment applied to each deposit is a qualitative statement which reflects these criteria, and the scheme used is as follows: unsuitable, favourable, good.

2.2 Airphotographs

A set of recent, (1984) black and white panchromatic air photographs, at a scale of 1:20,000, were supplied by the GNWT for inspection. The approximate area covered by these photographs is shown on Plate 1 (Appendix "C").

It was not the intention to conduct a detailed airphoto interpretation during Phase I, instead the photographs were utilized to :

(i) provide an overview of terrain conditions
(ii) check previous interpretations
and (iii) determine the need for additional airphoto interpretation in Phase II.

Based upon a review of the airphotographs and existing reports, it is our opinion that some detailed airphoto-interpretation would be worthwhile in Phase II. Details of this proposed work are contained in Section 4.0.

2.3 Meeting in Tuktoyaktuk

On Wednesday July 16, 1986 a meeting was convened in Tuktoyaktuk to obtain input from all parties interested in the granular management plan for the community. The interested parties and their representatives present at the meeting included the following:-

Hamlet of Tuktoyaktuk	-	Mr. Emanuel Felix (Deputy Mayor)
Inuvialuit Land Administration Commission, and Hamlet of Tuktoyaktuk	-	Mr. Vince Steen (ILA Commissioner and Hamlet Development Officer)
Inuvialuit Land Administration	-	Mr. Guy Dobbyn (Administrator)
Inuvialuit Land Administration	-	Mr. Dean Walker (Assistant Administrator)
Gruben's Transport Ltd.	-	Mr. Russel Newmark (Contractor)

G.N.W.T	-	Mr. Peter Morris (DPW, Highways Division)
Hardy Associates (1978) Ltd.	-	Mr. Alan Hanna (Consultant)
Hardy Associates (1978) Ltd.	-	Mr. Neil Mosley (Consultant)

An invitation had been extended to the local Trappers Association as well as another contractor, Storr & Sons, however neither of these were represented at the meeting. The objectives of the meeting were as follows:

(i) to address the concerns of all interested parties regarding development of particular granular deposits.

(ii) to gather information from contractors on their operating procedures and any problems they have encountered

(iii) to arrive at a concensus from all present on which deposits are preferred for develoment, and which all parties will be happy to work with or conversely, which deposits are "off-limits".

The information from the meeting was used as a guideline in evaluating all other information, so that recommendations (which are acceptable to all parties) will result from Phase I.

3.0 DISCUSSION

The following discussion is based upon the information obtained mainly from the meeting in Tuktoyaktuk.

It is understood that most recently the majority of material used for road construction/maintainance in Tuktoyaktuk is obtained from source 211 (embankment material) and Ya Ya Lakes (base and surface course). These two sources are at a radial distance of 50 km and 75 km respectively from Tuktoyaktuk and access to them primarily is by winter ice-road along the coast and East Channel (see Plate 1).

The mandate for this study is to locate (if possible) more local sources of suitable granular material in order to reduce the overall cost to the community. Hence the obvious rationale is to concentrate attention upon potential sources close to the community and gradually work outwards. However, as indicated by the contractor in the meeting, a deposit which is available by overland haul (as opposed to ice road) will likely be more expensive to develop due to: the cost of haul road construction/maintaince, less hauls per day, and additional wear and tear on equipment. A typical cost of winter haul road construction is about $6,250/km (i.e. $10,000/mi). This cost may be reduced somewhat by accessing across frozen lakes and minimizing the overland sections ("portages") between lakes.

In the meeting, a number of the more promising "local" granular deposits were discussed in detail to ascertain the various concerns with respect to their development. The following summarizes the conclusions of the meeting.

Deposit	Concerns
162	There are no major concerns with dredging in Tuktoyaktuk Harbour, however the community is concerned about blowing sand from the stockpile. The contractor indicated the fine/medium sand is difficult to work with (compact)
156 and 157	Beaches and spits are "off-limits". The community has established a policy forbidding any development of beaches within a 32 km (20 mi) radius, and would strongly object to any such development beyond this distance.
159, 160 & 161	In accordance with Environmental Policies in the Community Plan for Tuktoyaktuk (1983): "no development will be permitted within 200 metres of Freshwater Creek or adjacent to that area of the harbour from Kiktoreak Point to Aveltkok Inlet, which constitute spawning and fishing areas of importance to the community". Aveltkok Inlet, which is surrounded by Deposit 159, is also a prime area for recreation, camping and hunting, hence there would be strong objections from the community to any development of this deposit. Freshwater Creek, Kudluk Lake (south of the creek) and Pikiolak Lake (north of the creek) are all used (or reserved) as supplies of fresh water for the

community. Hence, the community has resolved that no permits will be issued adjacent to these areas. Application was made recently to excavate granular material from elsewhere within Deposit 161, however, the Community Corporation turned down the application and further resolved to ban future development of this area.

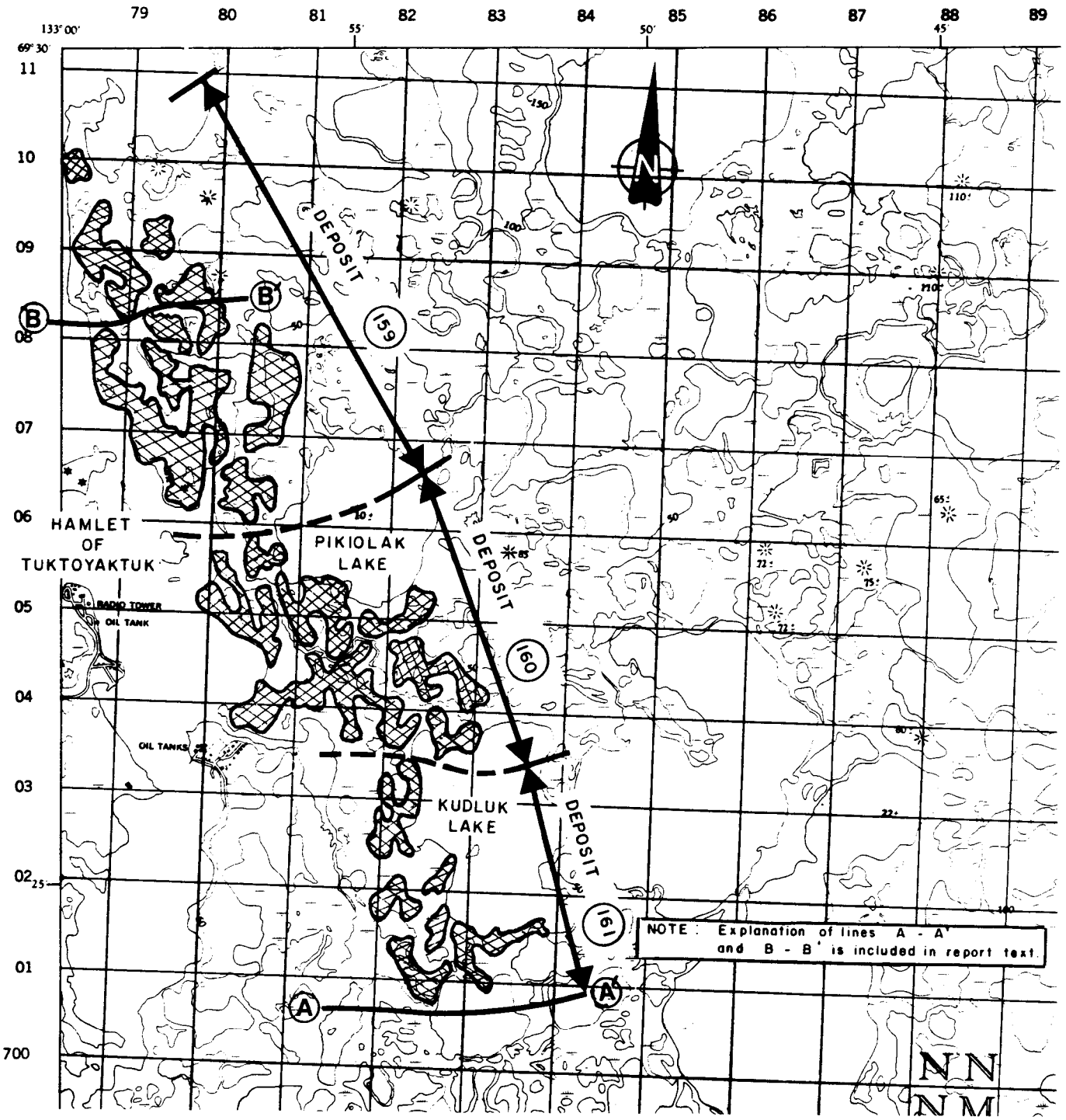
A demarcation line south of Deposit 161 (A-A' on Figure 1) was agreed upon at the meeting; development of granular deposits south of this line would be allowed.

158 There are no major concerns with dredging these deposits.

169 Development of this deposit is restricted by I.L.A. rules which do not permit excavation below the high water level of the adjacent lake(s) within 100m of the shore. In addition, there is concern for siltation of the lake(s).

177, 168 and 167 There are no major concerns with development of these deposits.

In addition to these deposits the meeting touched upon Deposits 163 and 155 which have been opened up and exploited to some extent in the last year or so. The granular material quality (163 & 155) is apparently comparable to that from Deposit 177. It was further noted that the haul costs were comparable for the three deposits 155, 163, and 177.



NORTHWEST TERRITORIES

SCALE 1:50,000

1.25 inches to 1 Mile approximately

1 0 1 2 3 Miles

1000 500 0 1000 2000 3000 4000 Metres

1000 500 0 1000 2000 3000 4000 Yards

CONTOUR INTERVAL 50 FEET

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COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK N.W.T.

GRANULAR DEPOSITS CLOSE TO TUKTOYAKTUK

CG 14096

FIGURE 1

HT83-82/03

Also, some granular material has recently been borrowed from an area south of Deposit 161 (Source "C"). This material was rejected in the field as unsuitable for general fill, but when tested in the laboratory it classified as a poorly graded fine sand (SP). In this same general area, Esso has recently constructed a drill-pad and it was noted that "good gravel" was encountered in the excavation for the sump.

4.0 CONCLUSION AND RECOMMENDATIONS

Based upon the results of our reviews and investigations it may be concluded that the following deposits are "off-limits" for various reasons: 156, 157, 159, 160, and 161.

It is our opinion however, that with a strictly controlled borrow pit management plan, parts of Deposits 160 and 161 could be fully exploited, then restored and re-vegetated to remove the scars which are present today. During a field visit to these deposits (after the meeting in Tuktoyaktuk), it was apparent that significant quantities of fair to good quality granular material still remain here. In addition, it would be worthwhile exploring the possibility of defining another demarcation line (e.g. B-B' on Figure 1) north of Aveltkok Inlet in Deposit 159, beyond which development may be permitted. Through these means the presently scarred landscape could be rehabilitated, and some of the granular material requirement may be obtained within 3 to 8 km of Tuktoyaktuk.

However, with the above conclusions in mind, it is our recommendation that Phase II should consist of the following:

(i) Undertake a detailed airphoto-interpretation of the area shown on Plate 1, for which 1:20,000 scale photographs are presently available. Particular attention will be placed on the area south, southeast and southwest of Deposit 161. We feel that the roughly triangular area between Deposits 161, 177 and 167 holds the most promise for locating new sources of granular material. Recent (1985) airphotographs at a scale of 1:60,000 are available for almost the whole study area. Thus, we also propose to obtain photographs of specific areas (e.g. Deposits 155, 177, 168 and 163) at this scale, to fully confirm their extent.

(ii) Pending the results of the airphoto-interpretation a field reconnaissance will be conducted to groundtruth the most promising deposits. Potential targets for groundtruthing, in order of priority, are as follows:

(a) Any new deposits identified from the airphoto-interpretation, starting with the closest and most accessible, which are felt to contain significant quantities of suitable material in areas of low environmental sensitivity. It is anticipated that up to four new deposits may warrant field reconnaissance.

(b) If permissible, Deposit 159 in the area north of line B-B' (Figure 1). The amount of existing information in this area is limited to one shallow test pit and the log of an exposure.

Deposits 169, 177, 168 and 167 are not considered as priorities for groundtruthing due to sufficient existing information (168 & 177), environmental sensitivity (169) and poor access (167). Therefore we propose some groundtruthing of more distant yet probably more accessible deposits, for example:

(c) Deposits 155 and 163 are considered worthy of re-inspection as sources of embankment fill. They are accessible by ice road for the most part and have been partially opened up just recently.

Organize
Helicopter + net (slinging)
2 Labourers
Accommodations
Flights.
Meeting in YK
Sandy Murray ?
Freight Boxes

As indicated in our proposal, groundtruthing will consist of a helicopter supported team (equipped with picks, shovels, hand-auger and jack hammer) who will excavate, log and sample a number of test pits. This investigation will not provide sufficient information (e.g. thickness of deposits, massive ground ice at depth) to prove the granular reserves and their suitability for development. It is expected that there will be a requirement for a Phase III winter drilling program to determine these aspects.

5.0 PHASE II COST ESTIMATE

The cost estimate provided in our original (May 9, 1986) proposal may be adequate for the level of investigation now envisaged for Phase II, provided it is clearly understood there will definitely be a requirement for a winter drilling program. The emphasis for the Phase II investigation is, however, on numerous new potential sources south of Deposit 161 that have not been previously identified. It is considered that the actual field reconnaissance time (i.e.

project geologist alone) should be increased by one day to allow preliminary confirmation of the airphoto interpretation prior to selecting actual test pit locations. Depending on the outcome of the detailed airphoto interpretation (to be conducted at the start of Phase II), it may be necessary to allow more time for the actual field investigation of these potential deposits, as there is no existing information. The final scope of the field investigation would be confirmed with you during the review meeting following the detailed airphoto interpretation and prior to the field program.

We recommend for your consideration that the cost estimate for the field reconnaissance (Item B.4, page 24 of original proposal) be revised as follows:

B.4 Field Reconnaissance

N. Mosley			
(including travel)	9 days at $315/day	$2,835.00	
2 Labourers	12 man days at $200/day	$2,400.00	
Expenses (geologists + pilot)			
(taxi/airfare/subsistence)	Allow	$3,500.00	
Bell Jet Ranger			
206 Helicopter	7 days at $1,800/day	$12,600.00	
Helicopter fuel ($100/hr)	Allow	$2,000.00	
Equipment Rental (picks, shovels,			
Jack-hammer etc.)	Allow	$500.00	
Freigth (boxes, equipment, samples)			
	Allow	$1,000.00	
			$24,835.00

Items B.1, B.2, B.3, B.5 and B.6 will remain the same, hence the revised total for Phase II will be $34,215.00.

6.0 CLOSURE

We trust that our Interim Report meets with your satisfaction, and that your review and subsequent consultation with interested parties will lead to approval of our proposed Phase II. We look forward to meeting with you early in Phase II (if required) to finalize details of the field reconnaissance.

Respectfully Submitted

HARDY ASSOCIATES (1978) LTD.

Per:

N.G. Mosley, M.Sc., P.Geol.

Per:
A.J. Hanna, M.A.Sc., P.Eng.

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11/27

APPENDIX "A"

List of Existing Reports

APPENDIX "A"

LIST OF EXISTING REPORTS

BBT Geotechnical Consultants (1983). Granular Materials Evaluation, Deposits 168 and 211, Tuktoyaktuk Area, N.W.T. Department of Indian Affairs and Northern Development.

E.P.E.C. Consulting Western Ltd. (1982). Tuktoyaktuk Water Reservoir, Dredging Construction Observations. Government of the Northwest Territories, Department of Public Works.

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Public Works Canada, Western Region (1981). Geotechnical Investigation, Mile 970 to Mile 1059 Mackenzie Highway (Combined Data 1976 - 1980), Volumes I, II and III.

Rampton, V.N. and M. Bouchard (1975). Surficial Geology of Tuktoyaktuk, District of Mackenzie Geological Survey of Canada, Paper 74 - 53.

Ripley Klohn and Leonoff International Ltd. (1973). Stage II Community Granular Materials Inventory - Tuktoyaktuk. Department of Indian Affairs and Northern Development.

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Terrain Analysis and Mapping Services Ltd. (1976). Ya Ya Lakes Esker Complex, Site Development and Restoration Plan. Department of Indian Affairs and Northern Development.

Thurber Consultants Ltd. (1979). Airphoto Interpretation, Terrain Analysis, Tuktoyaktuk N.W.T. Government of the Northwest Territories, Town Planning and Lands Division.

Thurber Consultants Ltd. (1981). Tuktoyaktuk Water Reservoir, Geotechnical Report No. 1: Borrow Source and Site Investigations. E.P.E.C. Consulting Western Ltd.

APPENDIX "B"

Table 1: Summary of Potential Borrow Source Information

TABLE 1: SUMMARY OF POTENTIAL BORROW SOURCE INFORMATION

DEPOSIT DESCRIPTION						BORROW PIT DEVELOPMENT CRITERIA						
BORROW SOURCE NUMBER	MATERIAL TYPE	MATERIAL QUALITY	LANDFORM	ICE CONTENT	SURFACE DRAINAGE	ESTIMATED VOLUME (M^3)	ESTIMATED RECOVERY DEPTH (M)	OVERBURDEN THICKNESS (M)	ACCESS	ENVIRONMENTAL CONSIDERATIONS	DATA QUALITY RELIABILITY	OVERALL ASSESSMENT
162	Sand (fm), some gravel	Fair to good. General fill	Submerged and reworked glaciofluvial deposits	None	-	5.2×10^6	16.0	1.0-2.0	Partially developed. Dredging. 3 km	Impact on fishing	Good	Good Prospect
156	Sand (fm) some gravel	Fair to good General fill	Beaches and Spits	None	Well drained 1-2m relief	225,000	1.0	none	Some development. Summer or winter operation. 2 to 10 km	Coastal erosion	Poor	Favourable Prospect
159	Sand (f,m) and thin gravel beds	Fair to good. General fill to aggregate	Glaciofluvial outwash plain	Low to medium	Well to moderately well drained.	3.5×10^6	3.0	1.8	Undeveloped. Winter road, Summer barge. 4 km	Inuvialuit hunting and fishing grounds	Poor to Fair	Good Prospect
160	Sand (f,m) some gravel beds	Fair to good. General fill to aggregate	Glaciofluvial outwash plain	Low to medium	Well to moderately well drained 15 m relief	3.3×10^6	3.0	0.6-2.5	Partially developed. Winter road, summer barge. 5 km	Siltation of community water supply	Good	Good Prospect
161	Sand (f,m) some gravel beds	Fair to good. General fill to aggregate	Glaciofluvial outwash plain	Low to medium	Well to moderately well drained. 15 m relief	1.4×10^6	3.0	0.3-1.8	Partially developed. Winter road, summer barge. 6 km	Siltation of community water supply	Good	Good Prospect
158	Sand, some gravel	Fair to good. General fill, possible aggregate	Offshore shoals/bars	None to low	-	3.8×10^6	1.0	none to minimal	Undeveloped. Shallow water dredging. 5 to 7 km	No major concerns	Poor	Favourable Prospect
157	Sand (fm) some gravel	Fair to good. General fill	Beaches and spits	None	Well drained. 1-1.5 m relief	980,000	1.2	none	Some development. Summer or winter operation. 8 to 20 km	Coastal erosion	Poor	Favourable Prospect
169	Sand (f,m) some gravel beds	Fair to good. General fill	Glaciofluvial outwash plain	Low - some massive ice	Moderately well drained. 18 m relief.	750,000	4.6	2.5	Undeveloped. Winter road. 16 km	Siltation of adjacent lakes	Poor	Favourable Prospect
177	Sand and gravel (SW-GW)	Fair to good. General fill to aggregate	Glaciofluvial outwash and esker/crevasse fill	Low/medium some massive ice	Well drained. 18 m relief	2×10^6	4.6	0 - 1.5	Undeveloped. Winter road. 22 km	No major concerns	Good	Good Prospect

TABLE 1: SUMMARY OF POTENTIAL BORROW SOURCE INFORMATION (CONTINUED)

DEPOSIT DESCRIPTION						BORROW PIT DEVELOPMENT CRITERIA						
BORROW SOURCE NUMBER	MATERIAL TYPE	MATERIAL QUALITY	LANDFORM	ICE CONTENT	SURFACE DRAINAGE	ESTIMATED VOLUME (M^3)	ESTIMATED RECOVERY DEPTH (M)	OVERBURDEN THICKNESS (M)	ACCESS	ENVIRONMENTAL CONSIDERATIONS	DATA QUALITY RELIABILITY	OVERALL ASSESSMENT
168 ✓	Sand and gravel (SW-GW)	Good. General fill to aggregate	Kame complex and Esker ridge	Low	Well drained	350,000 to 500,000	1.5 - 7.5	0 - 1.5	Undeveloped. Winter road. 25 km	No major concerns	Good	Good Prospect
27 27A 27B X	Sand and gravel, Trace of silt	Fair. General fill	Glaciofluvial outwash	Low, some massive ice	Poor to moderately well drained. Little relief	260,000	2.5	0 - 3.0	Undeveloped. Winter road. 26 km	No major concerns	Fair to Good	Unsuitable Prospect
167 ✓	Sand (fmc) and gravel (GP)	Fair to good. General fill to aggregate	Kame complex	Low some massive ice	Well drained. 21 m relief	1.7×10^6	6.0	0 - 0.6	Undeveloped. Winter road. 27 km	No major concerns	Poor	Good Prospect
26 26A 26B 27C 28 X	Silt and clay with sand and gravel	Poor. Unsuitable	Glaciofluvial outwash	Medium	Poor to moderately well drained. Little relief	Minor amount	-	-	Undeveloped. Winter road. 25 - 33 km	No major concerns	Fair	Unsuitable Prospect
166 X	Sand (fmc) and gravel (GW/SP)	Fair to good. General fill, possible aggregate	Kame complex	Low, some massive ice	Well drained. 20 m relief	125,000	6.0	0.3	Undeveloped. Winter road. 31 km	Siltation of lakes	Poor	Unsuitable Prospect
165 X	Sand (fmc) and gravel (GW)	Fair to good. General fill	Glaciofluvial outwash and Kames	Low, some massive ice	Well drained. 15 - 20 m relief	1.3×10^6	up to 9.0	0.9	Undeveloped. Winter road. 32 km	Siltation of lakes	Poor	Favourable Prospect
170 X	Sand (fmc) thin gravel beds	Fair to good. General fill	Glaciofluvial outwash	Low, some massive ice	Well drained. 15 - 25 m relief	750,000	1.0 - 1.5	0 - 0.6	Undeveloped. Winter road. 32 km	No major concerns	Poor	Favourable Prospect
155 ✓	Sand, silty some gravel	Fair. General fill only	Glaciofluvial /Alluvial benches	Medium to high	Moderately well to well drained. 8-23 m relief	750,000	1.0 - 1.5	0 - 0.6	Undeveloped. Winter road. 33 km	Siltation of stream	Poor	Favourable Prospect
163 ✓	Sand (fm)	Fair to good. General fill	Glaciofluvial outwash plain	Medium	Moderately well drained.	7.2×10^6	3.0	0 - 0.3	Undeveloped. Winter road, summer barge. 33 km	Siltation of lakes	Poor	Favourable Prospect

TABLE 1: SUMMARY OF POTENTIAL BORROW SOURCE INFORMATION (CONTINUED)

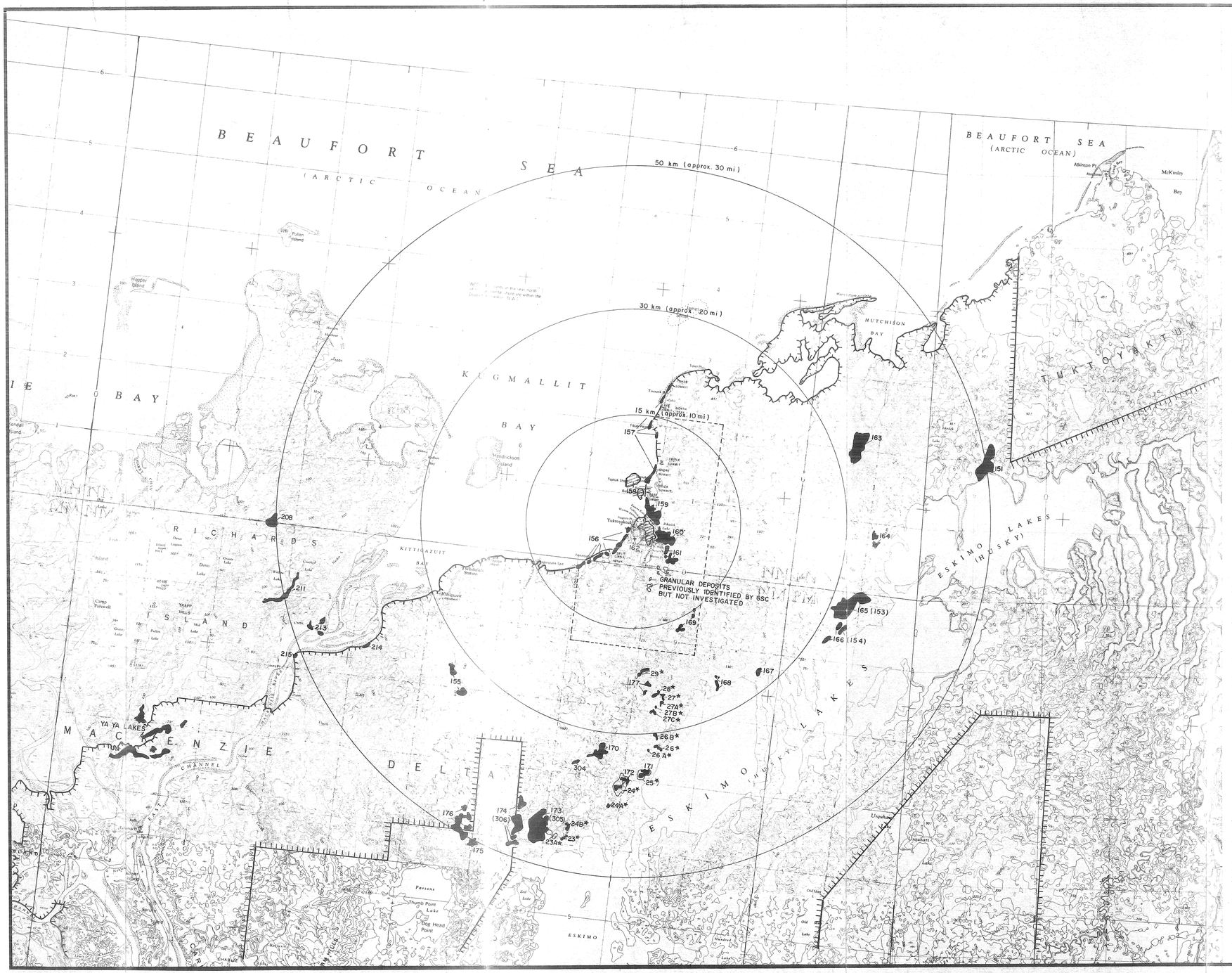
DEPOSIT DESCRIPTION						BORROW PIT DEVELOPMENT CRITERIA						
BORROW SOURCE NUMBER	MATERIAL TYPE	MATERIAL QUALITY	LANDFORM	ICE CONTENT	SURFACE DRAINAGE	ESTIMATED VOLUME (M^3)	ESTIMATED RECOVERY DEPTH (M)	OVERBURDEN THICKNESS (M)	ACCESS	ENVIRONMENTAL CONSIDERATIONS	DATA QUALITY RELIABILITY	OVERALL ASSESSMENT
304	Gravel and sand (GW)	Fair to good. General fill	Small eskers	Low	Well drained.	35,000	1.5	0.3 - 1.8	Undeveloped. Winter road. 34 km	No major concerns	Poor	Unsuitable Prospect
164	Sand (mc) and thin gravel beds	Fair to good. General fill	Glaciofluvial outwash plain	Low/medium, some massive ice	Well/moderately well drained. 20-30 m relief	2.6×10^6	3.0	0.3	Undeveloped. Winter road. 35 km	No major concerns	Poor	Favourable Prospect
171	Sand and gravel (SW-GW)	Fair to good. General fill	Glaciofluvial outwash + kame complex	Low, some massive ice	Well/moderately well drained. 30 m relief	1.5×10^6	6.0	0 - 2.0	Undeveloped. Winter road. 36 km	No major concerns	Fair	Favourable Prospect
172	Sand (fmc) minor gravel	Fair. General fill	Glaciofluvial outwash or Kame complex	Low/medium, some massive ice	Moderately well drained. 21 m relief	900,000	4.6	0.9 - 3.0	Undeveloped. Winter road. 36 km	Siltation of lakes	Fair to Good	Favourable Prospect
214	Sand (f) silty (SP)	Poor to fair. General fill only	Alluvial terrace	Medium some massive ice	Well drained. 22 m relief	300,000	0.6	0 - 0.6	Undeveloped. Winter ice road, Summer barge. 36 km	Siltation of river	Poor	Unsuitable Prospect
24A	Sand and gravel, trace of silt	Fair. General fill	Kames on Glaciofluvial outwash plain	Low/medium, some massive ice	Well drained. 6-30 m relief	150,000	up to 6.0	0 - 4.0	Undeveloped. Winter road. 40 km	No major concerns	Fair to Good	Unsuitable Prospect
24B	Silt and clay with sand and gravel	Poor. Unsuitable	Kames on Glaciofluvial outwash plain	Medium, some massive ice	Moderately well drained. 6-30 m relief	Minor amount	-	-	Undeveloped. Winter road. 43 km	Siltation of lakes	Fair	Unsuitable Prospect
174	Gravel and sand (GP)	Fair to good General fill to aggregate	Kames on Glaciofluvial outwash plain	Low	Well drained. 25 m relief	3×10^6	2.0	0 - 1.2	Undeveloped. Winter road. 44 km	No major concerns	Poor	Favourable Prospect
173	Sand and gravel (SW-GW)	Fair to good. General fill to aggregate	Kames on Glaciofluvial outwash plain	Low to high	Well drained.	500,000	up to 9.0	0 - 0.6	Undeveloped. Winter road. 45 km	No major concerns	Poor to Fair	Favourable Prospect

TABLE 1: SUMMARY OF POTENTIAL BORROW SOURCE INFORMATION (CONTINUED)

DEPOSIT DESCRIPTION						BORROW PIT DEVELOPMENT CRITERIA						
BORROW SOURCE NUMBER	MATERIAL TYPE	MATERIAL QUALITY	LANDFORM	ICE CONTENT	SURFACE DRAINAGE	ESTIMATED VOLUME (M^3)	ESTIMATED RECOVERY DEPTH (M)	OVERBURDEN THICKNESS (M)	ACCESS	ENVIRONMENTAL CONSIDERATIONS	DATA QUALITY RELIABILITY	OVERALL ASSESSMENT
23	Sand and gravel trace silt	Fair. General fill	Kames on Glaciofluvial outwash plain	Medium, some massive ice	Moderately well drained 6-30 m relief	Significant amount	-	4.5-6.0	Undeveloped. Winter road. 45 km	Siltation of Lakes	Fair	Unsuitable Prospect
23A	Sand and gravel trace silt	Fair. General fill	Kames on Glaciofluvial outwash plain	Medium, some massive ice	Moderately well drained 6-30 m relief	Significant amount	-	5.0	Undeveloped. Winter road. 45 km	Siltation of lakes	Fair	Unsuitable Prospect
213	Sand (f) some silt	Poor. Marginal general fill	Alluvial/ Glaciofluvial terrace	Medium	Well drained. 5 - 20 m relief	300,000	1.5	0-0.6	Undeveloped. Winter ice road, Summer barge. 47 km	Siltation of River	Poor	Unsuitable Prospect
211 ✓	Sand (fmc) some gravel (SP)	Fair. General fill only	Esker	Low/medium, some massive ice	Well drained. 15 m relief	500,000 to 865,000	up to 2.0	0 - 0.3	Partially developed. Winter ice road. 50 km	No major concerns	Good	Good Prospect
208	Sand, some silt (SM)	Poor. Unsuitable	Glaciofluvial /Alluvial terrace	Medium to high, massive ice	Well drained.	-	-	-	Undeveloped. Winter ice road. 50 km	No major concerns	Poor	Unsuitable Prospect
215	Sand and gravel	Fair. General fill, possible aggregate	Glaciofluvial delta	Medium, some massive ice	Well drained. 22 m relief	23,000	1.2	2.0	Undeveloped. Winter ice road, summer barge. 50 km	Siltation of river	Poor	Unsuitable Prospect
175	Sand (fm) and local gravel	Fair to good. General fill	Glaciofluvial outwash	Low/medium some massive ice	Moderately well drained. 15-25 m relief.	1.5×10^6	6.0	0 - 2.0	Undeveloped. Winter road. 50 km	No major concerns	Poor	Favourable Prospect
151	Gravel and sand (GW)	Fair to Good. General fill to aggregate	Glaciofluvial outwash	Medium	Well drained.	500,000	1.5 - 3.0	0 - 0.3	Undeveloped. Winter road, summer barge. 50 km	Siltation of lakes	Poor	Favourable Prospect
Ya Ya Lakes ✓	Sand and gravel (SW-GW)	Good. General fill to aggregate	Esker-Kame complex	Low to medium, some massive ice	Well drained. 7-40 m relief	9.8×10^6	5.0-15.0	0.6	Partially developed. Winter ice road. 75 km	Siltation of lakes	Good	Good Prospect

APPENDIX "C"

Plate 1: Location of Potential Borrow Sources



LEGEND

29* Area No. (by DPW)

Deposit Outline

(Offshore)

Inuvialuit Lands

Approx. Area Covered by 1: 20,000 Airphotographs

Scale 1: 250,000

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CONSULTING ENGINEERING & PROFESSIONAL SERVICES

COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOCATION OF POTENTIAL BORROW SOURCES

DATE JULY/86 DWN YK/BV CHKD NM APPD AH

CG 14096 | PLATE 1