Granular Resources Management
12 Communities
Baffin Region, Nunavut

Government of Nunavut
Community Government and Transportation
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Executive Summary

A granular resource management study was undertaken for the communities of Arctic Bay, Broughton Island, Cape Dorset, Clyde River, Grise Fiord, Hall Beach, Igloolik, Lake Harbour, Pangnirtung, Pond Inlet, Resolute and Sanikiluaq located in Baffin Region, Nunavut. This work was authorized by the Department of Community Government and Transportation, Government of Nunavut, Cape Dorset.

Terms of reference required gathering information from the various communities on existing aggregate resources, known quantities and anticipated future needs. Based on this information, anticipated life expectancy of the existing resources was to be computed. A desktop study of the communities where there is a need to locate additional resources was to be undertaken to identify potential granular resources.

The work done comprised of preparing a questionnaire, which was sent to all the Hamlets to obtain information regarding existing granular resources, estimated quantities available and estimated future need. Based on this information, the life expectancy of the existing resources was estimated in the case of Hamlets that responded to the questionnaire. Potential granular resources were identified for communities in need of additional granular material by performing a desktop study. The study comprised of a review of available geological maps of the area, and stereoscopic examination of the aerial photos to locate potential granular resources. When locating the granular resources, the criteria used was that the resources have to be relatively large and potentially suitable (after processing) for making concrete, asphaltic concrete and as road base and sub-base materials. This information along with any of the existing tracks or roads identified from aerial photos were plotted on topographical maps of the Hamlets to assess accessibility of the potential resources identified. A brief discussion of the suitability of the potential sources as granular material has also been presented in the report.

The above and other related considerations are discussed in greater detail in the body of the report.

Gradation

Specific gravity

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Copy of the Questionnaire

Introduction

A granular resources management study was undertaken of twelve communities located in Baffin Region, Nunavut. This work was authorized by Mr. Sameh Elsayed of Department of Community Government & Transportation, Government of Nunavut, Cape Dorset, Nunavut.

The twelve communities studied are Arctic Bay, Broughton Island, Cape Dorset, Clyde River, Grise Fiord, Hall Beach, Igloolik, Lake Harbour, Pangnirtung, Pond Inlet, Resolute and Sanikiluaq. The locations of the twelve communities are shown on Figure 1.

Terms of reference required compilation of information on existing granular resources in the various communities, known quantity of granular reserves and anticipated future requirements. Based on this information, an assessment was to be made of communities where there is need to procure additional granular materials. A desktop study of the communities where there is a need to locate additional granular resources was to be undertaken and potential granular resources identified. The information was to be presented in a report.

For the purpose of this study, the granular materials were classified into two broad categories.

(1) 'Pit run' or 'borrow materials' comprise of naturally occurring sand, gravel and cobbles in various proportions within the identified granular deposits. These materials are used as general fill, embankment, road sub-base and culvert bedding.

(2) 'Select grades' are granular materials that have been processed or altered from its natural state. Pit run or borrow materials are processed through crusher or screens to obtain a specific size of material. Select grades require special equipment and processing and are not found naturally. Select grades are used for road surfacing, engineered fill and for production of concrete.

It is noted that when locating potential granular resources, the following assumptions were made:

(1) The potential granular resource should be relatively large.

(2) The potential granular resources should be suitable for making select grades.

Methodology

Assessment of Existing Granular Resources and Quantity of Granular Materials Available

The first task was to gather all the available information on existing granular resources and quantity of granular materials available. In order to obtain information on existing granular resources, quantity of granulars available and anticipated future granular requirements of the communities, a questionnaire was prepared and sent to the various Hamlets. Of the twelve communities that were sent the questionnaire, response was received from only four communities. Repeated requests comprising of telephone calls, faxes etc. were made to the Hamlets to respond to the questionnaire.

The information provided by the various Hamlets was reviewed and has been incorporated in the report.

A copy of the questionnaire is attached in Appendix 'A'.

Assessment of the Future Needs

The assessment of the future needs of the Hamlets was based on the information provided by the Hamlets in the questionnaire. In cases where no response was received from the Hamlets, it was not possible to make this assessment.

Comparison of Estimated Quantities of Granulars Available and Future Requirements

This comparison was based on the response to the questionnaire which solicited information on the estimated quantities of granulars available and the anticipated future requirement. In cases where no response to the questionnaire was received, or all the information was not provided, it was not possible to undertake this comparison.

Potential Granular Resources

In order to identify potential granular resources, the surficial and bedrock geology maps (where available) were obtained from Geological Survey of Canada. The aerial photographs were obtained from National Library of Canada. The topographic maps of the communities were procured from a local commercial establishement.

The geological maps were studied with a view to identifying potential geological deposits which may be suitable as granular resources. Aerial photographs of the communities were then stereoscopically examined to locate potential granular resources. The potential granular resources identified by

stereoscopic examination of the aerial photos were then plotted on the topographic maps for ease of identifying the location and assessing the accessibility of the potential resource areas. The topographical maps were also updated for any of the roads/tracks evident from the aerial photos but not shown on the topographical maps. It was therefore possible to assess the accessibility of the potential granular resources identified.

A brief description of the granular resources for each community was also prepared and has been presented in the following pages.

Arctic Bay

Arctic Bay is located at latitude 73°02' N and longitude 85°10' W. It is 1223 air km north west of Iqaluit and 1674 air km north east of Yellowknife in the Baffin Region. It is situated on the north shore of Adams Sound, off Admiralty Inlet, North Baffin Island. It is located on a low gravel beach enclosed on three sides by high hills. King George "V" Mountain, about 564 high, rises 1.6 km to the east.

Existing Granular Resources

The response to the questionnaire indicated that the Hamlet of Arctic Bay used to obtain the aggregates by surface stripping in three areas. However, these sources have been depleted and the Hamlet has no material left for maintenance of roads in the Hamlet or the road between Arctic Bay and Nanisivik.

Assessment of Needs – Potential Granular Resources

Surficial geology map of the area (Figure AB-1) indicates that the surficial deposit in the coastal area comprises of an undulating till blanket 2 to 10 m thick with drumlins and ribbed moraines in places. Away from the central area, the terrain is mountainous comprising of bedrock infilled with discontinuous till areas.

The bedrock geology map of the area (Figure AB-2) shows that the bedrock underlying the coastal till is likely to be black shale of the Arctic Bay Formation except along the eastern portion of the Arctic Bay where it is expected to be silica cemented quartzite. Further north and west of the shale, the bedrock is grey dolomite of the Society Cliffs Formation. The shale is relatively soft rock compared to the dolomite or cemented quartzite.

A stereoscopic examination of the aerial photographs was undertaken. The examination identified the till blanket located along the coastline. In addition, it identified several large till areas and an area of colluvium located within the bedrock outcrops north west of the Hamlet of Arctic Bay. These areas have been plotted on Figure AB-3.

The till and colluvium are considered to be potential aggregate sources. The till is a heterogeneous mixture of clay, silt, sand, gravel, cobbles and boulders. The composition of the till is not known and would require further investigation. In order to obtain select grades from the till deposit, the cobbles and boulders from the till would have to be removed and crushed. An area of colluvium identified is expected to be a better potential source of select grades compared to the till since this is material which has essentially moved down slope mainly through gravity. As a result, it is expected to contain lesser quantities of clay and silt. This material is expected to be coarse and would require crushing and grading.

The till and colluvium areas identified by examination of the aerial photos have also been plotted on the topographic map of Arctic Bay (Figure AB-4). A review of this drawing indicates that one of the till deposits is located adjacent to an existing road and is therefore likely to be readily accessible. Although the colluvium deposit is potentially a better source, it is located approximately 1.3 km from a existing road and therefore would be difficult to access.

The potential aggregate sources identified must be confirmed by field investigation, sampling and laboratory testing. If the field investigation indicates that the till and/or colluvium are not suitable for making select grades, the other potential source of select grades is the bedrock which outcrops north and west of Arctic Bay. The bedrock comprises of dolomite which would be suitable for production of the select grade materials. It is noted that shale bedrock is located along the shoreline and that shale is not expected to be suitable for this purpose. Excavation of the dolomite bedrock would require the use of blasting techniques. In addition, a crusher and screener would be required for aggregate production. It is reported that the Hamlet neither has an experienced blaster who can handle explosives nor a crusher. Depending on the requirements of other Hamlets in the Baffin Region, award of a contract for the production of aggregate by blasting and crushing bedrock for various Hamlets may be an option resulting in economies of scale.

Broughton Island (Qikiqtarjuaq)

Broughton Island is located at latitude 67°33' N longitude 64°02' W at Elevation 15 m at the airstrip. It is 482 km north of Frobisher Bay and 2374 air km north east of Yellowknife in the Baffin Region. It is situated on Broughton Island, off the east coast of Baffin Island in Davis Strait. It is situated on a rock spur covered with glacial drift.

Existing Granular Resources and Assessment of Needs

A response to the questionnaire was received from the Hamlet of Broughton Island. The response indicated that the Hamlet was currently obtaining granular materials from six different pits. Information on the type of material in each pit, estimated quantity of aggregate remaining and the estimated life of each pit was provided and has been tabulated below.

Source #	Usage	Estimate Annual Consumption (m^3)	Estimated Quantity of Aggregate Remaining (m^3)	Estimated Life of Pit
1	Road construction, building parks, riprap	Varies	Not Quantified (95%)	To 2050
2	General fill	Not Determined	Not Quantified (30%)	Undetermined
3	General maintenance, fill	Not Determined	Not Quantified (98%)	To 2075
4 & 5	Road construction, building pads, maintenance	Unknown	Not Quantified (97%)	To 2075
6	General maintenance, fill.	Unknown	Not Quantified	Not Known
	It is noted that the material from sources 4 & 5 is produced by crushing blasted bedrock.			

A review of the above table indicates that sufficient quantities of fill suitable for road construction, building pads, riprap, and general maintenance is available to at least 2050 and beyond. However, it is noted that the quantities of each type of fill consumed on an annual basis or the estimated quantity of aggregate remaining is not known.

It is understood that the above information is based on an evaluation of the granular material deposits near Broughton Island, N.W.T. undertaken in 1981 by Terrain Analysis and Mapping Services located in Carp, Ontario. This report was made available to Trow. This report identified 21 aggregate sources

based on topographical examination of the aerial photos and subsequent field investigation. The study concluded that these sources contained approximately 750,000 to 1,153,000 m^3 of granular materials. This report listed borrow requirements for Broughton Island for 5 and 20 years to be 45,000 m^3 and 235,000 m^3 respectively.

Potential Granular Resources

Since substantial aggregate resources have already been identified by actual field searches, it was considered that a desktop study would not yield any additional useful information and therefore was not conducted. However, the geological information obtained, aerial photographs and the topographical map of the area have been included in the report as Drawings BI-1 to BI-3 inclusive.

Cape Dorset

Cape Dorset is located at latitude 64°14' N and longitude 76°32' W at Elevation 56 m at the airstrip. It is 402 air km south west of Iqaluit and 1891 air km north east of Yellowknife in the Baffin Region. It is situated on Dorset Island, off the Foxe Peninsula, southwest Baffin Island. It is situated in two valleys of the Kinngait Range of hills.

Existing Granular Resources and Assessment of Needs

The Hamlet of Cape Dorset's response to the questionnaire indicates that a Granular Resource Management Plan was prepared for Cape Dorset in 1998 by the Department of Public Works and Services, Yellowknife, NT and Municipal and Community Affairs, Iqaluit, NT. A copy of this report was made available to Trow Associates Inc. The plan was based on two previous investigations conducted in September 1998 and August 1993.

The plan conservatively estimated that 37,530 cubic metres of granular material will be available from the resources identified. The granular need for all grades from 1997/98 to 2001/02 was estimated to be 19,050 cu.metres and from 2002 to 2008 to be 10,000 m^3. Consequently, the Hamlet currently has identified granular resources that will last beyond the Year 2008.

Potential Granular Resources

The geological information gathered for Cape Dorset is given on Figure CD-1. This drawing indicates that majority of the island is comprised of gneissic granitic rocks with very little overburden. Stereoscopic examination of the air photos identified one area of colluvium which may be suitable as granular resource (Figure CD-2). The area has also been plotted on the topographical map (Figure CD-3). This area is expected to comprise of colluvium i.e. coarse grained material which has moved down slope mainly through gravity. The use of this material for production of select grades is expected to require screening and crushing. It is noted that a road leads to the area identified. Since a plan showing all the areas identified by the previous studies was not provided, it is not possible to establish whether this potential source has previously been identified. If this area was not previously identified, its suitability, as a potential granular source should be investigated. If this potential source proves unsuitable for making select grades, it is likely that the bedrock may have to be used to produce select grades. Excavation of the bedrock would require blasting. In addition, the blast shattered bedrock would have to be crushed and screened to obtain the select grade materials.

Clyde River

Clyde River is located at latitude 70°28' N and longitude 68°36' W at Elevation 61 m at the airstrip. It is 740 air km north of Iqaluit and 2153 air km north east of Yellowknife in the Baffin Region. It is located on the west shore of Patricia Bay on the east coast of Baffin Island near Cape Christian. It is situated on a shallow gravel ridge on a south facing slope surrounded by hills.

Current Sources and Future Needs

A response to the Trow questionnaire was not received from the Hamlet of Clyde River. Consequently, information on the current resources of the granular materials, quantities available and the future requirements of the community is not available.

Potential Granular Resources

The potential granular resources were located based on a review of the geological maps (Figure CR-1) and a stereoscopic examination of the aerial photos (Figure CR-2). The stereoscopic examination of the aerial photographs identified three areas of till located close to the Hamlet. In addition, six alluvium areas were identified. Four of these areas are located along the watercourse located on the east side of the airport. The other two areas are located along the south bank of Clyde River close to its discharge into the Patricia Bay. These potential granular resources have been plotted on topographical map of the Hamlet (Figure CR-3). Of the two types of potential granular resources identified, the alluvial deposits have greater potential of yielding good quality select grade material. Production of the select grades may require screening and crushing. The till deposits are expected to be a heterogeneous mixture of clay, silt, sand, gravel, cobbles and boulders. The suitability of the till for making select grades would depend on the gradation of the till. It is likely that the cobbles and boulders from the till can be crushed to make select grades.

No information was available regarding the existing aggregate sources in the Hamlet and it is not known whether any of the identified sources are currently in use.

It is noted that the till deposits are located close to the Hamlet and to existing roads and would therefore be readily accessible. The alluvium areas which are located at the mouth of the Clyde River are also expected to be readily accessible since air photos indicate that temporary gravel roads exist in this area. The alluvial sources located east of the air field are some 900 m to 1300 metres from existing temporarily roads and therefore are not readily accessible.

It is recommended that the potential granular resources located just north of the Hamlet and the ones located at the mouth of the Clyde River should be investigated further by obtaining and testing samples in order to assess their suitability for making select grades.

Grise Fiord

Grise Fiord is located at latitude 76°25' N and longitude 85°54' W at Elevation 44.6 m at the airstrip. It is 383 air km north east of Resolute and 1931 air km north east of Yellowknife in the Baffin Region. It is situated on the southern coast of Ellesmere Island on Jones Sound, north of Devon and Baffin Islands. It is located at the fiord entrance on a narrow strip of beach and low benches with bare rock mountains rising abruptly in the rear.

Current Sources and Future Needs

No response was received to the Trow questionnaire from the Hamlet of Grise Fiord. It was therefore not possible to assess the current resources, quantities available and future needs of the Hamlet.

Potential Resources

The potential aggregate sources were located based on examination of the geological map of the area and the stereoscopic examination of the aerial photos. The geology map available for this area is shown on Figure GF-1. This drawing indicates that beach deposits are located along the shoreline and at the mouth of the two watercourses that discharge into the sea. One of the watercourse is located between the residential development of the Hamlet and the airstrip. The second watercourse is located west of the airstrip. The remainder of the landmass comprises of granite bedrock.

Stereoscopic examination of the aerial photographs (Figure GF-2) indicated that deltaic deposits comprising of till and/or alluvium are located along the two water courses. These deposits are considered to be a potential granular sources. The exact composition of the alluvium and/or till would have to be established by field sampling and testing. In addition to the till and/or alluvium deposits, moraines are located between the two watercourses. The moraines are expected to be less suitable as granular resources compared to the alluvium and/or till deposits.

It is noted that the easterly alluvium and till source is located within the Hamlet and therefore should be readily accessible. The westerly source is currently not accessible although it is located close to an existing road. Construction of an access road would be necessary if this resource is found to be suitable as an aggregate source.

It is recommended that the potential granular resources identified should be investigated further by obtaining and testing samples in order to assess their suitability for making select grades.

Hall Beach

Hall Beach is located at latitude 68°46' N and longitude 81°13' W at Elevation 7.9 m at the airstrip. It is 840 air km north west of Iqaluit and 1650 air km north east of Yellowknife in the Baffin Region. It is situated on the east shore of the Mellville Peninsula, on the western side of Foxe Basin. It is located on sand and gravel raised beaches, with flat to gently rolling terrain studded by numerous lakes and ponds.

Current Resources and Future Needs

A response to the Trow questionnaire was not received from the Hamlet inspite of various reminders. Consequently, it was not possible to determine the current granular resources, quantities available or the future needs of the Hamlet.

Potential Granular Resources

The surficial geology map of the area has been presented as Figure HB-1.

The geological map indicates that non-glacial deposits of gravel and boulders are located along the shoreline. These deposits extend to the north as well as south of Hall Beach Hamlet. The flights of gravel and shingle beaches are derived from shattered limestone. As such, this material is expected to be a suitable granular resource. It is noted that glaciomarine deposits are located adjacent to and west of the coastal non-glacial deposits. These deposits comprise of stony sandy silt or stony clay and are expected to be less suitable for making select grades compared to the offshore deposits.

Since the majority of the material is expected to be coarse (gravel, cobbles and boulders), this material would have to be crushed and screened in order to obtain select grades required for use as road base and for making asphaltic concrete and concrete.

It is noted that the non-glacial deposit area contains a network of roadways and most of the area is readily accessible. However, this area is also developed and as a result only limited areas may be available as potential aggregate resources. Potential areas may be located along the coast south of the water reservoir, east of the airfield and south of Kingnitokvik point. It is recommended that the Hamlet should identify locations within the identified areas which are available as potential aggregate resources for further investigation. The investigation should comprise of sampling and testing the sources to assess their suitability for making select grades.

Igloolik

Igloolik is located at latitude 69°23' N and longitude 81°48' W at Elevation 53 m at the airstrip. It is 362 air km north east of Repulse Bay and 1641 air km north east of Yellowknife in the Baffin Region. It is located on Igloolik Island in Foxe Basin lowlands bounded on the north by Fury and Hecla Straits and separated on the south from the main land by Hooper Inlet. The topography comprises of limestone bedrock covered with muskeg and ponds. The settlement area is underlain by sand and gravel.

Current Sources and Future Needs

A reply to the Trow questionnaire was not received from the Hamlet of Igloolik. Therefore, it was not possible to document existing granular resources, quantities available or future needs of the Hamlet.

Potential Granular Resources

The potential granular resources were located based on an examination of the geological maps and aerial photos. The geological information for the area is presented on Figure I-1 whereas the aerial photos are shown on Figure I-2. Figure I-1 indicates that the non-glacial deposits of gravel, cobbles and boulders and are located along the coastline and extend some distance inland. These areas are considered to be potential granular resources. However, the material is expected to be coarse and would require crushing and screening in order to obtain select grades for use as road base and for making asphaltic concrete and concrete. The area west of the non-glacial deposit contains glacio-marine deposits (moraines). These deposits are expected to be less suitable as granular resources compared to the non-glacial deposits, since they are expected to contain varying amounts of clay and silt.

It is noted that the north-south road is located on the non-glacial deposit and as such the area is readily accessible.

It is recommended that the Hamlet should identify potential areas located in the non-glacial deposit that are available for use as granular resources. These areas should be further investigated by field sampling and testing to determine their suitability as select grades.

Lake Harbour (Kimmirut)

Lake Harbour is located at latitude 62°51' N longitude 69°53' W at elevation 61 metres at the airstrip. It is 120 km south of Frobishor Bay and 2245 air km north east of Yellowknife, in the Baffin Region. It is located at the head of a narrow inlet, on south shore of Meta Incognita Peninsula, southern Baffin Island. It is situated on a hummock about a metre above sea level surrounded by high hills with a beach primarily of exposed bedrock.

Current Resources and Future Needs

A response to the Trow questionnaire was not received from the Hamlet. It was therefore not possible to document existing sources, quantities available or future needs of the Hamlet.

An aggregate study for the Hamlet of Kimmirut was undertaken in 2001 by Ferguson, Simek Clark, Engineers and Architects, for the Government of Nunavut. This study was made available and was reviewed. The study identified six existing deposits namely Deposit Nos. 1, 1A, 2, 3, 3A, 4, 5 and 6.

Deposit No. 1

Deposit No. 1 is located west and south of the Petroleum Storage compound in the southeast area of the Hamlet. The pit contains sand with large 0.3 m to 0.6 m size boulders. The open face of the pit is reported to be approximately 2 to 3 in height and 400 m long. The sand lacks binder material and therefore is not ideal for road surfacing.

Deposit No. 1A

Deposit No. 1A is located south of the new graveyard on the hill and approximately 750 m west of the fuel storage yard. This pit is reported to be close to being fully depleted except for a small stockpile that existed on the site at the time of the investigation.

Deposit No. 2

This deposit is identified as the white rock quarry north east of the new water pumping station on the water supply lake. It is reported that the aggregate from this quarry was used for the new petroleum storage facility and for the new pumping station. The production of the aggregate is expensive due to blasting and crushing requirements. However, the end product is reported to be very popular as a street and road surfacing material. This has been identified as a potential source of aggregate for any large project in the Hamlet.

Deposit No. 3

This has been identified as a major local granular deposit north west of the new arena. It is reported that fifteen years ago the westerly rock dome area was blasted and left untouched for years. The pit has

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been used as a gravel source for several years. In recent years, the blasted rock has been mined for granular fill. This has been identified as a future source for Hamlet usage over the next three to four year but would require blasting to procure the aggregate.

Deposit No. 3A

This deposit comprises of a red sandy knoll located 100 m north of Deposit No. 3. There is a limited supply of red sand that has sufficient binder material to produce surfacing gravel. However, the supply of aggregate in this deposit is limited. A long range plan would be to carry out wide space blasting operations to break up some of the fractured bedrock.

Deposit No. 4

This deposit has been described as the toe of a small rock mountain. The talus slope is composed of deteriorated and weathered rock from the mountain. The aggregate is mainly coarse rock with some fines suitable for road construction. It is reported that this material can be excavated with a hoe ram or by blasting.

Deposit No. 5

This deposit is located north west of the road to the new municipal dump and comprises of a talus slope. However, it is reported that this source is 90 % depleted and that there are some environmental risks associated with keeping this deposit active. The useful remaining aggregate has been estimated to be 100 cu metres approximately.

Deposit No. 6

The source is located one kilometre west of the new arena on the right hand side of the Reversing Falls road. This deposit was used extensively in the summer of 2001. However, the report concludes that this source has now been depleted and recommends an additional investigation in this area.

New Deposit No. 1

The study also identified a new deposit. It is reported that this area is located one kilometre in a south easterly direction from the new dump road. There is no access road to this area and an attempt to mobilize a dozer to the site failed. The report stipulates that there is approximately 1000 metres of granular deposits in this area with a width of 100 m to 150 m. It has been estimated that there is the potential for 5 to 10 years' supply of granular material for Hamlet use.

look!!

1.75 km

New Deposit No. 2

The study identified a second new deposit located 750 m up the sloping ground from Deposit No. 6 but would require construction of an access road. It has been estimated that this deposit has the potential of yielding 35,000 to 50,000 cu. metres of aggregate.

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The study concluded that potential sources of granular materials for the Hamlet use for the next 10 to 20 years have been identified. Consequently, an aerial photo search of this area was not undertaken. The geological information gathered for this site has been presented on Figure LH-1. The aerial photo has been included as Figure LH-2. The topographical map of the area is given on Figure LH-3.

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Pangnirtung

Pangnirtung is located at latitude 66°09' N longitude 65°43' W at Elevation 25 m at the airstrip. It is approximately 298 km north of Frobisher Bay and 2333 air km north east of Yellowknife in the Baffin Region. It is situated on the southeastern shore of Pangnirtung Fiord, Cumberland Sound, Baffin Island. It is located on the remains of a tidal beach, old river delta and glacial drift. It is bounded on the north and west sides by fiord, by steep hills on the south and by the Kolik River on the east.

Granular Resources and Future Needs

A response to the survey was not received from the Hamlet. Therefore, information on existing aggregate resources, quantities available and future needs could not be assessed.

Potential Granular Resources

The potential granular resources were located based on a review of the geological maps and an examination of the aerial photos.

The various soil deposits identified are shown on Drawing No. P-1. A review of this drawing indicates that a deposit of deltaic gravel, sand and silt is located along the coastline and is more than 10 m in thickness. This deposit is expected to provide a good source of granular materials. Potential areas include south of the airport and along the coast between the Hamlet and the dump.

The surficial deposit in the area south of the deltaic gravel, sand and silt deposit is till with a thickness of 1 m to 2 m. Typical composition of this material is reported to be 20 to 50 percent gravel, 60 percent or more sand and less than 10 percent silt or clay. This deposit is also considered to be a good source of granular materials although its thickness is limited. Potential areas of this deposit are expected to be located along the roadway going in south-easterly direction from the Hamlet. It is noted that existing roads are located within these deposits and therefore they should be readily accessible.

Stereoscopic examination of the aerial photos identified two alluvium fans located at the mouths of the streams that discharge into the Audatsivik Bay. These areas are located along the coast approximately 4.2 km and 4.9 km east of the Hamlet of Pangnirtung. The alluvial fans are expected to comprise of gravel, sand, silt and clay.

An area of collivium was identified located south of the first alluvium area identified. The colluvium is expected to comprise of boulders, cobbles and coarse gravel which has moved down slope mainly through gravity.

The stereoscopic examination also identified moraines located along the south slopes of Mount Duval. Of the three types of deposits identified, alluvium fans are expected to be the most suitable for production of select grades followed by the colluvium deposit and the moraines.

A review of the topographical map of the area indicates that none of these areas are currently accessible and construction of access roads would be required. This is expected to be relative ly easy for access to the alluvial fans compared to the colluvium or the moraines because of the relatively flat terrain.

It is recommended that the Hamlet should select a number of areas from the potential areas identified for further investigation. The investigation would comprise of obtaining representative samples and testing them to assess their suitability for use as select grades.

Pond Inlet

Pond Inlet is located at latitude 72°42' N longitude 77°59' W at elevation 57 m at the airstrip. It is located 525 km south east of Resolute and 1883 km north east of Yellowknife in the Baffin Region. It is situated on the southern shore of Eclipse Sound, facing Bylot Island, north Baffin Island. It is situated on a loamy sand terrace among considerable arctic vegetation near high glaciated mountains.

Current Resources and Future Needs

A response to the survey was not received from the Hamlet. It is therefore not possible to list existing granular resources, quantities available for future use or future needs.

Potential Granular Resources

The potential granular resources were located based on a review of the geological maps and an examination of the aerial photos. The geology map of the area (Figure PI-1) indicates that marine and glacial marine deltaic deposits are located close to the coastline. The remainder of the area in the vicinity of the Hamlet is covered with a till veneer.

It appears that most of the coastal area has been build on such that the marine and glacial marine deposits are unlikely to be available. The till veneer is expected to be less suitable compared to some of the other areas identified. The thickness of the till cover is not known but is expected to be relatively shallow. The till is expected to be a heterogeneous mixture of clay, silt, sand, gravel, cobbles and boulders. Depending on the composition of the till, it may be possible to separate the coarser material by sieving and crushing to obtain select grade materials.

The results of the stereoscopic examination of the aerial photos are given on Figure PI-2. Four alluvium areas were identified and are shown on this figure. Three of these areas are located on the till plain whereas the fourth area is located in the deltaic deposit. These deposits are expected to be a mixture of gravel, sand, silt and clay.

The four alluvium areas identified have been plotted on the topographical map of Pond Inlet (Figure PI-3) in order to assess the accessibility of these areas. It is noted that two of these areas are located south of the Hamlet east of the water pipeline. The topographical map indicates that an existing road terminates within 500 metres of this area. This area is therefore considered to be comparatively easily accessible. The other two areas are located approximately 1.3 km to 3 km from Pond Inlet and there are no existing roads leading to these areas. The access is therefore expected to be difficult and would require construction of temporary roads. Moraines were identified located some 3 kms south east of the Hamlet. These deposits are expected to be inferior in quantity compared to the alluvium deposits. They are also located further away from the hamlet and would be difficult to access.

It is recommended that the potential aggregate sources identified should be further investigated by obtaining and testing soil samples to assess the suitability of these resources for select grade materials.

Resolute

Resolute is located at latitude 74°42' N and longitude 94°50' W at Elevation 67 m at the airstrip. It is 1651 air km north east of Yellowknife and 3444 air km north west of Montreal in the Baffin Region. It is situated on the north east shore of Resolute Bay on the south coast of Cornwallis Island, in the Queen Elizabeth Islands.

Granular Resources and Future Needs

A response to the Trow questionnaire was not received from the Resolute Hamlet. Therefore, no information is available on the current sources of aggregates, quantities available or the future requirements of the community.

Potential Aggregate Resources

Potential aggregate resources where established by examination of the geological map of the area and stereoscopic examination of the aerial photographs.

The review of the geology map (Figure R-1) indicates that marine deposit of gravel with varying amount of sand and silt (3a1) are located in the coastal area surrounding Resolute Bay. In addition, two areas of stratified gravel (4b) are located south to south east of the Hamlet. These areas are considered to be potential granular resources.

Examination of the aerial photos identified three alluvium fan areas located approximately 3 km north of the Hamlet (Figure R-2). In addition, two colluvium areas located approximately 2 km north east of the Hamlet were identified. An alluvium/till area is also located south of the colluvium areas. This area is quite extensive and has a good potential of yielding good quality granular material.

It is considered that areas 3a1 and 4a and b are likely to prove good granular sources for use as general fill and as granular base and sub-base material. Although the three alluvium areas located north of the Hamlet are good potential sources of aggregate, they are located some distance from the Hamlet and are not readily accessible. The colluvium and till/alluvium areas located north and east of the Hamlet are expected to be more accessible since review of the aerial photos indicates that an existing track is located in the vicinity of these areas.

It is recommended that the Hamlet should identify potential sources based on the information presented above for field sampling and testing.

Sanikiluaq

Sanikiluaq is located at latitude 56°32' N and longitude 79°14' W at elevation 33 m at the airstrip. It is 1024 air km south west of Iqaluit and 1282 air km north west of Montreal in the Baffin Region. It is situated near the north end of Flaharty Island, a large central island of the Belcher Islands in Hudson Bay on a strip bounded by Eskimo Harbour to the north and west and by Sanikiluaq Lake to the south. Typical arctic tundra vegetation predominantly mosses and lichens exist in this area.

Granular Resources and Future Needs

A response to the Trow questionnaire was received from the Hamlet of Sanikiluaq. It indicated that a study of the available aggregate sources was conducted in the Hamlet by EBA Engineering Consultant Ltd. This study identified various aggregate sources located west of the airstrip. This area is currently used as a local gravel pit.

The information provided also indicates that currently two gravel pits are located in the Hamlet. The material from Source #1 is identified as sand. The sand is screened and used as fill. The material obtained from Source #2 is gravel. This material is also screened and used as fill as well as for construction of the roads (i.e. as granular base and sub-base).

No estimates are available on the quantity of granular materials remaining. The Hamlet has estimated that the consumption from Source No. 1 to be in the order of 10 tons per year. The consumption from Source No. 2 is variable. In any event, the Hamlet is of the opinion that these two sources are likely to last until the year 2020.

Potential Aggregate Resources

Since the Hamlet has sufficient known granular reserves to satisfy their need to year 2020 and possibly beyond, a desktop study was not undertaken. Background information gathered for this site i.e. geological information, aerial photos and the topographical map have been included in the report as Figures S-1 to S-3 inclusive.

General Comments

We trust that the information contained in this report will be satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

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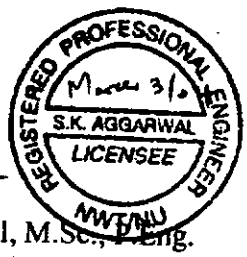

Surinder K. Aggarwal, M.Sc., P.Eng.
Principal Geotechnical Engineer
Assistant Branch Manager

Ismail M. Taki, M.Eng.
Manager
Geotechnical & Materials Testing Services

Drawings

FIG LH-1	JOB N° MA15364A	DRAWN NI	DATE JUNE 2003	SCALE 1:15,000	Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Tel: (613) 225-9940 Fax: (613) 225-7337

GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
LAKE HARBOUR - BEDROCK GEOLOGY

5/7

FIG LH-2	
JOB N°	MA15384A
DRAWN	NJ
DATE	JUNE 2003
SCALE	1:15,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
LAKE HARBOUR - POTENTIAL GRANULAR RESOURCES

6/7

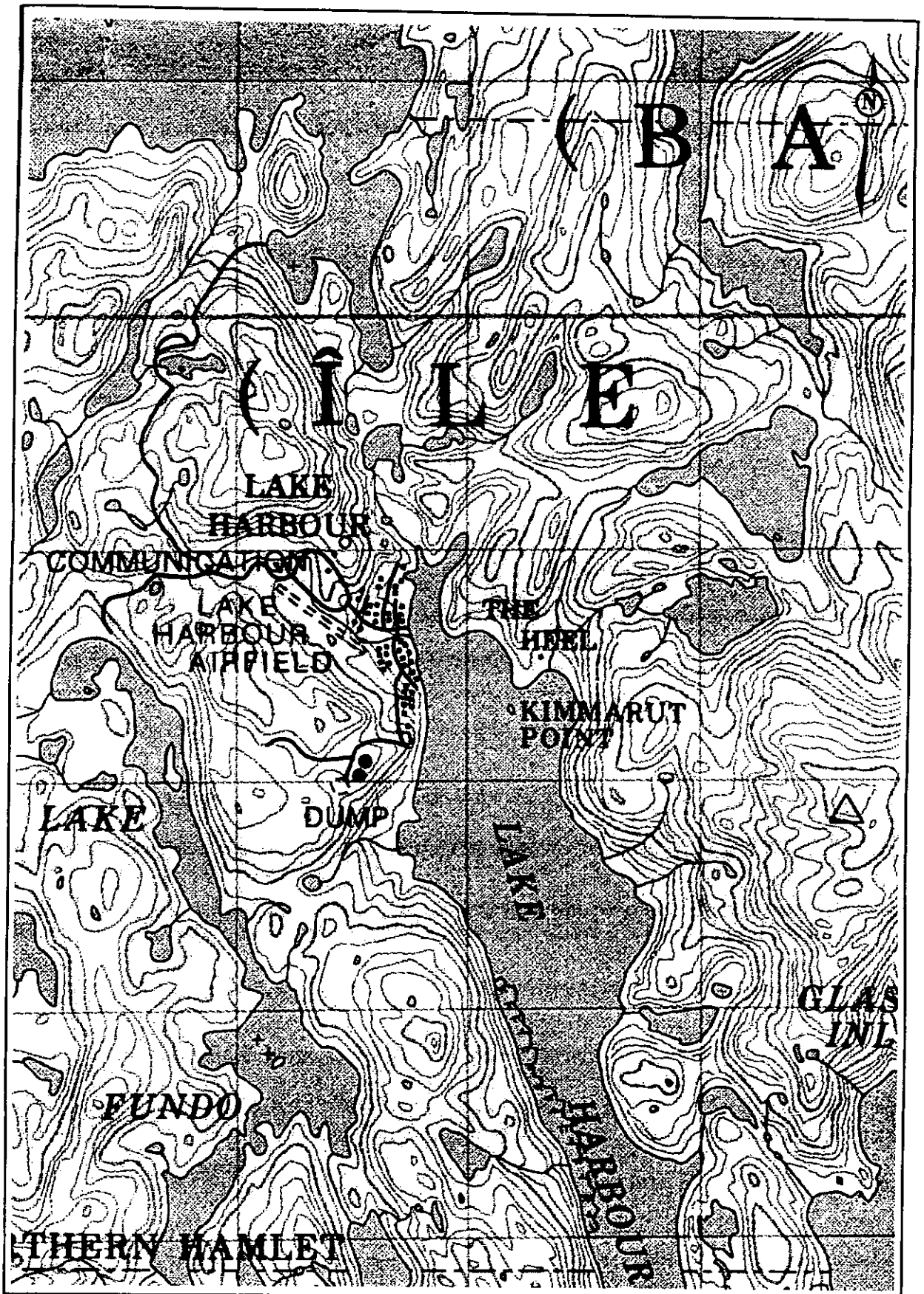
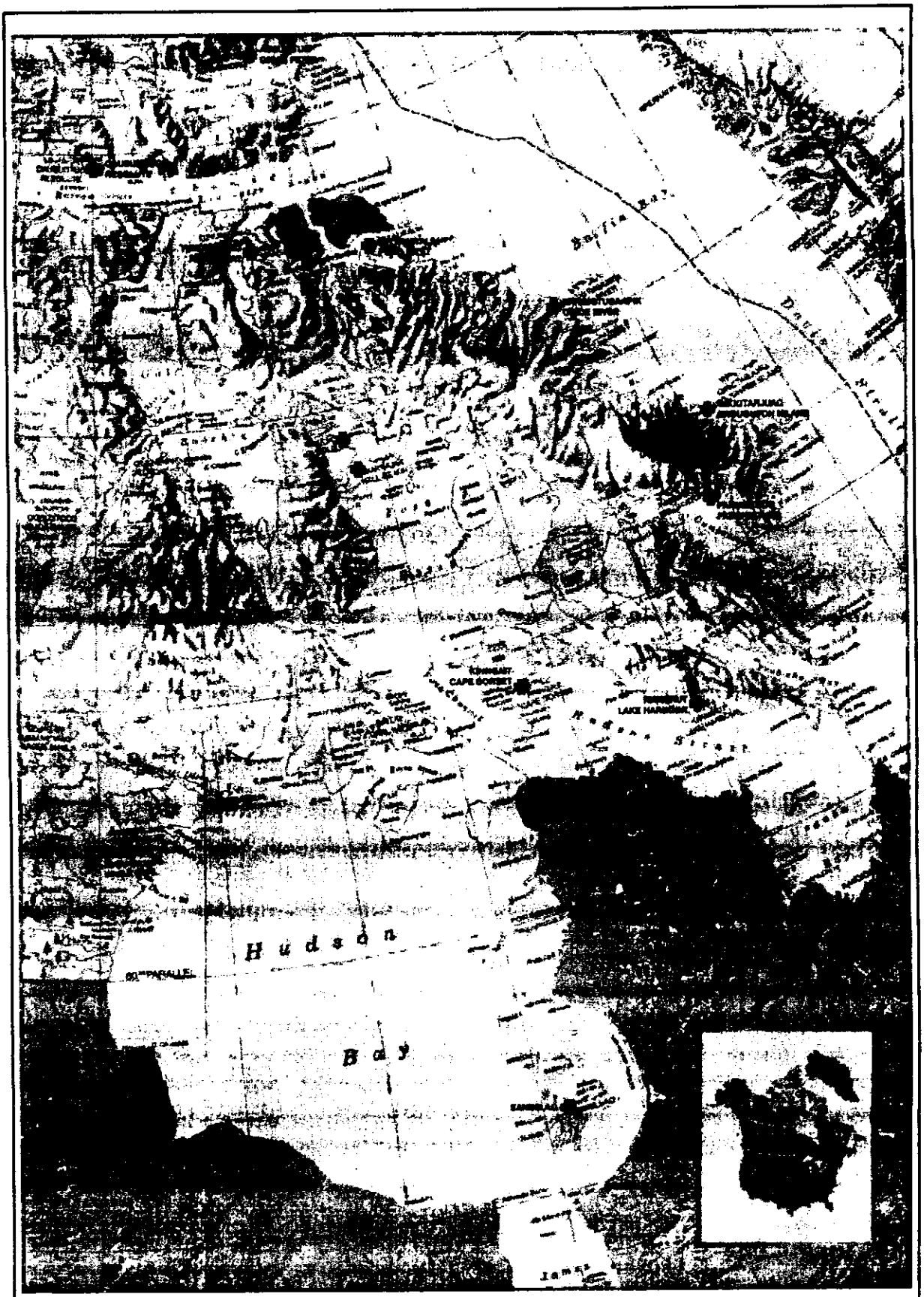


FIG LH-3	JOB N° MA15384A	DRAWN NI	DATE JUNE 2003	SCALE 1:15,000	Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Tel (613) 225-9940 Fax (613) 225-7337

GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
LAKE HARBOUR - POTENTIAL GRANULAR RESOURCES

7/7



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SCALE	1:710,000
DATE	FEBRUARY 2004
DRAWN	RD
JOB #	MA15384
FIG #	

GOVERNMENT OF NUNAVUT, BAFFIN REGION
GRANULAR RESOURCES MANAGEMENT STUDY PLAN OF COMMUNITIES STUDIED
● 12 COMMUNITIES , BAFFIN REGION, NUNAVUT, C ANADA

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
ARCTIC BAY - SURFICIAL GEOLOGY

SCALE	1:10,000
DATE	JUNE 2003
DRAWN	NI
JOB #	MA15364A

FIG AB-1

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
ARCTIC BAY - BEDROCK GEOLOGY

SCALE	1:10,000
DATE	JUNE 2003
DRAWN	NI
JOB #	MA15354A

FIG AB-2

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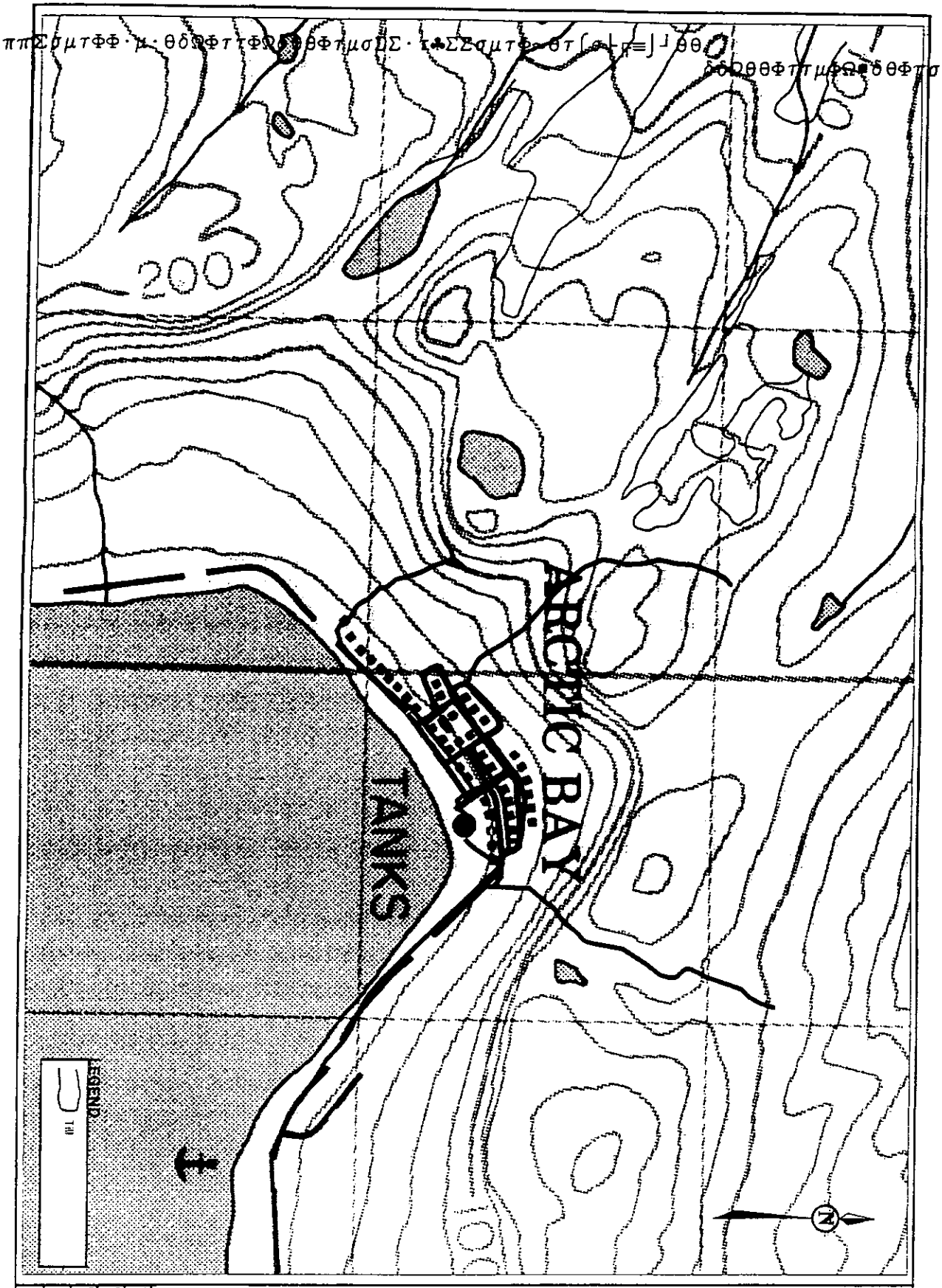
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
ARCTIC BAY - POTENTIAL GRANULAR RESOURCES

SCALE	1:10,000
DATE	JUNE 2003
DRAWN	NI
JOB #	MA153R4A

FIG AB-3



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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
ARCTIC BAY VICINITY - POTENTIAL GRANULAR RESOURCES

SCALE	1:10,000
DATE	JUNE 2003
DRAWN	MJ
EDIT#	MA1538AA

FIG AB-4

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
BROUGHTON ISLAND - SURFICIAL AND BEDROCK GEOLOGY

SCALE	DATE	DRAWN	JOB N°	FIG BI-1
1:20,000	JUNE 2003	NI	MA15384A	

Quarry sites, managed under quarry administration

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
BROUGHTON ISLAND - POTENTIAL GRANULAR RESOURCES

SCALE	DATE	DRAWN	JOB N°	FIG BI-2
1:20,000	JUNE 2003	NI	MA15384A	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
BROUGHTON ISLAND - POTENTIAL GRANULAR RESOURCES

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB #	MA15384A

FIG BI-3

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CAPE DORSET - BEDROCK GEOLOGY

SCALE	DATE	DRAWN	JOB #	FIG CD-1
1:20,000	JUNE 2003	NI	MA15384A	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CAPE DORSET - POTENTIAL GRANULAR RESOURCES

SCALE	DATE	DRAWN	JOB #	FIG CD-2
1:20,000	JUNE 2003	NI	MA15364A	

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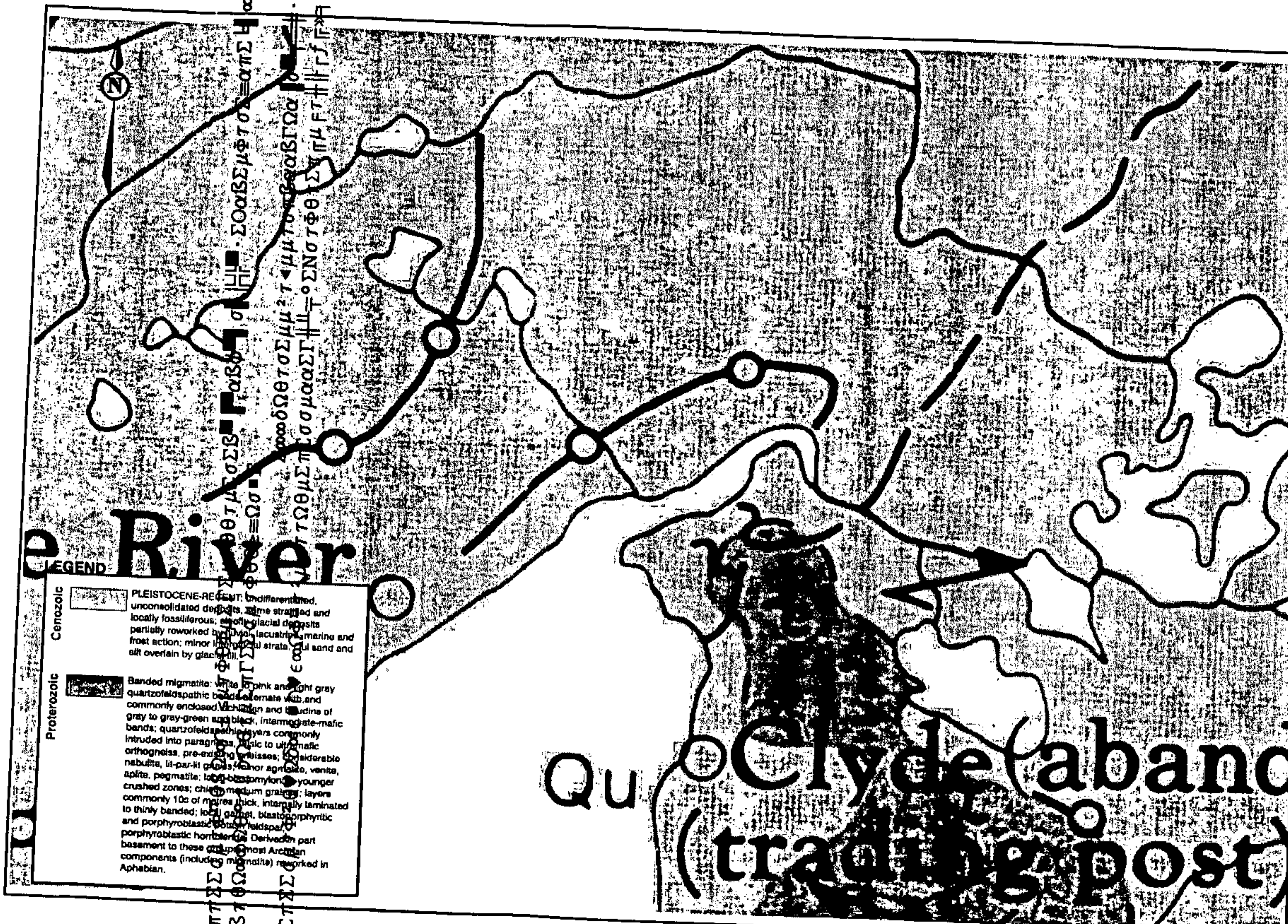
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CAPE DORSET VICINITY - POTENTIAL GRANULAR RESOURCES

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG CD-3


LEGEND
Cenozoic
PLEISTOCENE-RECENT: Undifferentiated, unconsolidated deposits, some stratified and locally fossiliferous; glacial deposits partially reworked by fluvial, lacustrine, marine and frost action; minor interbedded strata, mud sand and silt overlain by glacial till.
Proterozoic
Banded migmatite: white to pink and light gray quartzofeldspathic bands alternate with and commonly enclosed schlieren and boudins of gray to gray-green and black, intermediate-mafic bands; quartzofeldspathic layers commonly intruded into paragneiss, mafic to ultramafic orthogneiss, pre-existing gneisses; considerable nebulite, lit-par-lit gneiss, minor agmatite, venite, aplite, pegmatite; local blastomylonite younger crushed zones; chiefly medium grained; layers commonly 10s of metres thick, internally laminated to thinly banded; local garnet, blastoporphyritic and porphyroblastic potash feldspar, porphyroblastic hornblende. Derivation part basement to these groups, most Archean components (including migmatite) reworked in Aphebian.
River
Qu
Clyde (abandoned)
(trading post)
N

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CLYDE RIVER - BEDROCK GEOLOGY

SCALE	1:25,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG CR-1

LEGEND

Alluvium

Till

SCALE	1:25,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA18384A

FIG CR-2

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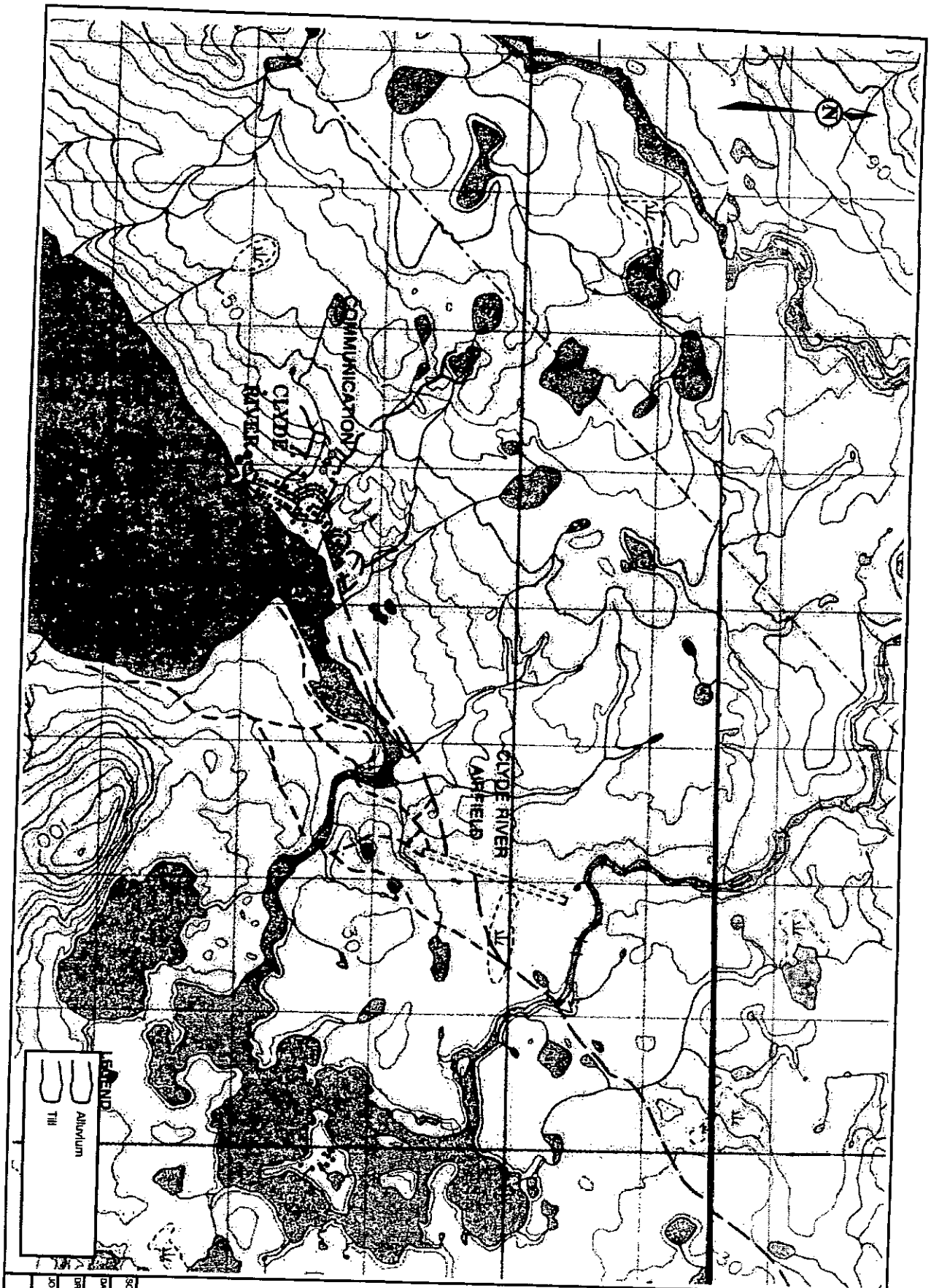
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CLYDE RIVER - POTENTIAL GRANULAR RESOURCES



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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CLYDE RIVER - POTENTIAL GRANULAR RESOURCES

SCALE	1:25,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG CR-3

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
GRISE FIORD - BEDROCK GEOLOGY

SCALE	DATE	DRAWN	JOB N°	FIG GF-1
1:10,000	JUNE 2003	NI	MP14831A	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
GRISE FIORD - POTENTIAL GRANULAR RESOURCES

SCALE	1:10,000
DATE	JUNE 2003
DRAWN	NI
JOB #	MA15344A

FIG GF-2

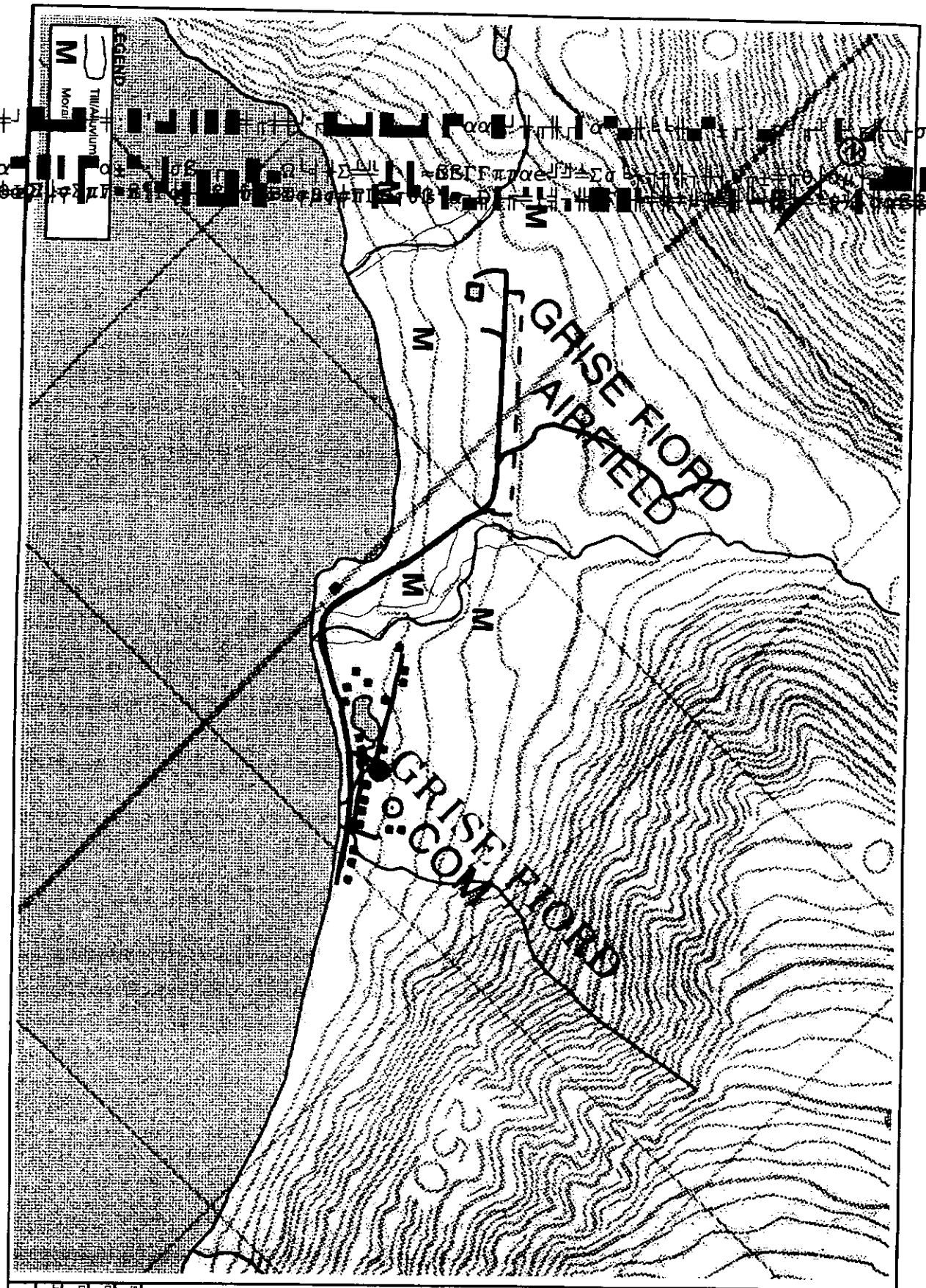

FIG GF-3	
JOB N°	MA15384A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:10,000

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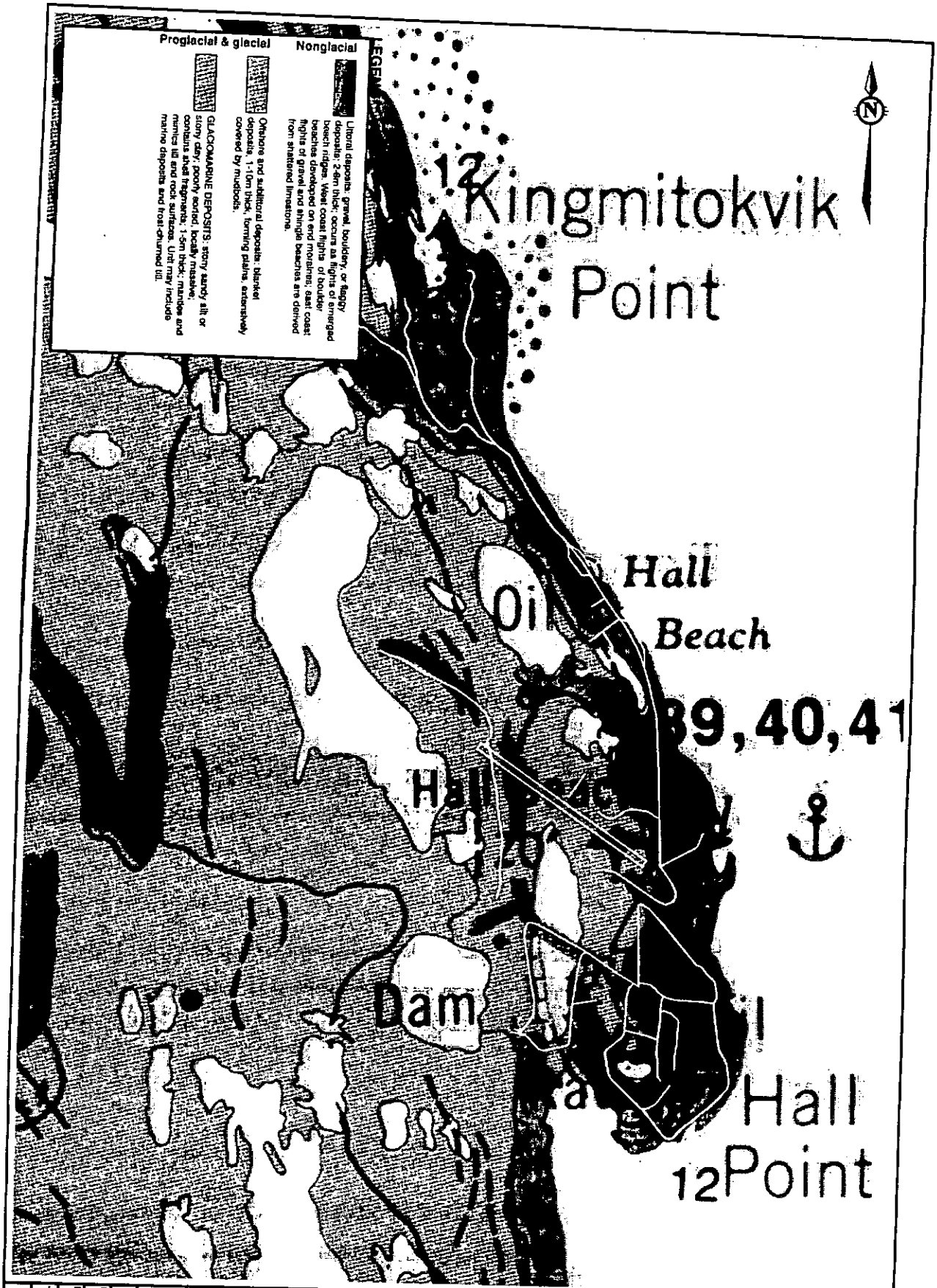
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
GRISE FIORD - POTENTIAL GRANULAR RESOURCES



SCALE	1:30,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A
FIG HB-1	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
HALL BEACH - SURFICIAL GEOLOGY

FIG HB-2	
JOB N°	MA15384A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:30,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
HALL BEACH - AERIAL PHOTOGRAPH

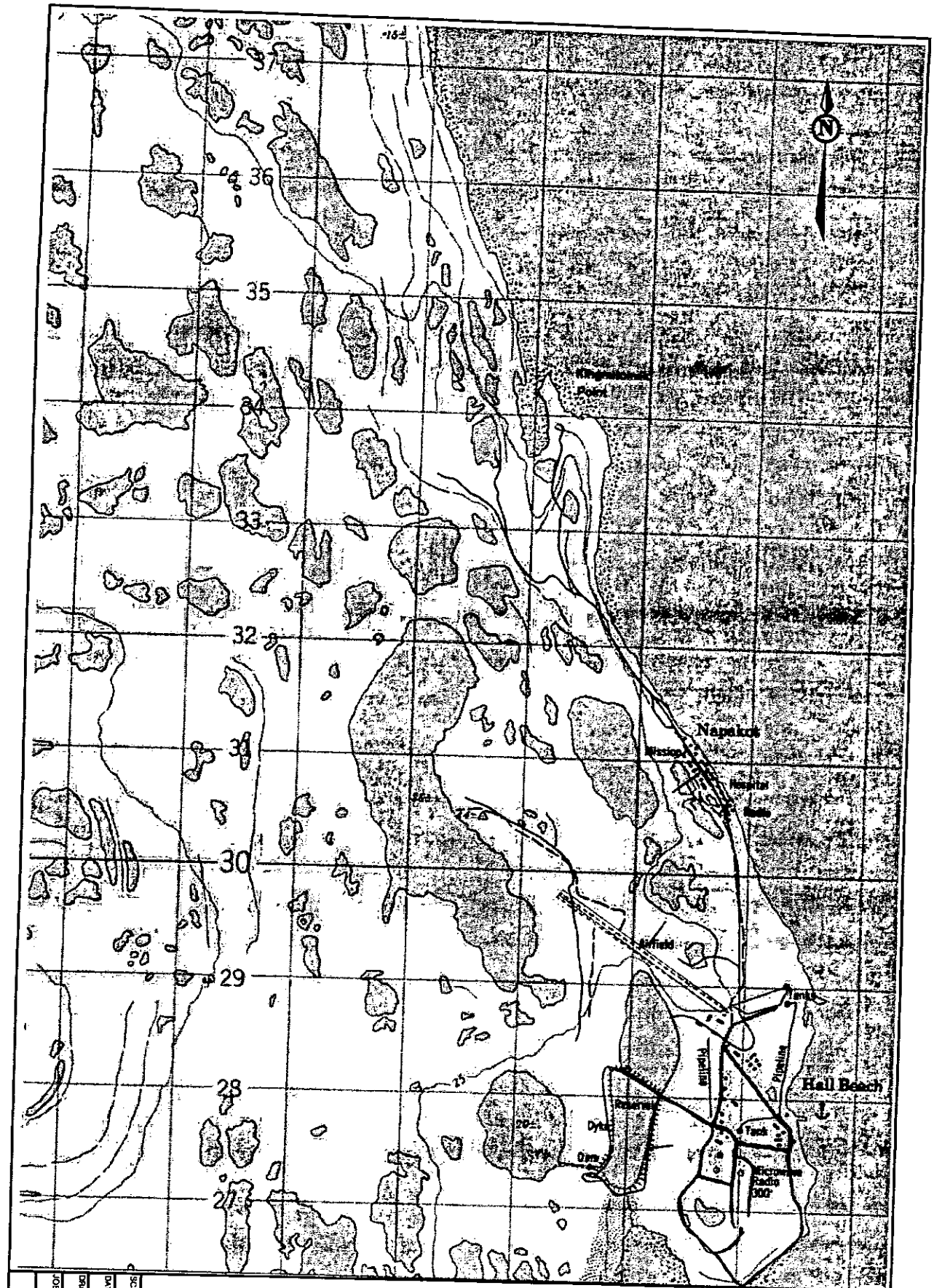

FIG HB-3	
JOB N°	MA15394A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:30,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
HALL BEACH

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
IGLOOLIK - GEOLOGY

SCALE	1:25,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG I-1

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
IGLOOLIK - POTENTIAL GRANULAR RESOURCES

SCALE	1:25,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG I-2

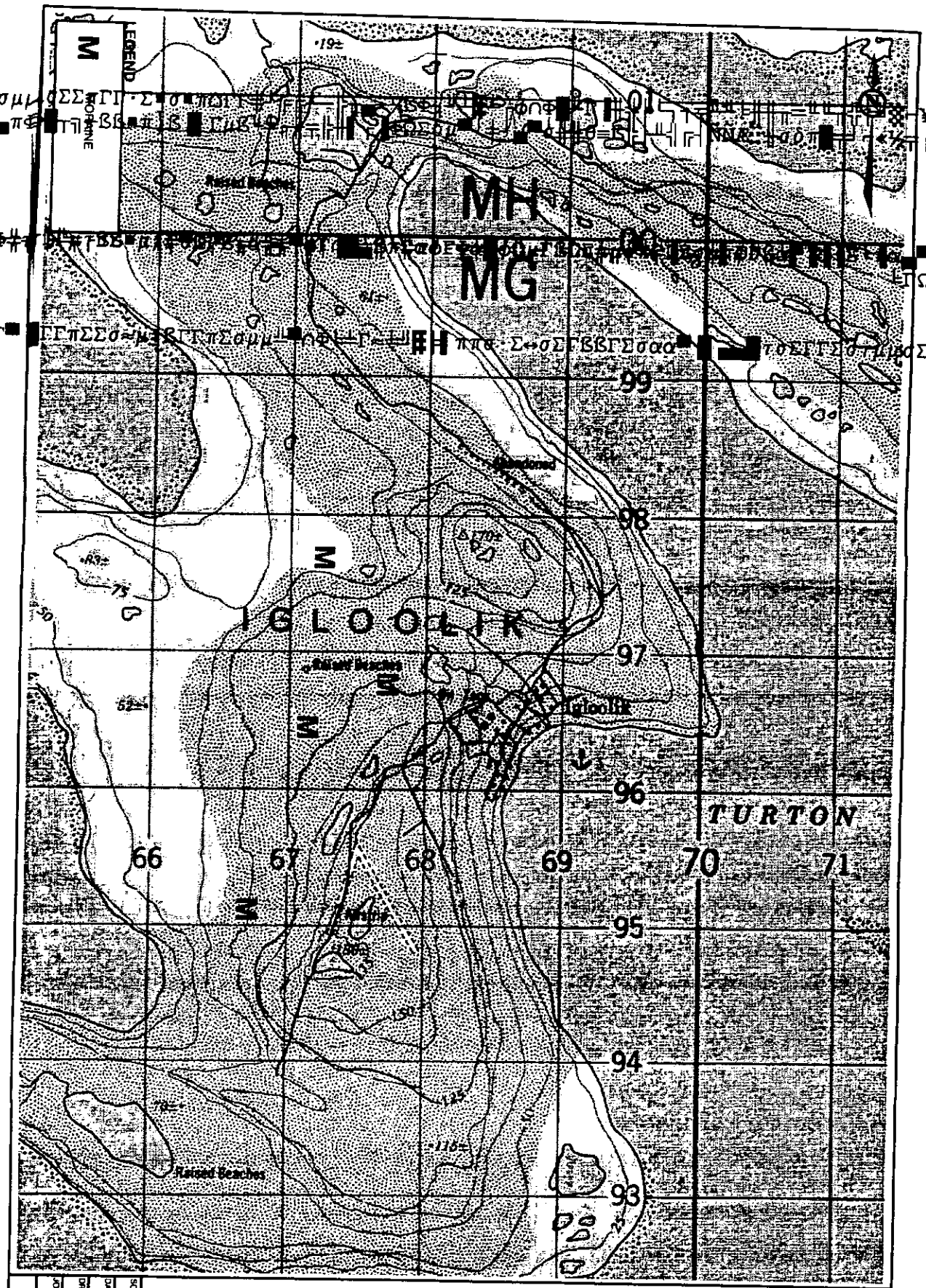

FIG I-3	
JOB N°	MA15364A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:25,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
IGLOOLIK - POTENTIAL GRANULAR RESOURCES

FIG LH-1	Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Tel: (613) 225-9940 Fax: (613) 225-7337
	GOVERNMENT OF NUNAVUT - BAFFIN REGION
	GRANULAR RESOURCES MANAGEMENT STUDY LAKE HARBOUR - BEDROCK GEOLOGY

SCALE	DATE	DRAWN	JOB N°
1:15,000	JUNE 2003	NI	MA15364A

FIG LH-2

JOB N°	MA15364A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:15,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
LAKE HARBOUR - POTENTIAL GRANULAR RESOURCES

Sep 08/06

Mr. Cecil, SAO

FIG LH-2

SCALE	1:15,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MAT5268A

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
LAKE HARBOUR - POTENTIAL GRANULAR RESOURCES

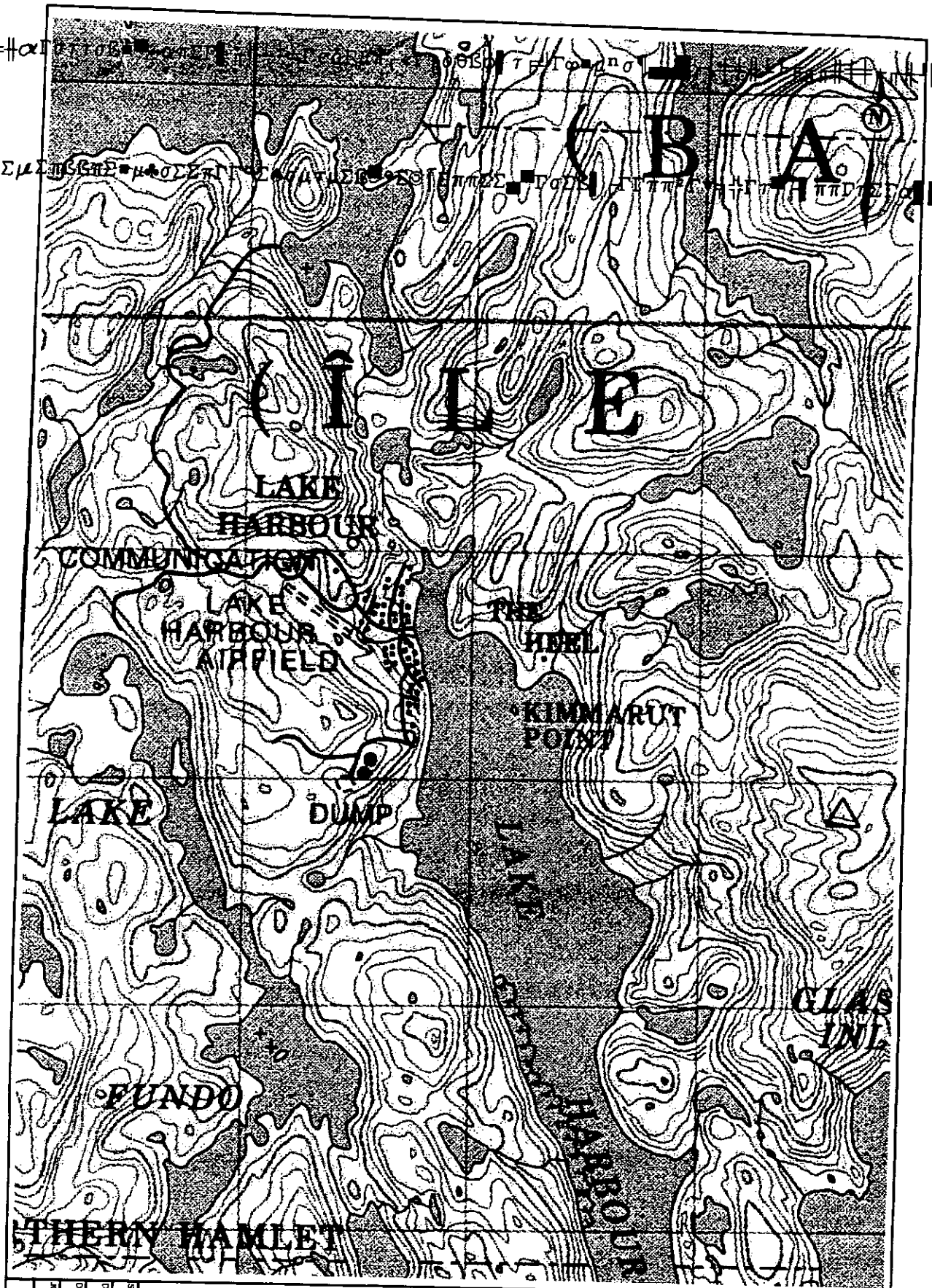

FIG LH-3	Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Tel: (613) 225-9940 Fax: (613) 225-7337
JOB N°	MA15384A
DRAWN	NI
DATE	JUNE 2000
SCALE	1:15,000

GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
LAKE HARBOUR - POTENTIAL GRANULAR RESOURCES

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
PANGNIRTUNG - GEOLOGY

SCALE	1:35,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG P-1

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
PANGNIRTUNG - POTENTIAL GRANULAR RESOURCES

SCALE	DATE	DRAWN	JOB N°
1:35,000	JUNE 2003	NI	MA15384A

FIG P-2

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
PANGNIRTUNG - POTENTIAL GRANULAR RESOURCES

SCALE	DATE	DRAWN	JOB N°	FIG P-3
1:35,000	JUNE 2003	NI	MA15364A	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
POND INLET - GEOLOGY

SCALE	DATE	DRAWN	JOB N°	FIG PI-1
1:20,000	JUNE 2003	NI	MA15384A	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
POND INLET - POTENTIAL GRANULAR RESOURCES

FIG PI-2

JOB N°	MA15384A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:20,000

FIG PI-3	
JOB N°	MA15364A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:20,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
POND INLET - POTENTIAL GRANULAR RESOURCES

R3 CARBONATE AND EVAPORITE: limestone, dolomite, gypsum, and anhydrite of Ordovician to Devonian age.

R2 CONSOLIDATED CLASTIC ROCK: sandstone, siltstone, shale, local argillaceous limestone of Ordovician to Devonian age.

2a Till, locally derived: silty or loamy, carbonate-rich diamicton clasts derived mainly from carbonates; locally includes shale and siltstone clasts and few erratics of southern provenance.

3a1 MARINE DEPOSITS: gravel, with varying amounts of sand, silt, 0.3-2m thick; deposited during periods of marine overlap in beach and nearshore environments. Raised beach deposits: coarse gravel, with varying amounts of sand and silt, forming a series of ridges and swales; generally less than 2m thick; clasts predominantly carbonate.

4b Older terrace deposits: stratified gravel s with minor interbedded sand and silt; terrace surface commonly patterned with high or low centre polygons; includes raised marine deltas.

4a Modern flood plain deposits: stratified gravel with local sand and silt; includes active braided channels and adjacent terraces, flooded each year.

5b Talus: coarse rock debris with a valuable amount of matrix; less than 1m to several metres thick; occurs at the base of cliffs.

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
RESOLUTE - GEOLOGY

SCALE	N.T.S.
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG R-1

LEGEND

- Colluvium
- Till
- Alluvia fan

SCALE	1:40,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG R-2

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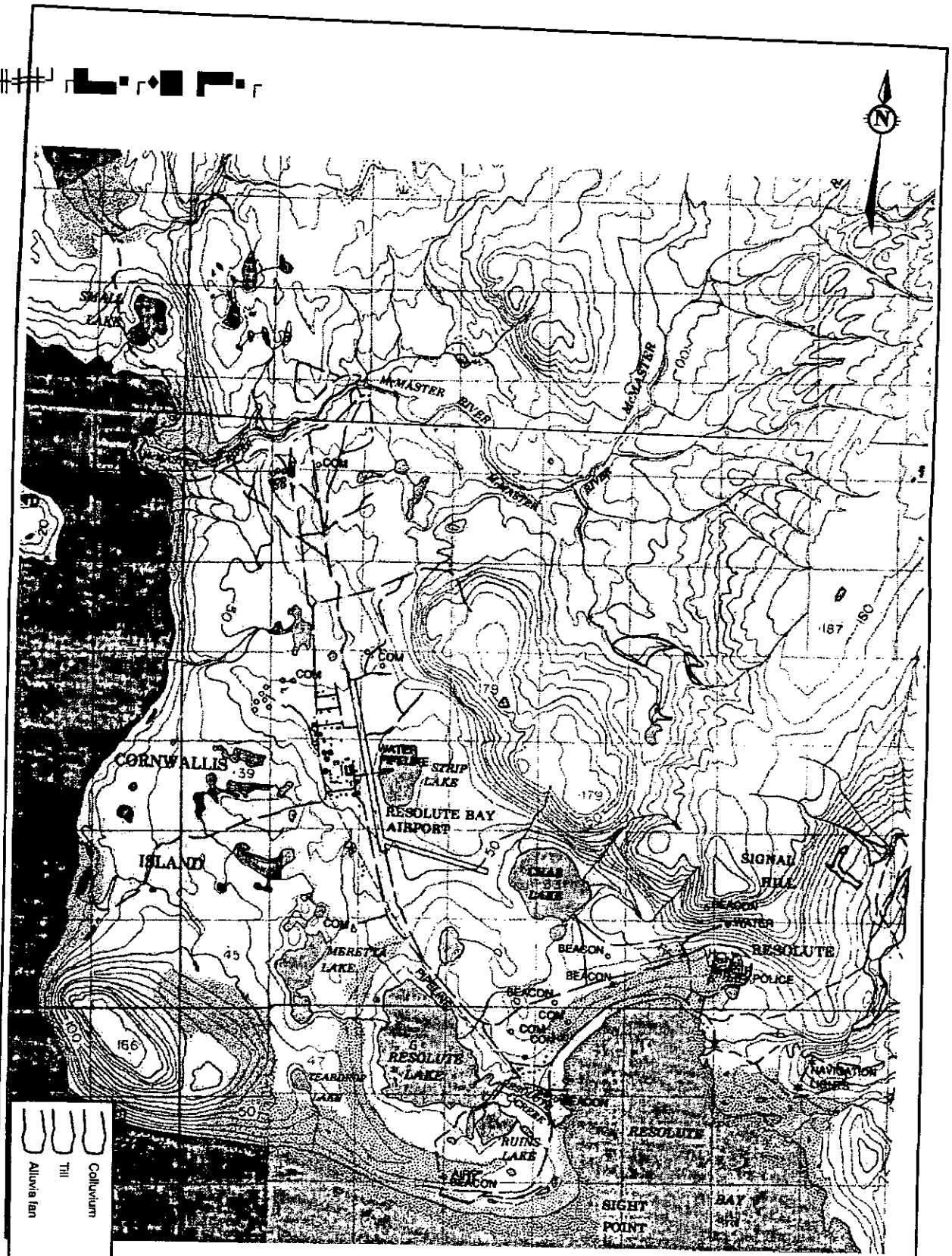
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
RESOLUTE - POTENTIAL GRANULAR RESOURCES



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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
RESOLUTE - POTENTIAL GRANULAR RESOURCES

FIG R-3	JOB N°	DRAWN	DATE	SCALE
	MA15384A	NI	JUNE 2003	1:40,000

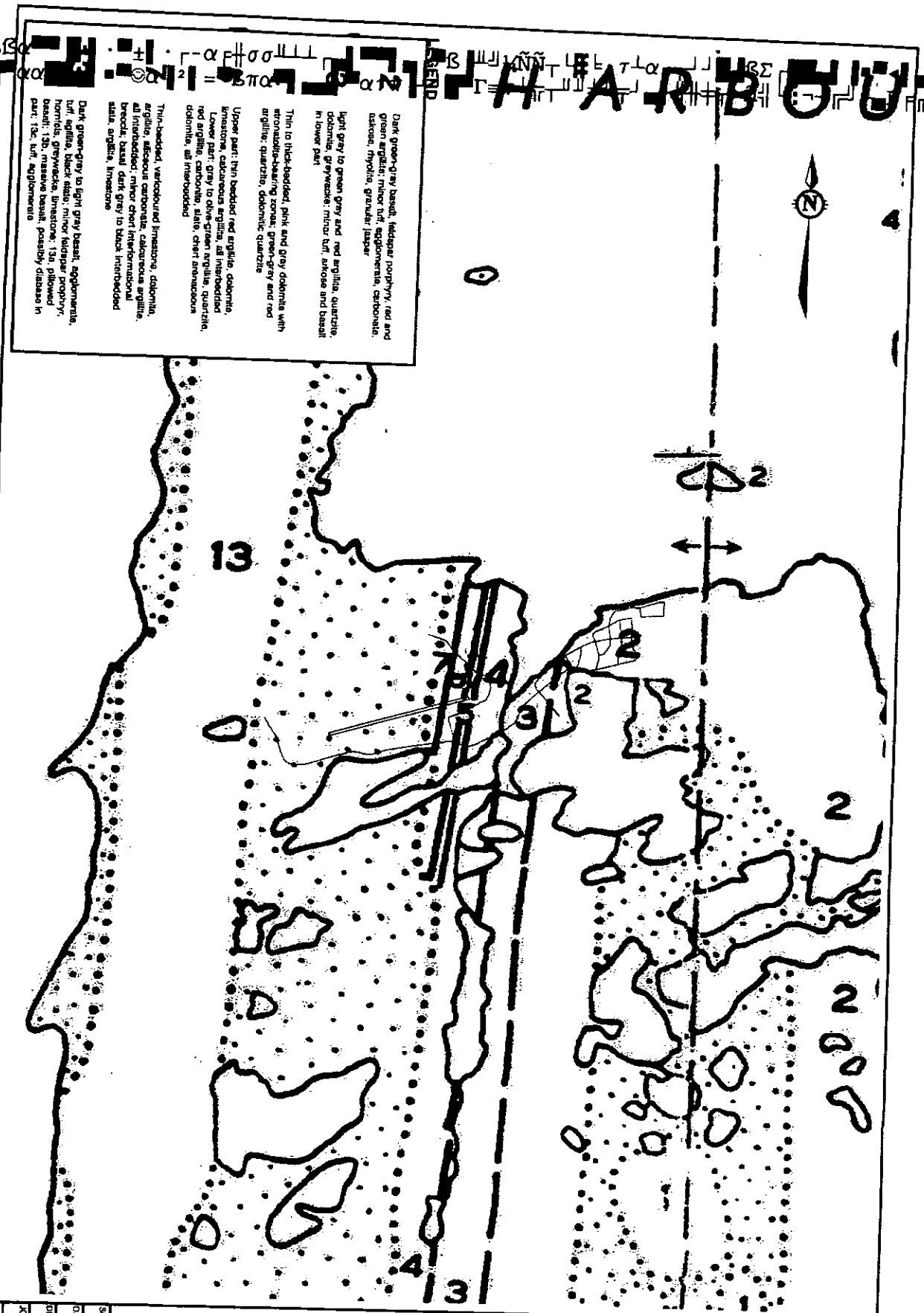

FIG S-1	Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Tel: (613) 225-9940 Fax: (613) 225-7337
JOB N°	MA15384A
DRAWN	M
DATE	JUNE 2002
SCALE	1:40,000

GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
SANIKILUAQ - BEDROCK GEOLOGY

FIG S-2	Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Tel (613) 225-9940 Fax (613) 225-7337
JOB N° MA15384A	GOVERNMENT OF NUNAVUT - BAFFIN REGION
DRAWN NI	GRANULAR RESOURCES MANAGEMENT STUDY SANIKILUAQ - EXISTING GRANULAR RESOURCES
DATE JUNE 2003	
SCALE 1:40,000	

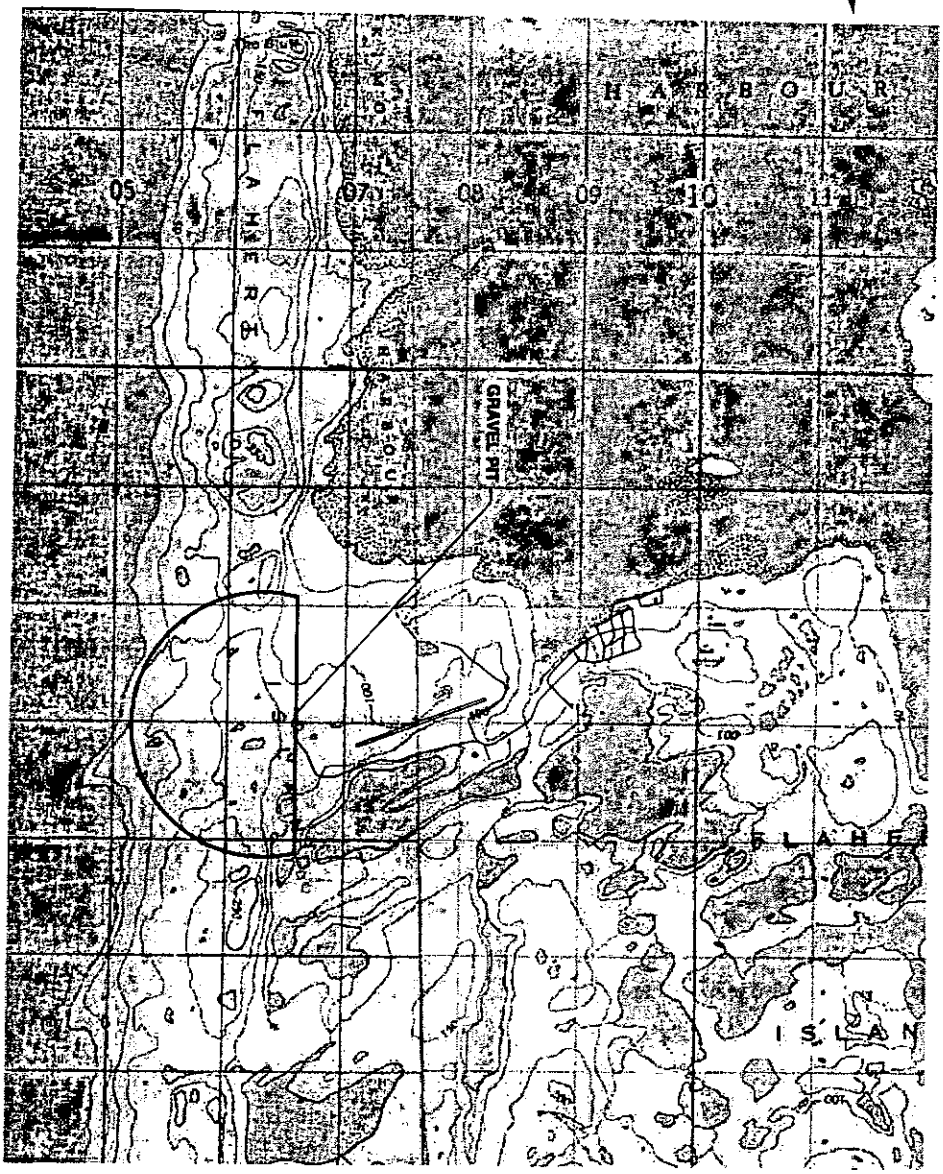

FIG S-3	JOB N° MA15384A	DRAWN NJ	DATE JUNE 2003

SCALE 1:40,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
SANIKILUAQ - EXISTING GRANULAR RESOURCES

Appendix 'A'

Trow Consulting Engineers Ltd.
Parent Company of Oliver, Mangione, McCalla & Associates
154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Telephone: (613) 225-9940
Facsimile: (613) 225-7337
E-mail: trow@trowot.com
Web Site: www.trow.com

Aggregate Resource Management Study
Questionnaire
12 Communities
Baffin Region, Nunavut

Overview:

Attached please find a questionnaire comprising of 4 pages, a topographical map sheet of your community, and an example topographic map sheet. We would appreciate that all questioned be answered. Please indicate "N/A" where the question is not applicable to your community, or if there is no information available to your knowledge to provide an answer to the question.

Your co-operation in completing this questionnaire is greatly appreciated. We look forward to receiving back your questionnaire.

Questionnaire:

Completed by: (Name)_____

Position, Title: _____

Mailing Address:_____

_____

Phone: (867)_____ Fax:(867)_____

Hamlet General Information:

A: Population Confirmation: __(_____)_____

B: Industries: _____

C: Water Supply and Location :_____

_____

1 –Topographic Map Sheet Data:

Please refer to the enclosed topographic map of your community and sample topographic map sheet for the following questions.

A: Please highlight the extent of your developed hamlet area on the topographic map of your community. Draw developed hamlet borders as close as possible to actual limits of your community as per example.

B: Considering topographic, and physical restraints (terrain, water bodies, road access) among others: please plot, a rough estimate representing the furthest extent for the practical consideration of any future aggregate (sand and /or gravel) resource areas as per sample map sheet.

C: Please identify the location and approximate extent of any existing pits or quarries (active or decommissioned) in your community as per enclosed sample sheet. Identify each source for future reference with a number or letter.

D: Now identify if there are any potential aggregate resource site(s) (if any) on the same map sheet; however, utilizing a different symbolization and numbering system as per sample sheet.

2- Existing Aggregate Resources:

A: Has there been any studies conducted on your available or potential aggregate sources in your community? YES_____ NO_____

If yes, please indicate the author, dates of reports and forward a copy to us.

_____

B: How many granular sources (pits and/or quarries) are currently active in your community?

Pits: _____ Quarries: _____

C: To the best of your ability, please summarize and describe each source location as identified on the topographic map sheet of your community according to the following criteria: (utilize additional data forms for any additional aggregate sources)

1- Source Number (as identified by yourself):_____

2- Pit or quarry source?_____

3- Estimated quantity of aggregate remaining? _____

4- What processing is involved ?(blasting, screening, stripping)_____

5- Describe the terrain. (Flat, rolling, steep etc.)_____

6- Material type (sand, sand & gravel, boulders, bedrock etc.):_____

7- Deposit or geological formation? (if known):_____

8- Typical uses in the community? (Roads, fill etc.)_____

9- Annual resource consumption? (tones per year)_____

10- Estimated life of pit or quarry? (final operating year)_____

Additional Forms for question 3-B

1- **Source Number** (as identified by yourself):_____

2- Pit or quarry source?_____

3- Estimated quantity of aggregate remaining? _____

4- What processing is involved ?(blasting, screening, stripping)_____

5- Describe the terrain. (Flat, rolling, steep etc.)_____

6- Material type (sand, sand & gravel, boulders, bedrock etc.):_____

7- Deposit or geological formation? (if known):_____

8- Typical uses in the community? (Roads, fill etc.)_____

9- Annual resource consumption? (tones per year)_____

10- Estimated life of pit or quarry? (final operating year)_____

1- **Source Number** (as identified by yourself):_____

2- Pit or quarry source?_____

3- Estimated quantity of aggregate remaining? _____

4- What processing is involved ?(blasting, screening, stripping)_____

5- Describe the terrain. (Flat, rolling, steep etc.)_____

6- Material type (sand, sand & gravel, boulders, bedrock etc.):_____

7- Deposit or geological formation? (if known):_____

8- Typical uses in the community? (Roads, fill etc.)_____

9- Annual resource consumption? (tones per year)_____

10- Estimated life of pit or quarry? (final operating year)_____

3- Future Resource Requirements:

A- What is the approximate annual consumption of each available granular resource type?(tonnes or volume) as per source number provided on topo sheet.

Source # - _____ = _____

Source # - _____ = _____

Source # - _____ = _____

Source # - _____ = _____

B- Is there an anticipated requirement for additional granular resources in the future? What type and approximate volume?

_____

_____

4- Archaeological and Environmental Considerations:

A- Has there been identified any archaeologically or environmentally sensitive regions within the area of consideration established on the topographic map in section number 1B (Impact to historic sites, flora or fauna species, and water bodies):

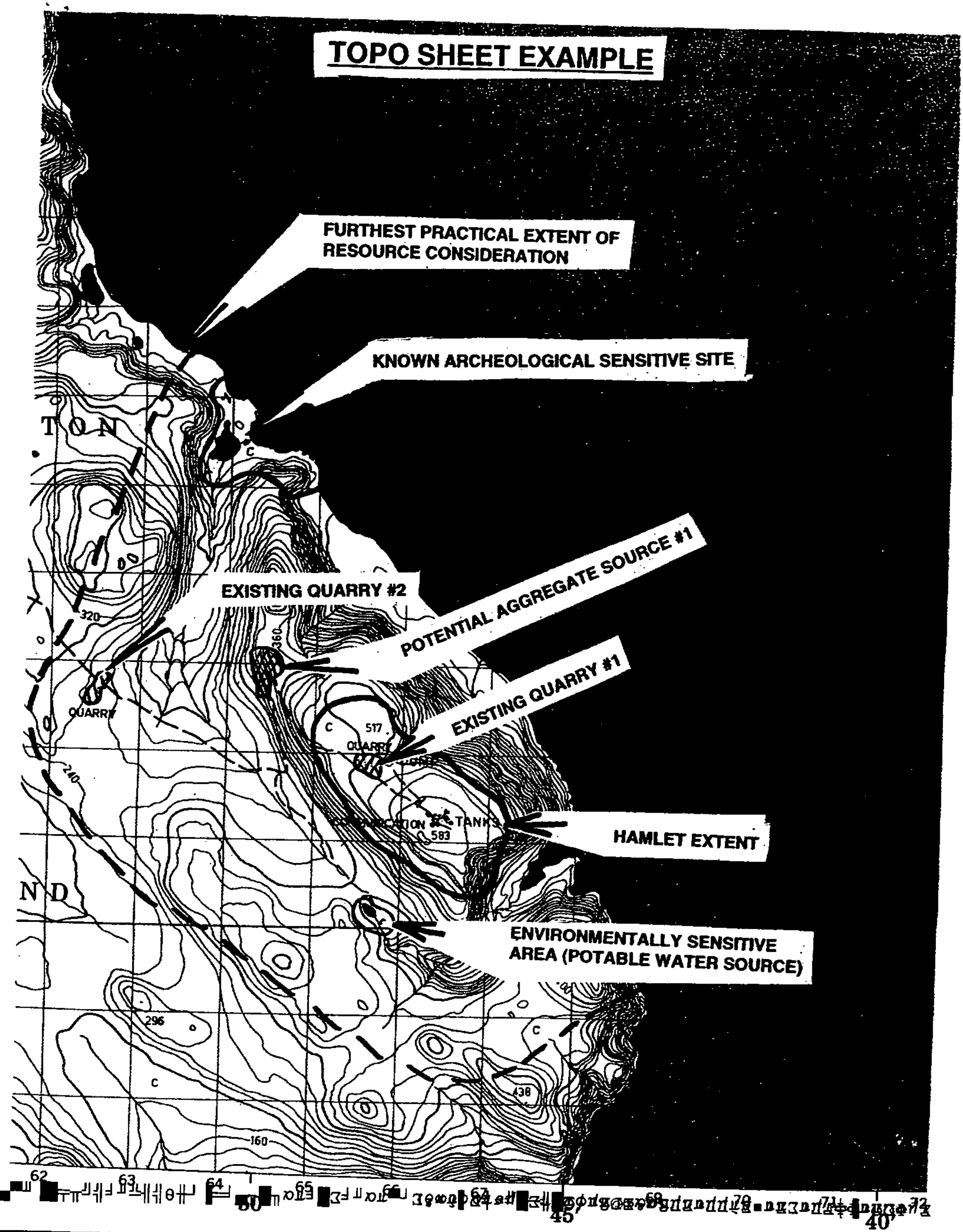
_____

If so, please plot the approximate location and extent on the community topographic map sheet and identify as such.

Thank-you,

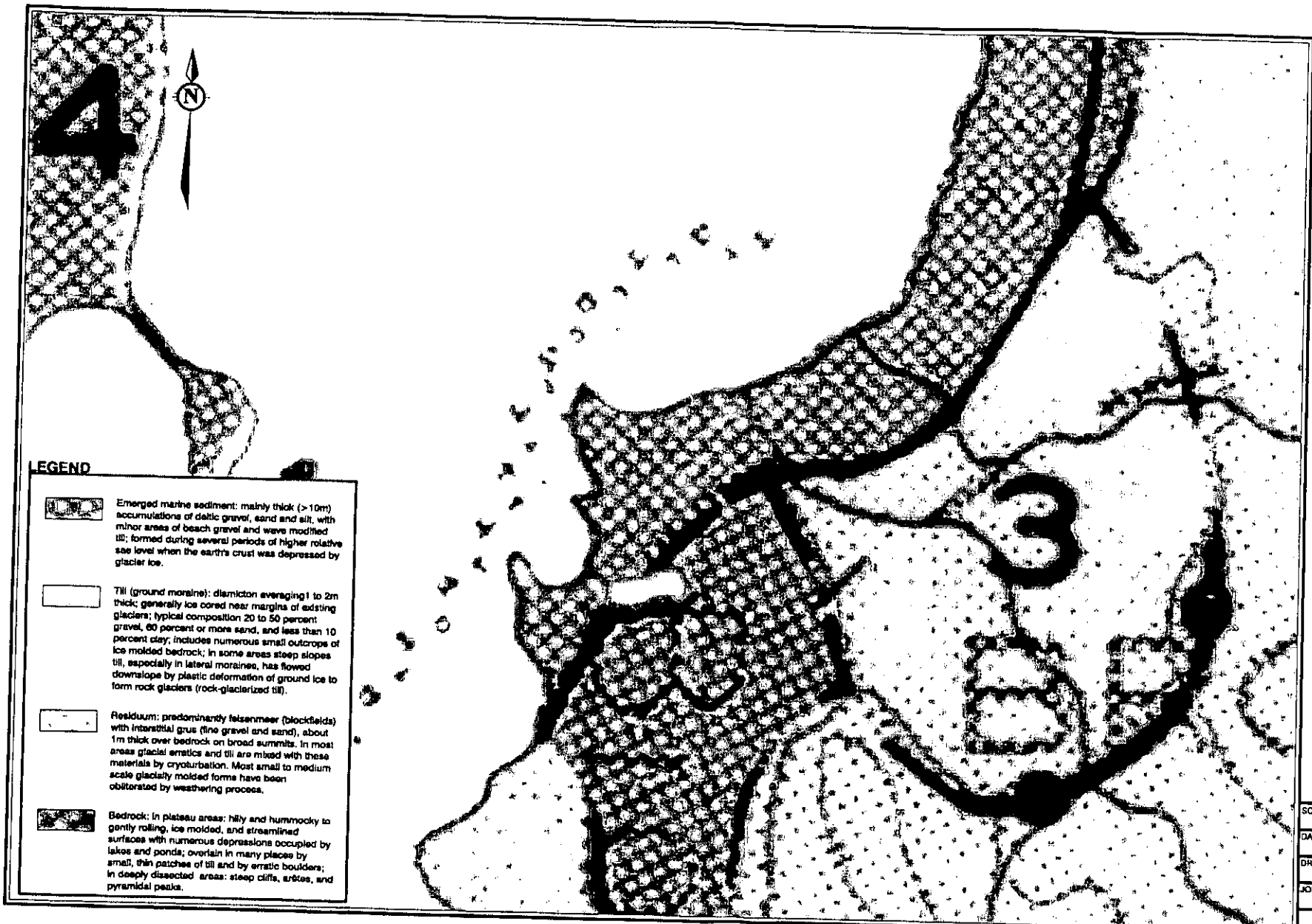
Trow Consulting Engineers Ltd.

Chris Radway, C.E.T.
Senior Engineering Technologist
Geotechnical & Materials Testing Services


TOPO SHEET EXAMPLE
FURTHEST PRACTICAL EXTENT OF RESOURCE CONSIDERATION
KNOWN ARCHEOLOGICAL SENSITIVE SITE
EXISTING QUARRY #2
POTENTIAL AGGREGATE SOURCE #1
EXISTING QUARRY #1
HAMLET EXTENT
ENVIRONMENTALLY SENSITIVE AREA (POTABLE WATER SOURCE)
QUARRY
QUARRY
TANKS
517
583
320
360
240
296
438
160
TON
ND
62
63
64
65
66
67
68
70
71
72
50'
45'
40'

Trow
MA1536A

Appendix 'A'



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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
BROUGHTON ISLAND - SURFICIAL AND BEDROCK GEOLOGY

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG BI-1

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
BROUGHTON ISLAND - POTENTIAL GRANULAR RESOURCES

SCALE	DATE	DRAWN	JOB N°	FIG BI-2
1:20,000	JUNE 2003	NI	MA15384A	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
BROUGHTON ISLAND - POTENTIAL GRANULAR RESOURCES

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG BI-3

FIG CD-1	
JOB N°	MA15384A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:20,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CAPE DORSET - BEDROCK GEOLOGY

LEGEND

Colluvium

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CAPE DORSET - POTENTIAL GRANULAR RESOURCES

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG CD-2

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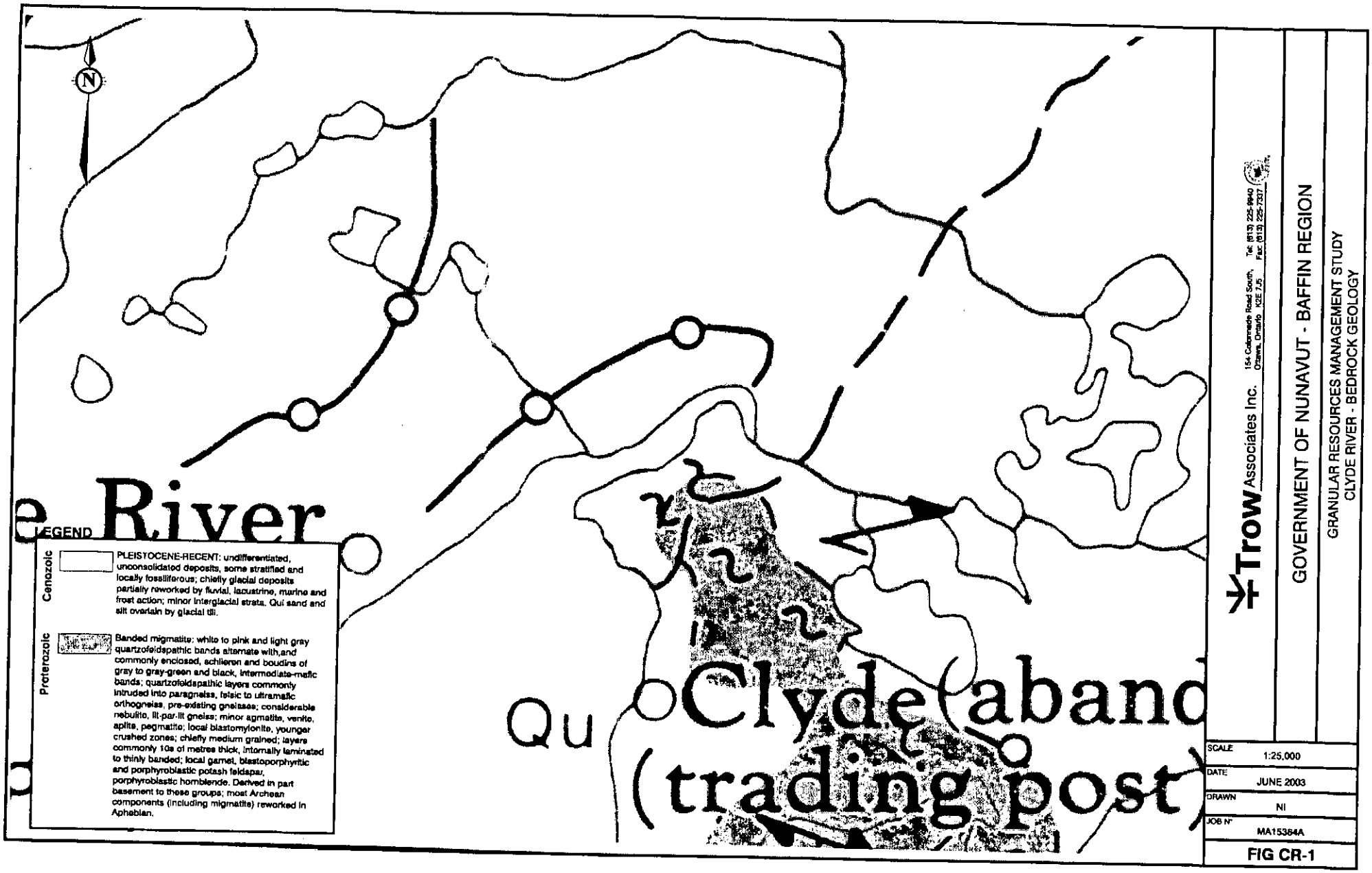
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CAPE DORSET VICINITY - POTENTIAL GRANULAR RESOURCES

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB #	MA15364A

FIG CD-3


N
e River
Qu
Clyde (aband
(trading post)
LEGEND
Cenozoic
PLEISTOCENE-RECENT: undifferentiated, unconsolidated deposits, some stratified and locally fossiliferous; chiefly glacial deposits partially reworked by fluvial, lacustrine, marine and frost action; minor interglacial strata. Qui sand and silt overlain by glacial till.
Proterozoic
Banded migmatite: white to pink and light gray quartzofeldspathic bands alternate with,and commonly enclosed, schlieren and boudins of gray to gray-green and black, intermediate-mafic bands; quartzofeldspathic layers commonly intruded into paragneiss, felsic to ultramafic orthogneiss, pre-existing gneisses; considerable rebuilte, lit-par-lit gneiss; minor agmatite, venite, aplite, pegmatite; local blastomylonite, younger crushed zones; chiefly medium grained; layers commonly 10s of metres thick, intomally laminated to thinly banded; local garnet, blastoporphyritic and porphyroblastic potash feldspar, porphyroblastic hornblende. Derived in part basement to these groups; most Archean components (including migmatite) reworked in Aphebian.
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GOVERNMENT OF NUNAVUT - BAFFIN REGION
GRANULAR RESOURCES MANAGEMENT STUDY
CLYDE RIVER - BEDROCK GEOLOGY
SCALE 1:25,000
DATE JUNE 2003
DRAWN NI
JOB N° MA15364A
FIG CR-1

LEGEND

Alluvium

Till

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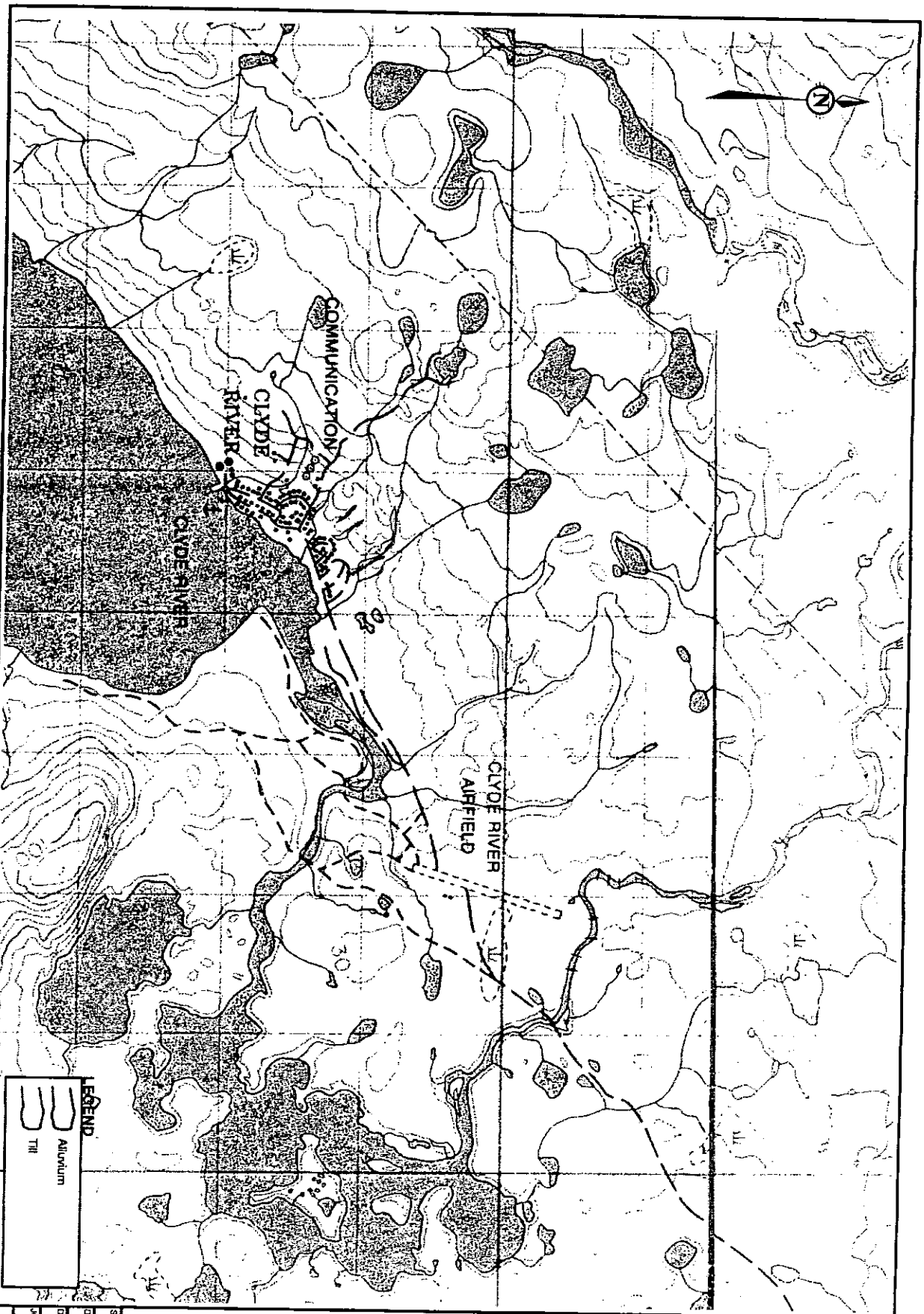
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CLYDE RIVER - POTENTIAL GRANULAR RESOURCES

SCALE	1:25,000
DATE	JUNE 2003
DRAWN	NI
JOB #	MA15384A

FIG CR-2



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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
CLYDE RIVER - POTENTIAL GRANULAR RESOURCES

FIG CR-3	JOB N°	DRAWN	DATE	SCALE
	MA15364A	NI	JUNE 2003	1:25,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
GRISE FIORD - BEDROCK GEOLOGY

SCALE	1:10,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MP14831A

FIG GF-1

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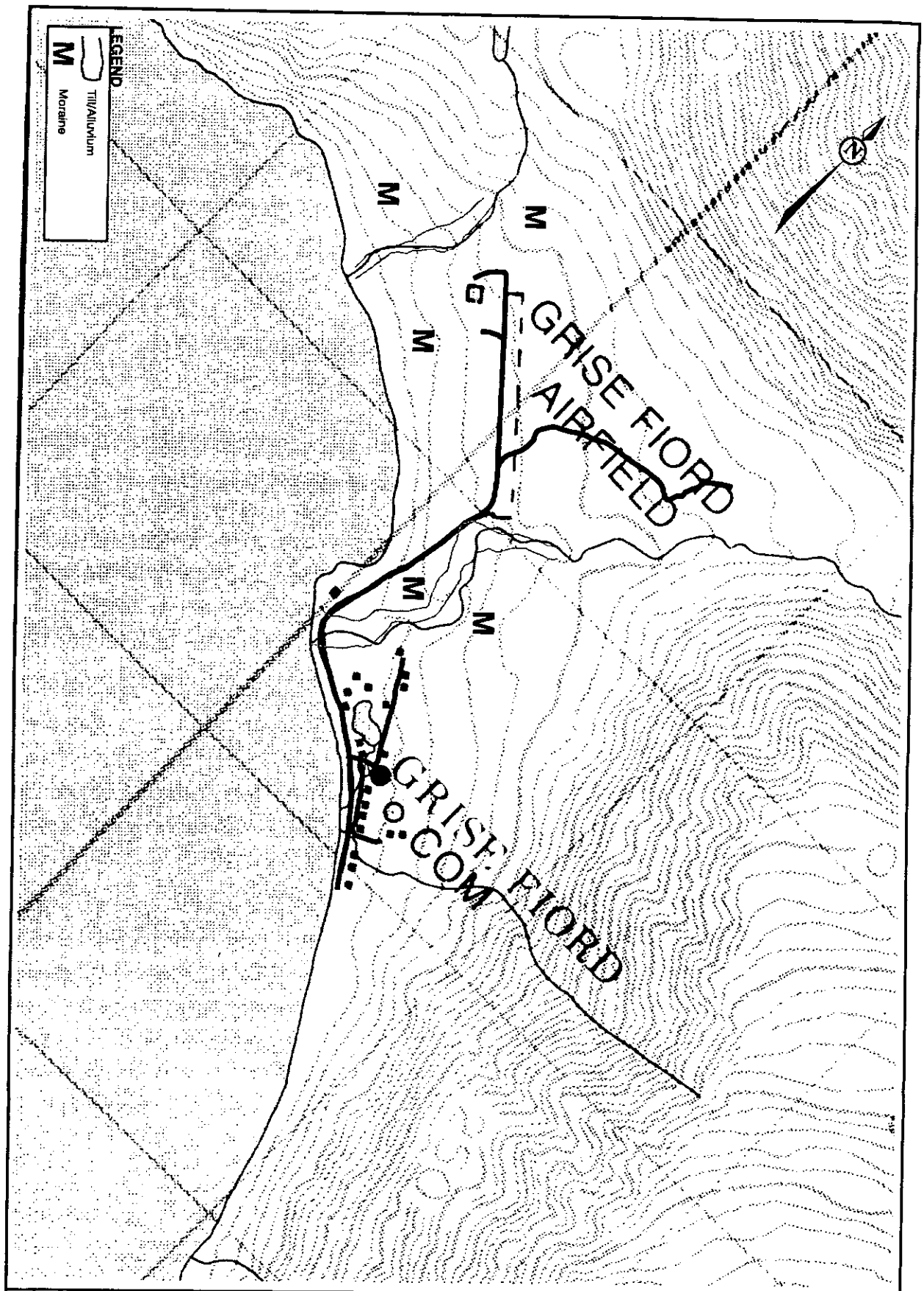
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
GRISE FIORD - POTENTIAL GRANULAR RESOURCES

SCALE	1:10,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG GF-2



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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
GRISE FIORD - POTENTIAL GRANULAR RESOURCES

SCALE	1:10,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG GF-3

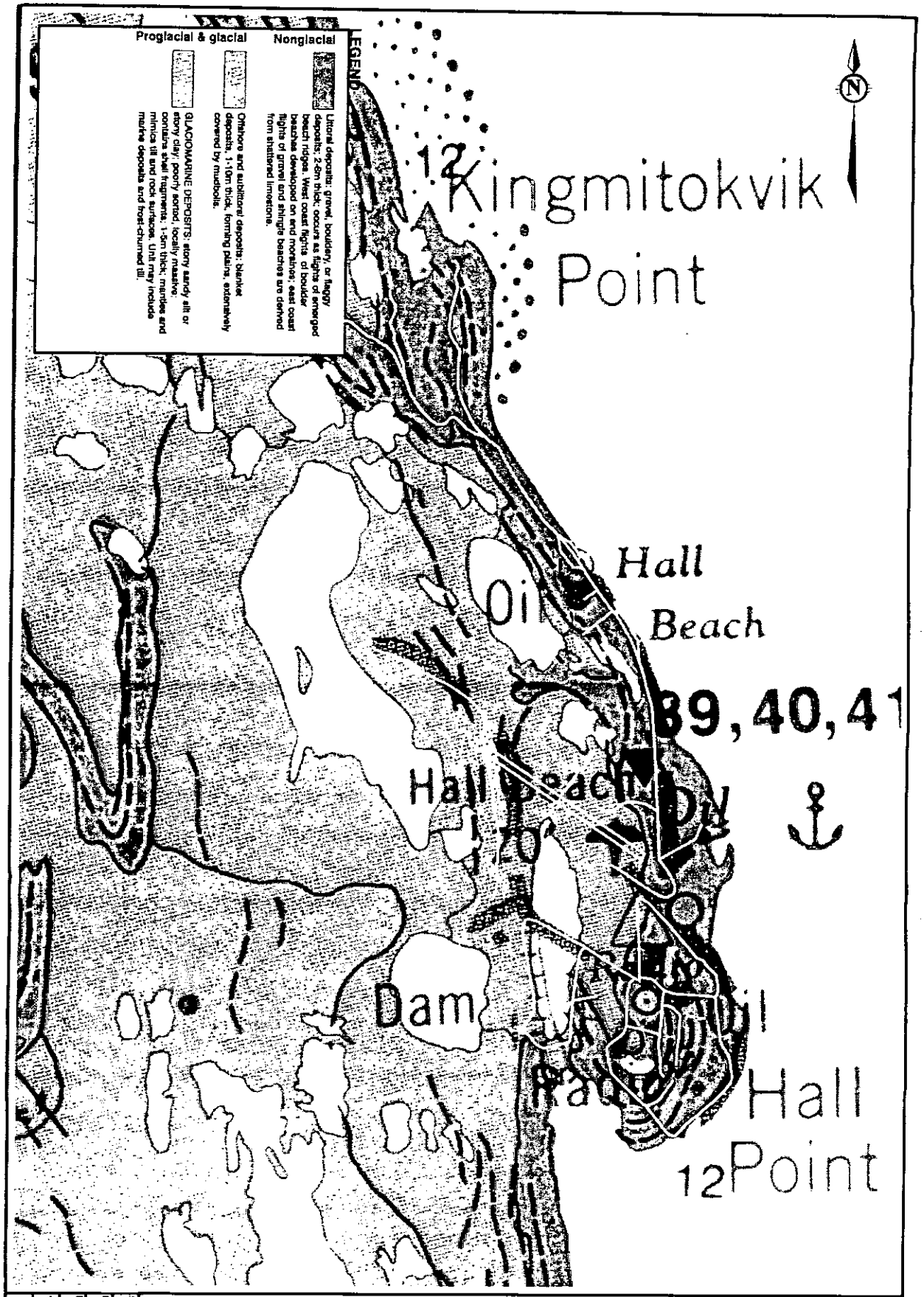

FIG HB-1	JOB N° MA15364A	DRAWN NI	DATE JUNE 2003	SCALE 1:30,000	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
HALL BEACH - SURFICIAL GEOLOGY

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
HALL BEACH - AERIAL PHOTOGRAPH

SCALE	1:30,000
DATE	JUNE 2009
DRAWN	NI
JOB N°	MA15384A

FIG HB-2

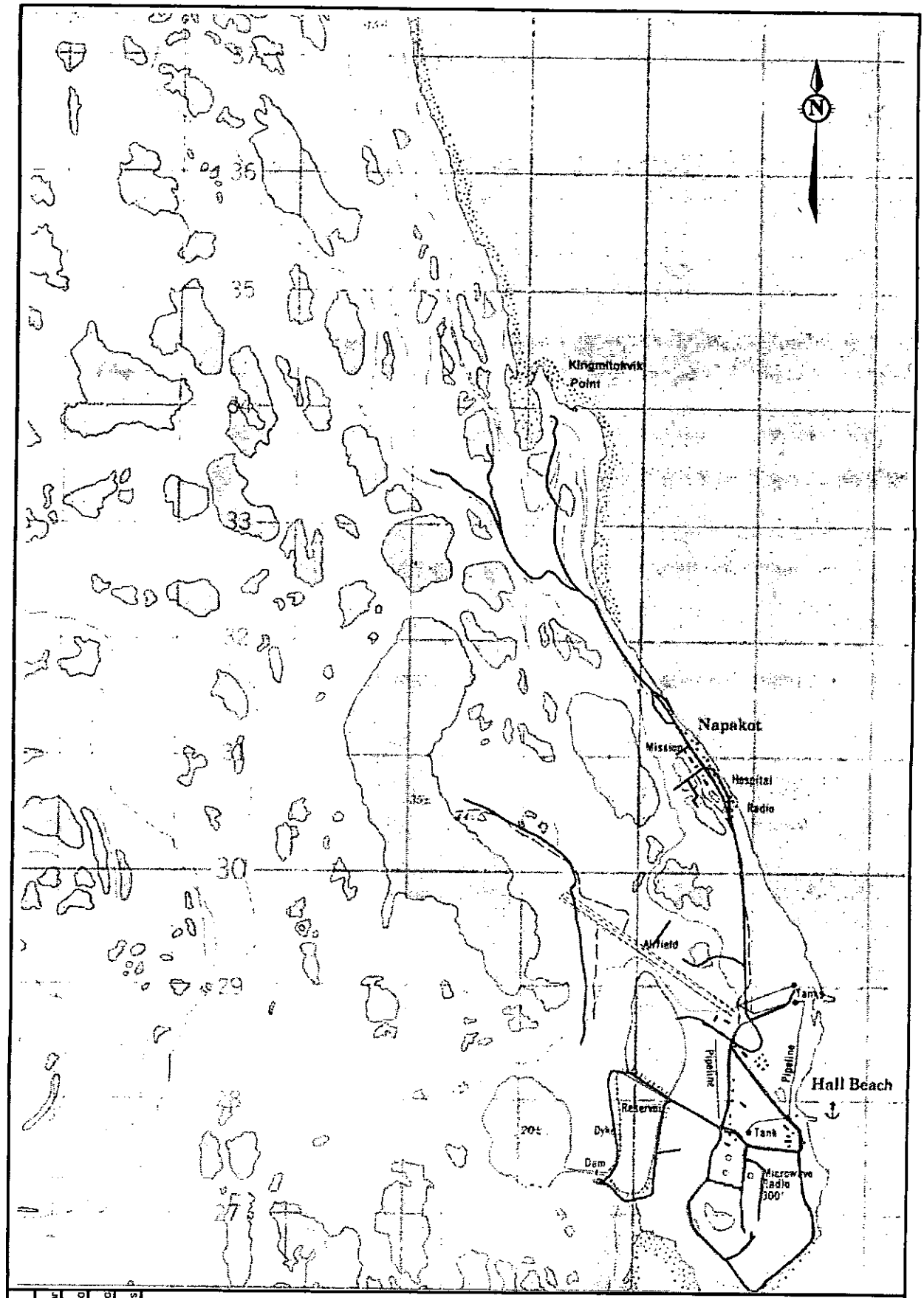

FIG HB-3

JOB N° MA15384A

DRAWN NI

DATE JUNE 2003

SCALE 1:30,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
HALL BEACH

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
IGLOOLIK - GEOLOGY

SCALE	1:25,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG I-1

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
IGLOOLIK - POTENTIAL GRANULAR RESOURCES

SCALE	1:25,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG I-2

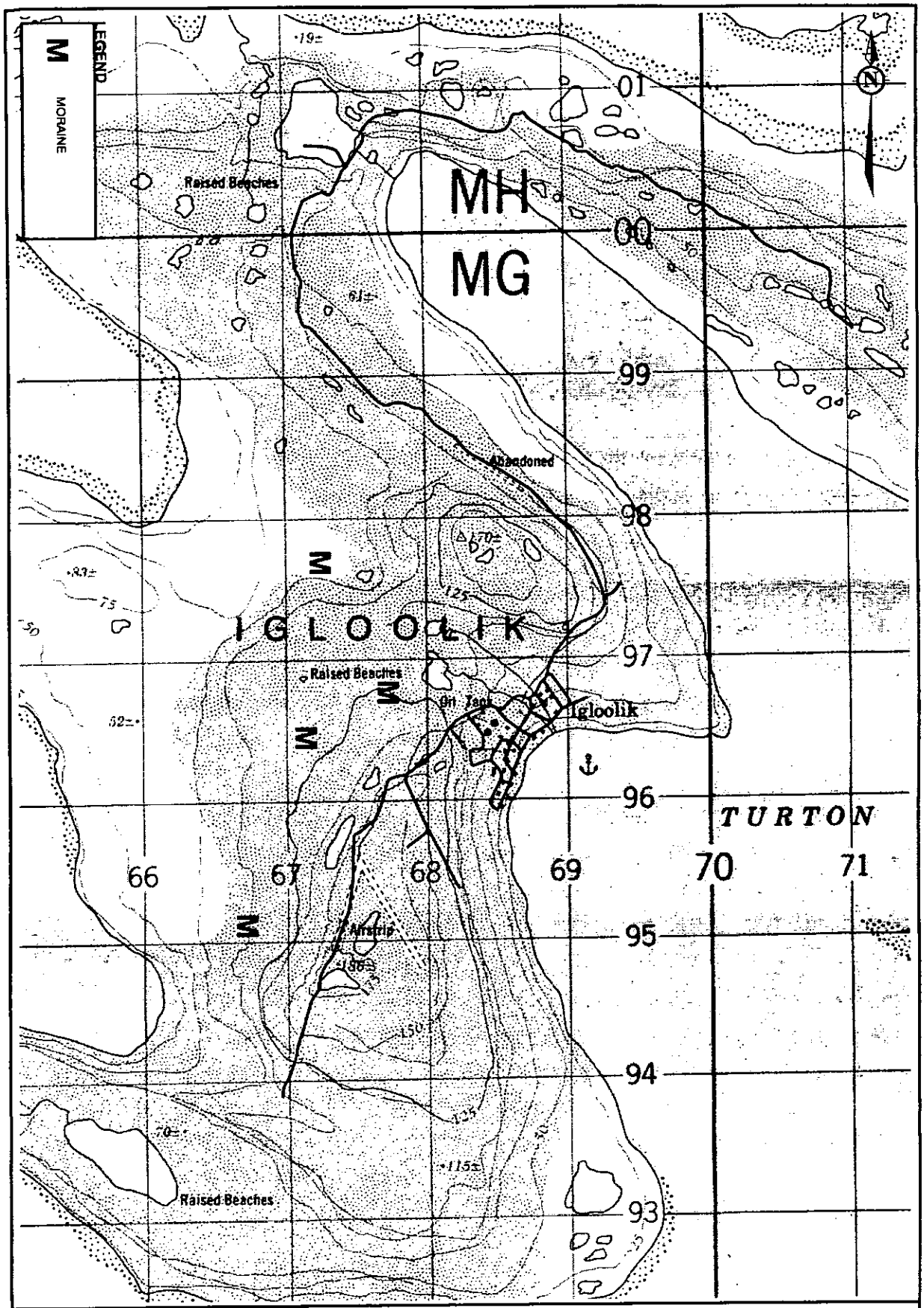

FIG I-3	
JOB N°	MA15364A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:25,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
IGLOOLIK - POTENTIAL GRANULAR RESOURCES

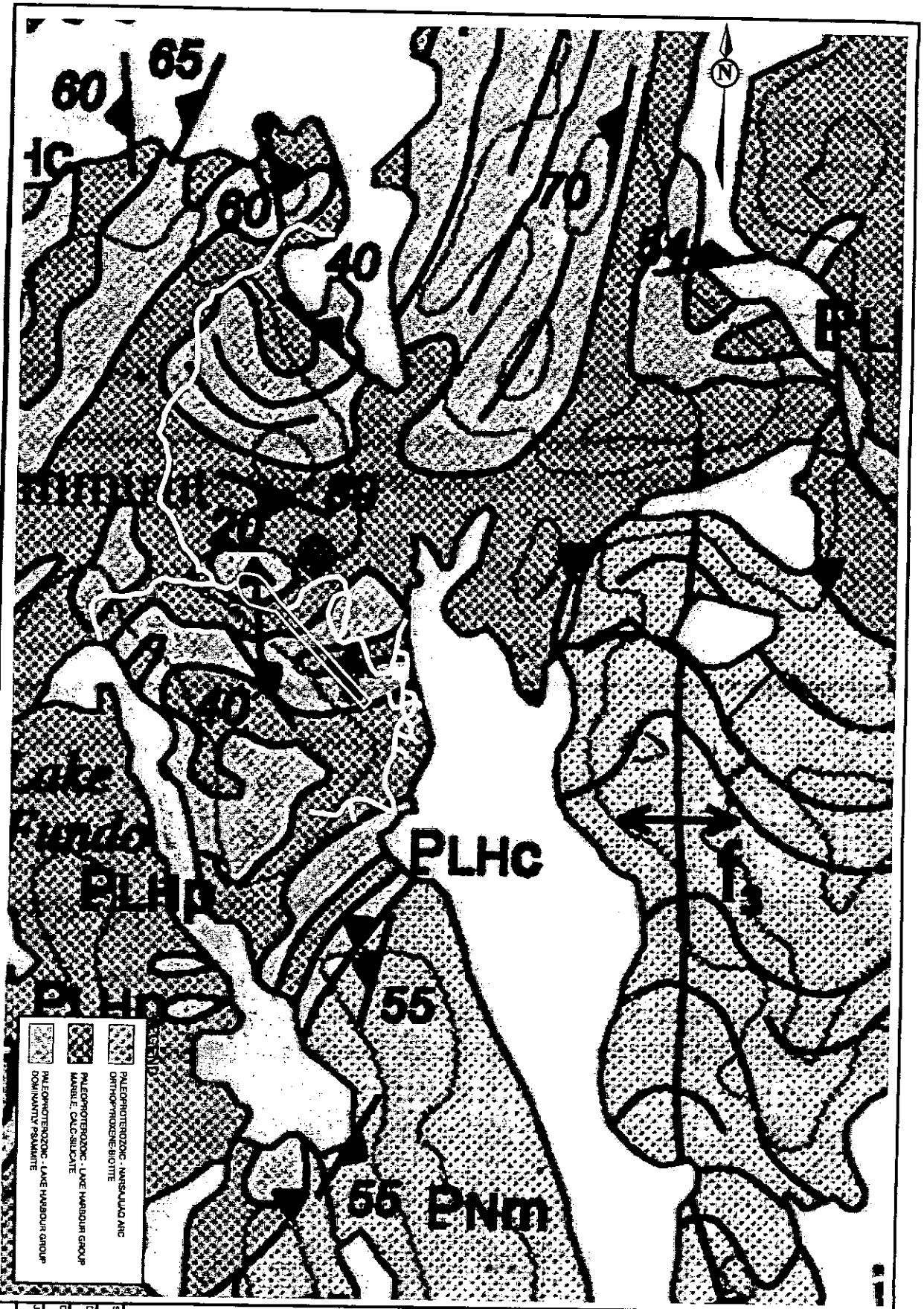

FIG LH-1	JOB N° MA15384A	DRAWN NI	DATE JUNE 2003	SCALE 1:15,000	Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Tel: (613) 225-9540 Fax: (613) 225-7337

GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
LAKE HARBOUR - BEDROCK GEOLOGY

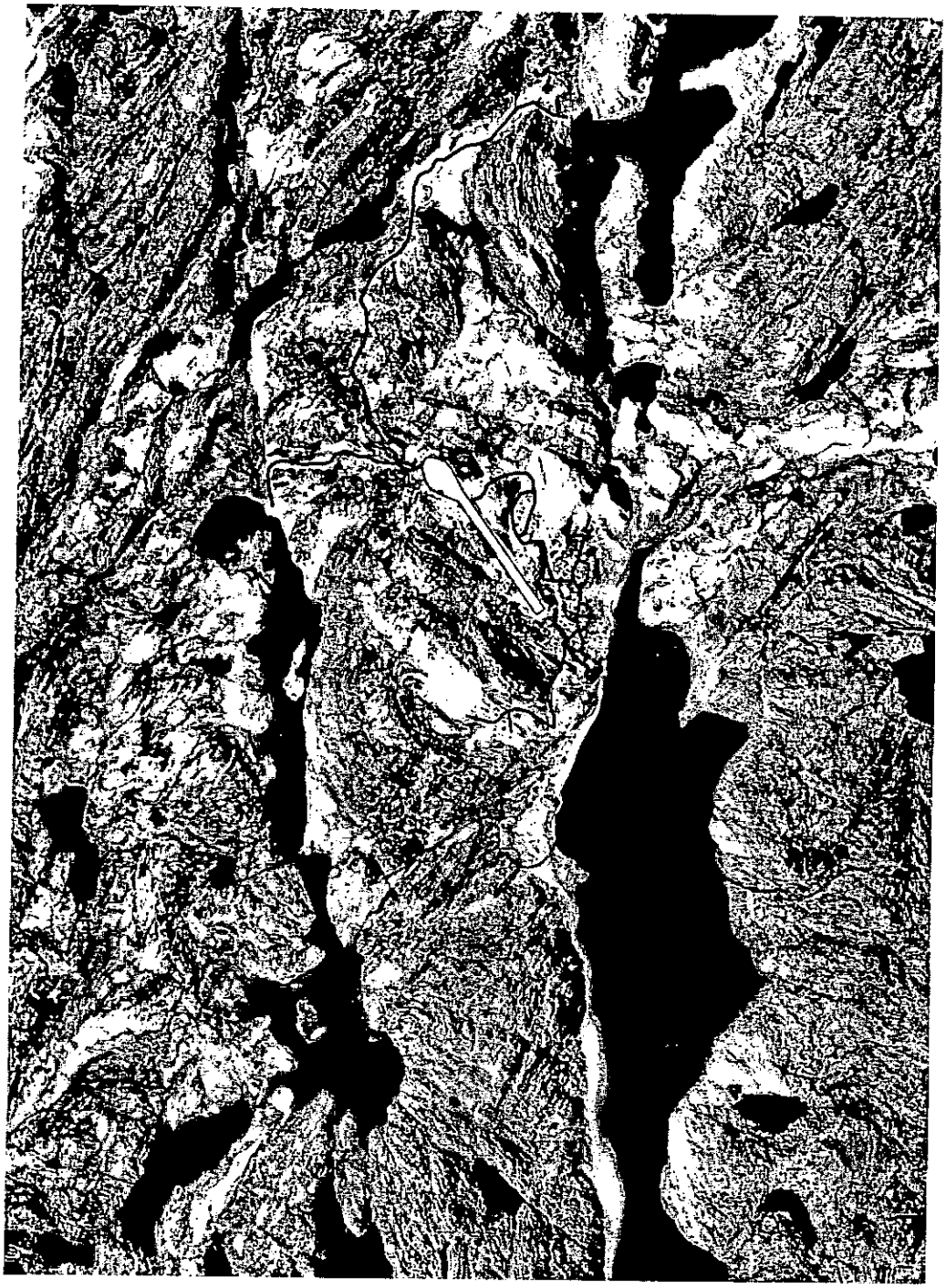

FIG LH-2

JOB N°	M4153984A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:15,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
LAKE HARBOUR - POTENTIAL GRANULAR RESOURCES

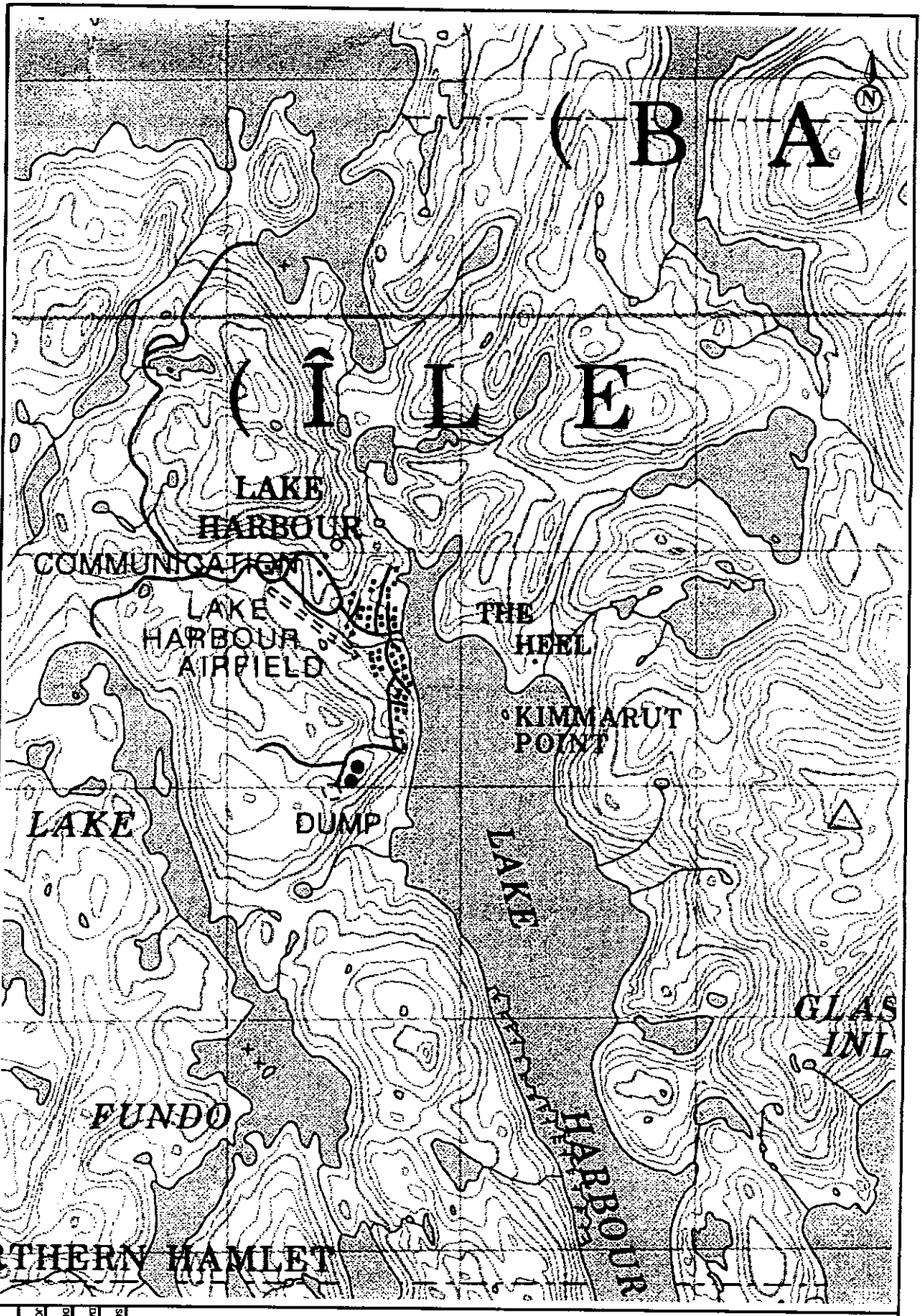
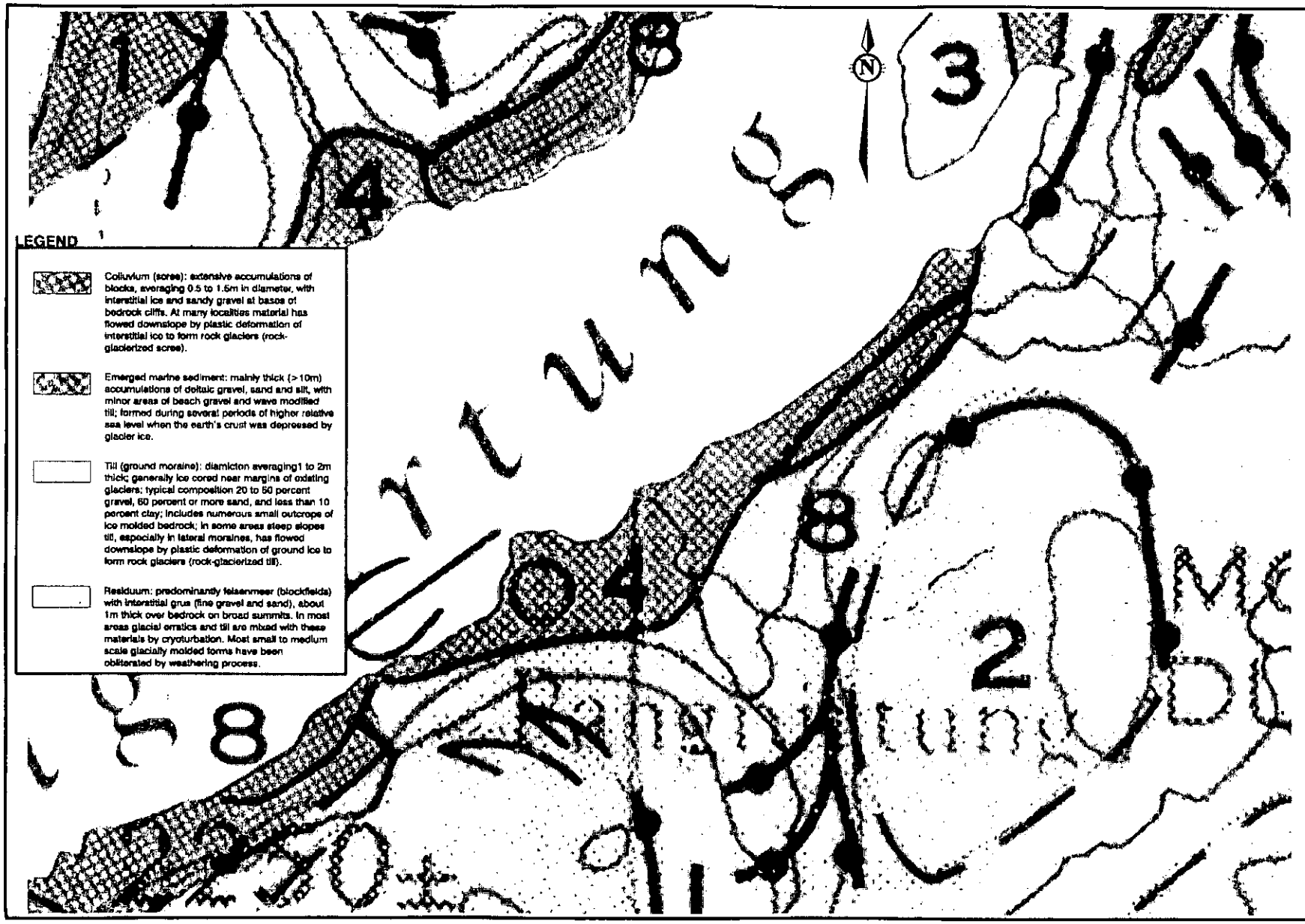


FIG LH-3	Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Tel: (613) 225-9940 Fax: (613) 225-7337
JOB N° MA15364A	GOVERNMENT OF NUNAVUT - BAFFIN REGION
DRAWN NI	GRANULAR RESOURCES MANAGEMENT STUDY
DATE JUNE 2003	LAKE HARBOUR - POTENTIAL GRANULAR RESOURCES
SCALE 1:15,000	



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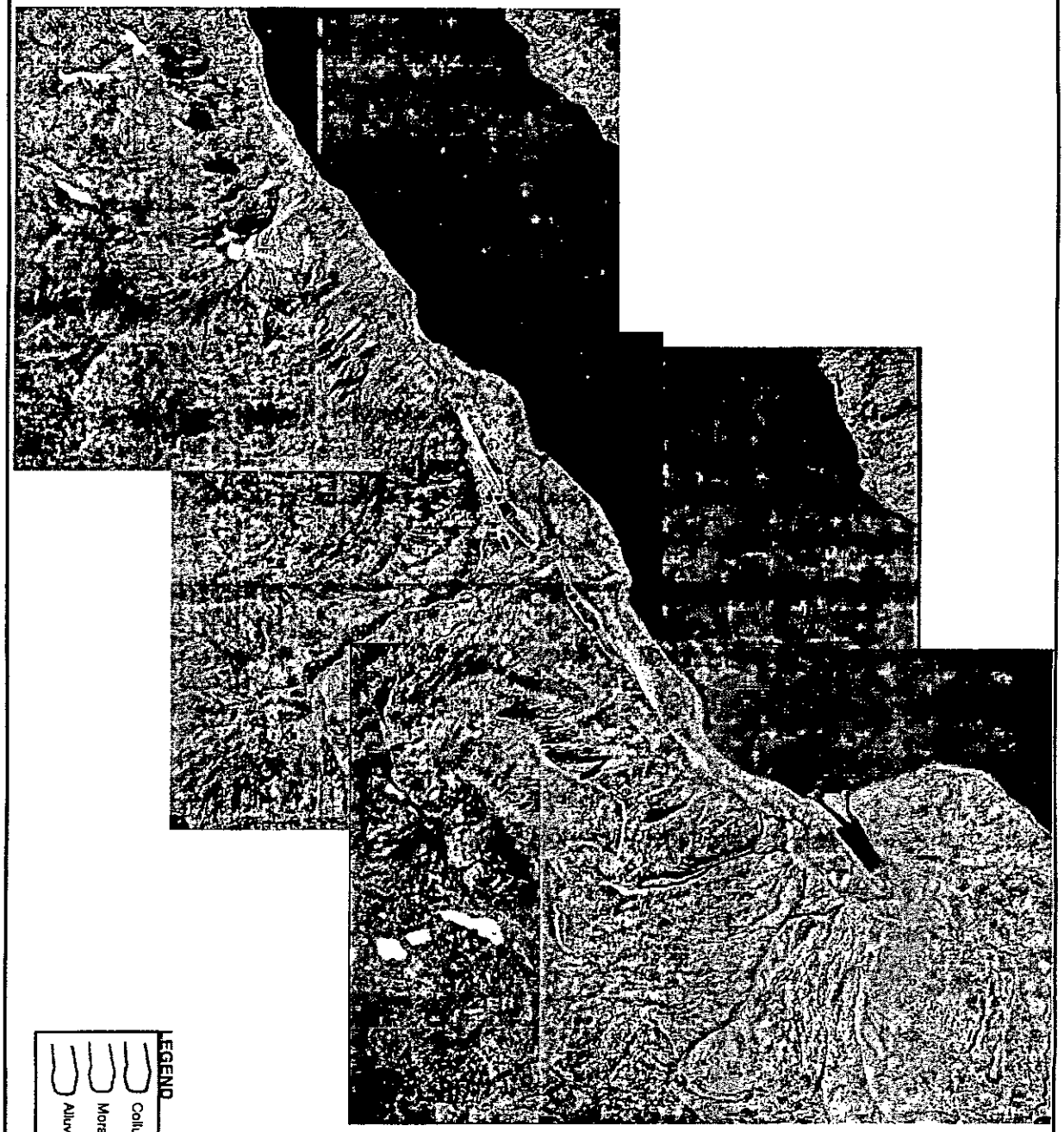
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
PANGNIRTUNG - GEOLOGY

SCALE	1:35,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG P-1



LEGEND

- Colluvium
- Moraine
- Alluvial fan

Trow Associates Inc.
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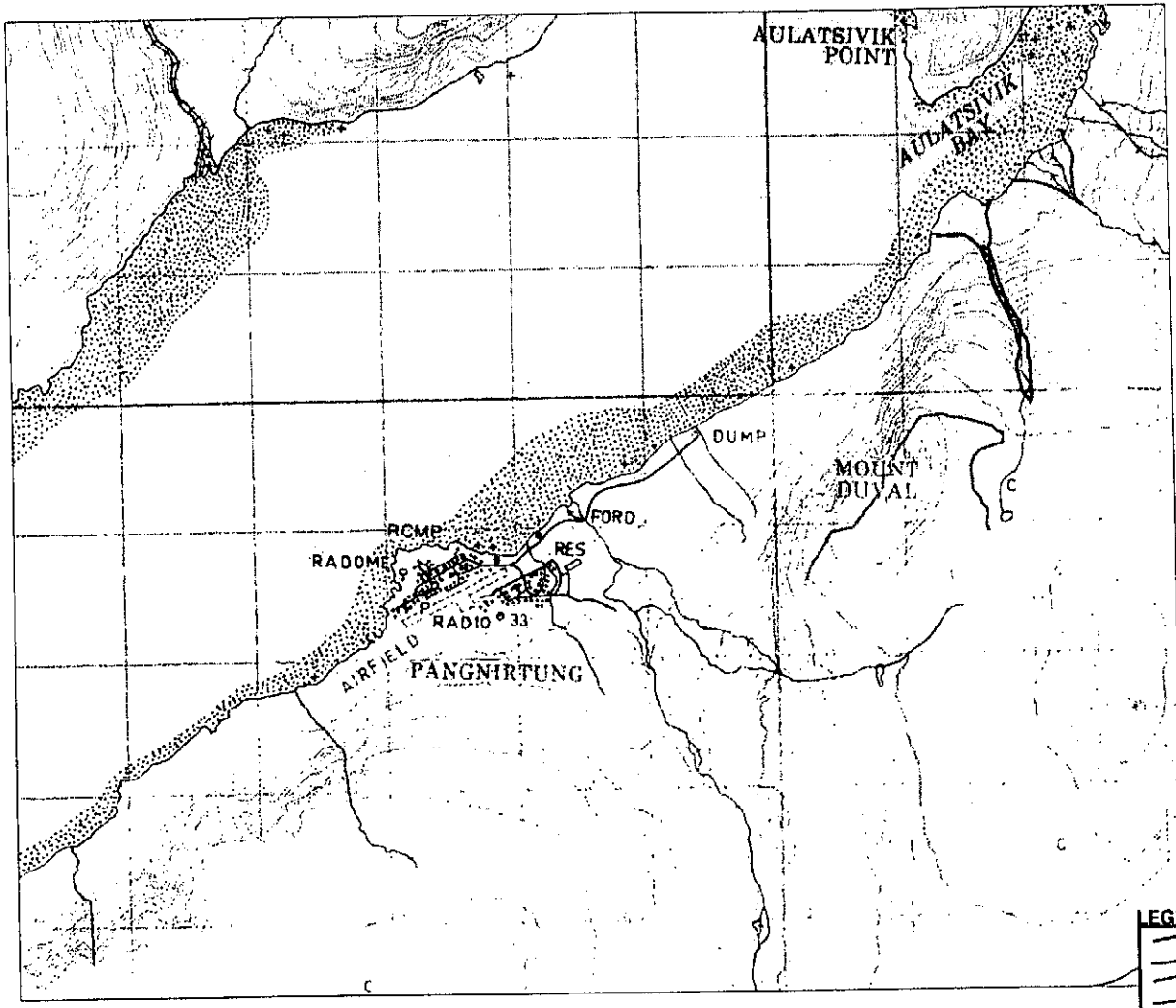
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
PANGNIRTUNG - POTENTIAL GRANULAR RESOURCES

SCALE	1:35,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15384A

FIG P-2



LEGEND

- Colluvium
- Moraine
- Alluvial fan

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
PANGNIRTUNG - POTENTIAL GRANULAR RESOURCES

SCALE	1:35,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG P-3

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
POND INLET - GEOLOGY

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG PI-1

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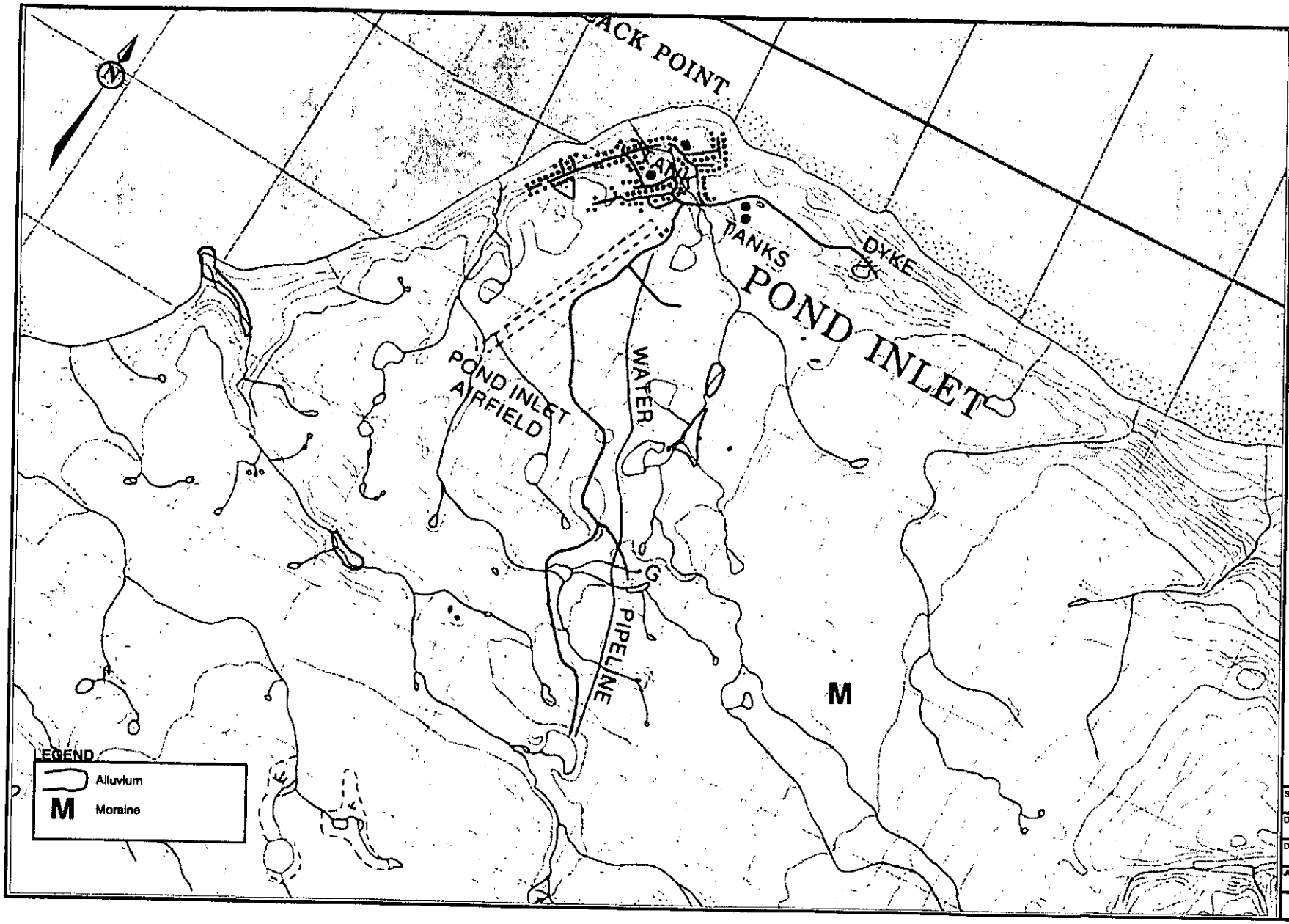
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
POND INLET - POTENTIAL GRANULAR RESOURCES

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15394A

FIG PI-2



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Tel: (613) 225-9940
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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
POND INLET - POTENTIAL GRANULAR RESOURCES

SCALE	1:20,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG PI-3

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
RESOLUTE - GEOLOGY

SCALE	N.T.S.
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG R-1

LEGEND

- Colluvium
- Till
- Alluvia fan

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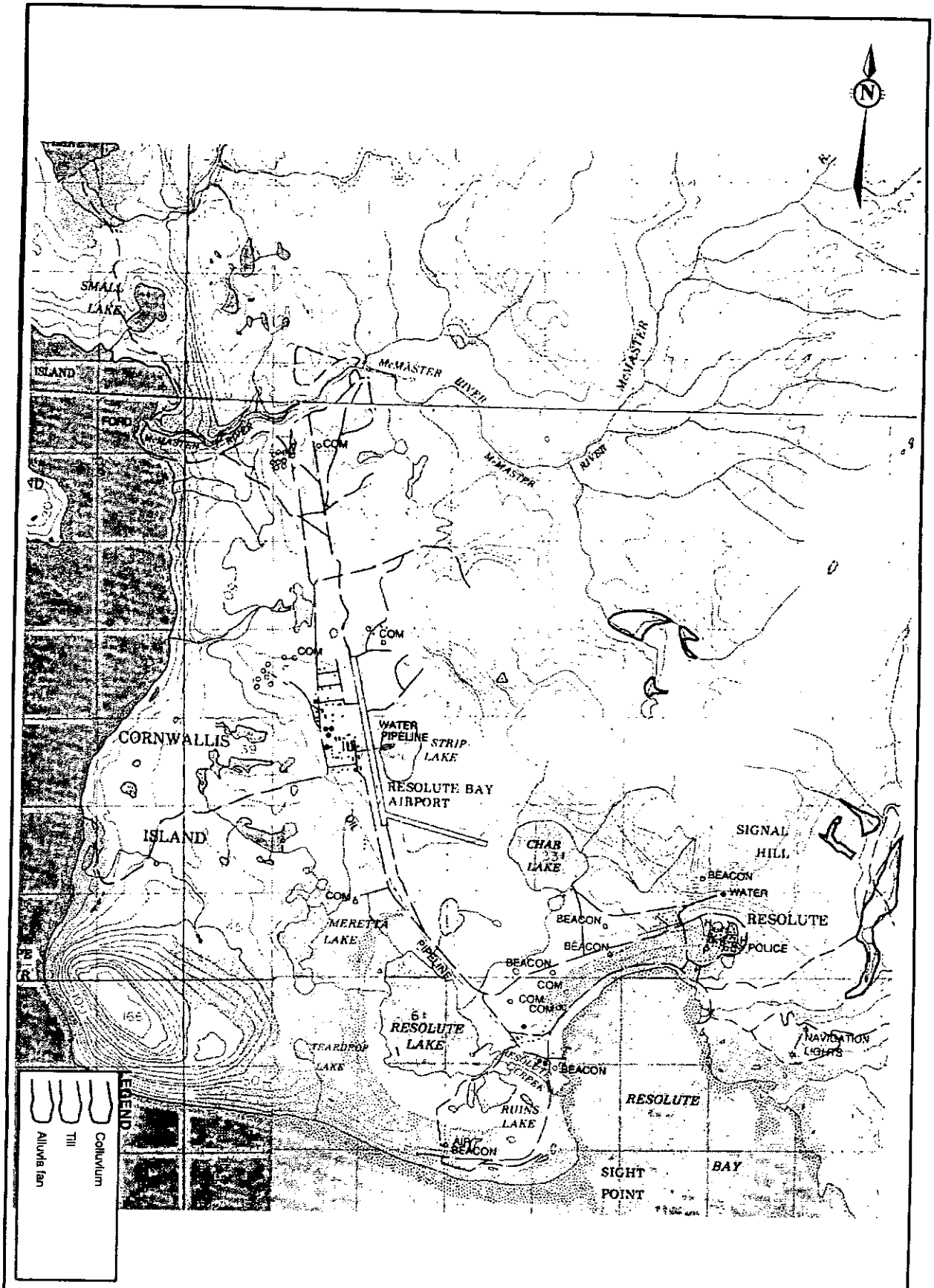
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
RESOLUTE - POTENTIAL GRANULAR RESOURCES

SCALE	1:40,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A

FIG R-2



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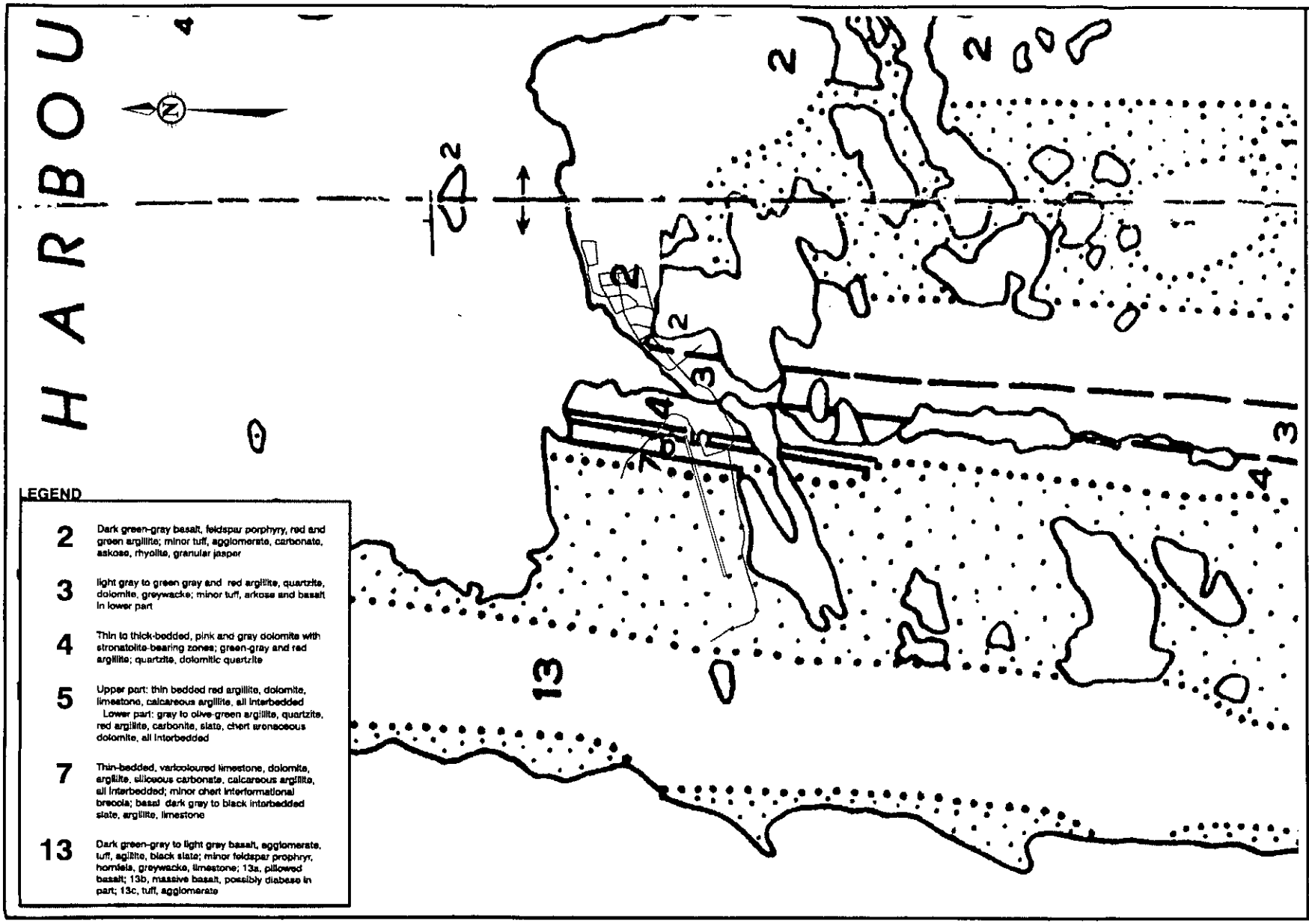
GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
RESOLUTE - POTENTIAL GRANULAR RESOURCES

SCALE	DATE	DRAWN	JOB N°	FIG R-3
1:40,000	JUNE 2003	NI	MA15384A	



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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
SANIKILUAQ - BEDROCK GEOLOGY

SCALE	1:40,000
DATE	JUNE 20032
DRAWN	NI
JOB N°	MA15364A

FIG S-1

SCALE	1:40,000
DATE	JUNE 2003
DRAWN	NI
JOB N°	MA15364A
FIG S-2	

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
SANIKILUAQ - EXISTING GRANULAR RESOURCES

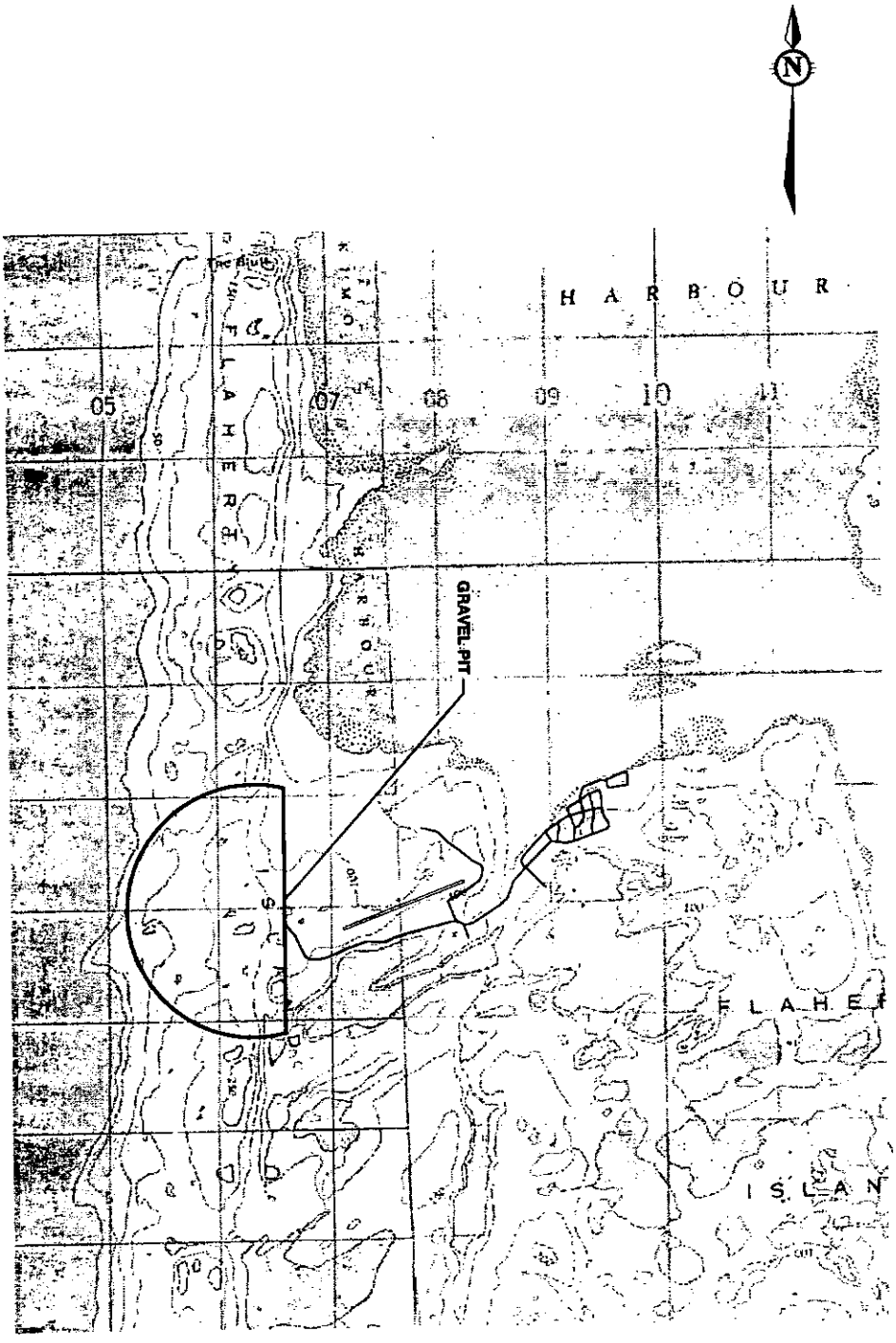

FIG S-3	
JOB N°	MA15384A
DRAWN	NI
DATE	JUNE 2003
SCALE	1:40,000

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GOVERNMENT OF NUNAVUT - BAFFIN REGION

GRANULAR RESOURCES MANAGEMENT STUDY
SANIKILUAQ - EXISTING GRANULAR RESOURCES

Trow

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Parent Company of Oliver, Mangione, McCalla & Associates
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E-mail: trow@trowot.com
Web Site: www.trow.com

Aggregate Resource Management Study
Questionnaire
12 Communities
Baffin Region, Nunavut

Overview:

Attached please find a questionnaire comprising of 4 pages, a topographical map sheet of your community, and an example topographic map sheet. We would appreciate that all questioned be answered. Please indicate "N/A" where the question is not applicable to your community, or if there is no information available to your knowledge to provide an answer to the question.

Your co-operation in completing this questionnaire is greatly appreciated. We look forward to receiving back your questionnaire.

Questionnaire:

Completed by: (Name)_____

Position, Title: _____

Mailing Address:_____

_____

Phone: (867)_____ Fax:(867)_____

Hamlet General Information:

A: Population Confirmation: __(_____)_____

B: Industries: _____

C: Water Supply and Location :_____

_____

1 –Topographic Map Sheet Data:

Please refer to the enclosed topographic map of your community and sample topographic map sheet for the following questions.

A: Please highlight the extent of your developed hamlet area on the topographic map of your community. Draw developed hamlet borders as close as possible to actual limits of your community as per example.

B: Considering topographic, and physical restraints (terrain, water bodies, road access) among others: please plot, a rough estimate representing the furthest extent for the practical consideration of any future aggregate (sand and /or gravel) resource areas as per sample map sheet.

C: Please identify the location and approximate extent of any existing pits or quarries (active or decommissioned) in your community as per enclosed sample sheet. Identify each source for future reference with a number or letter.

D: Now identify if there are any potential aggregate resource site(s) (if any) on the same map sheet; however, utilizing a different symbolization and numbering system as per sample sheet.

2- Existing Aggregate Resources:

A: Has there been any studies conducted on your available or potential aggregate sources in your community? YES_____ NO_____

If yes, please indicate the author, dates of reports and forward a copy to us.

_____

B: How many granular sources (pits and/or quarries) are currently active in your community?

Pits: _____ Quarries: _____

C: To the best of your ability, please summarize and describe each source location as identified on the topographic map sheet of your community according to the following criteria: (utilize additional data forms for any additional aggregate sources)

1- Source Number (as identified by yourself):_____

2- Pit or quarry source?_____

3- Estimated quantity of aggregate remaining? _____

4- What processing is involved ?(blasting, screening, stripping)_____

5- Describe the terrain. (Flat, rolling, steep etc.)_____

6- Material type (sand, sand & gravel, boulders, bedrock etc.):_____

7- Deposit or geological formation? (if known):_____

8- Typical uses in the community? (Roads, fill etc.)_____

9- Annual resource consumption? (tones per year)_____

10- Estimated life of pit or quarry? (final operating year)_____

Additional Forms for question 3-B

1- **Source Number** (as identified by yourself):_____

2- Pit or quarry source?_____

3- Estimated quantity of aggregate remaining? _____

4- What processing is involved ?(blasting, screening, stripping)_____

5- Describe the terrain. (Flat, rolling, steep etc.)_____

6- Material type (sand, sand & gravel, boulders, bedrock etc.):_____

7- Deposit or geological formation? (if known):_____

8- Typical uses in the community? (Roads, fill etc.)_____

9- Annual resource consumption? (tones per year)_____

10- Estimated life of pit or quarry? (final operating year)_____

1- **Source Number** (as identified by yourself):_____

2- Pit or quarry source?_____

3- Estimated quantity of aggregate remaining? _____

4- What processing is involved ?(blasting, screening, stripping)_____

5- Describe the terrain. (Flat, rolling, steep etc.)_____

6- Material type (sand, sand & gravel, boulders, bedrock etc.):_____

7- Deposit or geological formation? (if known):_____

8- Typical uses in the community? (Roads, fill etc.)_____

9- Annual resource consumption? (tones per year)_____

10- Estimated life of pit or quarry? (final operating year)_____

3- Future Resource Requirements:

A- What is the approximate annual consumption of each available granular resource type?(tonnes or volume) as per source number provided on topo sheet.

Source # - _____ = _____

Source # - _____ = _____

Source # - _____ = _____

Source # - _____ = _____

B- Is there an anticipated requirement for additional granular resources in the future? What type and approximate volume?

_____

_____

4- Archaeological and Environmental Considerations:

A- Has there been identified any archaeologically or environmentally sensitive regions within the area of consideration established on the topographic map in section number 1B (Impact to historic sites, flora or fauna species, and water bodies):

_____

If so, please plot the approximate location and extent on the community topographic map sheet and identify as such.

Thank-you,

Trow Consulting Engineers Ltd.

Chris Radway, C.E.T.
Senior Engineering Technologist
Geotechnical & Materials Testing Services