Granular Resources Inventory
- Mackenzie Valley -
Blackwater Lake - 96 B

GRANULAR RESOURCE INVENTORY - MACKENZIE

BLACKWATER LAKE NTS 96 B

Scale 1:125,000

D.E. Lawrence

F.G. Shnay

D.F. VanDine

For: Department of Indian
and Northern Affairs

SUMMARY

Deposits of unconsolidated granular material in the Blackwater Lake map area are widely separated and of variable size. Sand and gravel are of glaciofluvial, fluvial and lacustrine origin and vary in thickness up to 25'. Much of the map area is covered by wet lowlands and muskeg.

Flat lying shale and sandstone underlie the Great Bear Plain. Carbonate rocks form the Franklin Mountains. The shale and sandstone could be ripped for subgrade material, while the limestone and dolomite could be crushed for aggregate.

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derived bedrock map the rock units are grouped according to gross lithology and age. This overlay indicates the availability of bedrock as an alternative to unconsolidated material for construction purposes.

For conveniences in description, areas of granular material are numbered in Roman numerals on the Granular Resource map. Each area is sequentially listed in the tabular summary of materials in the report.

INTRODUCTION

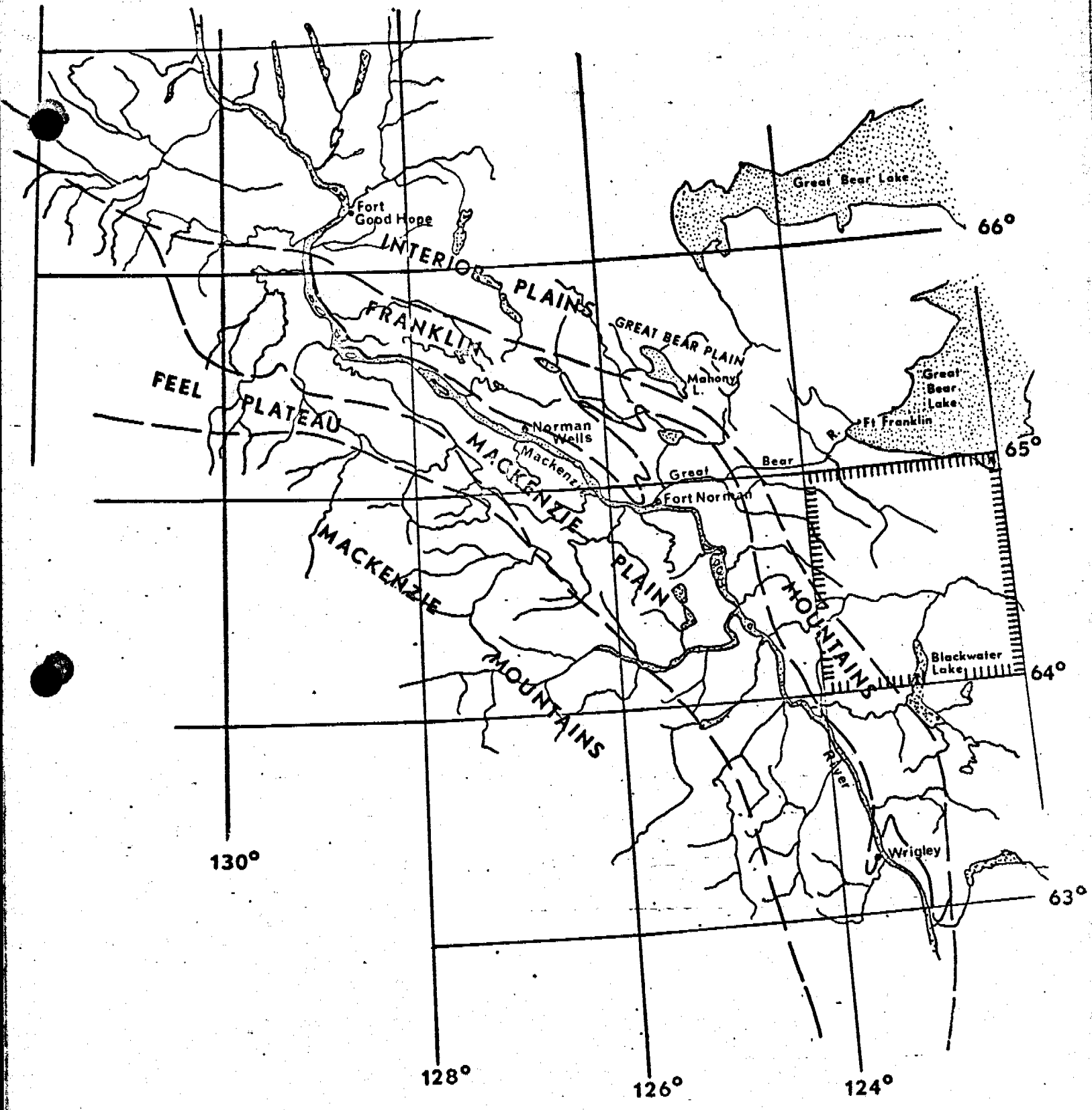
This report attempts to assess the quality and quantity of granular materials available for construction from both unconsolidated and bedrock sources in the Blackwater Lake map area. Sand and gravel of glaciofluvial and fluvial origin are good sources of unconsolidated construction material. Limestone and dolomite are good sources of construction aggregate. Shale is considered to be a source of subgrade material.

The information in this report and on the accompanying map has been compiled largely from published and unpublished manuscripts of the Geological Survey of Canada. Supplementary data on depth, thickness, texture and ice content have been obtained from confidential reports of other government departments and from industry.

The basic document used in this compilation and from which all areal data were derived, is a manuscript surficial geology map of Blackwater Lake map area, at a scale of 1:125,000 (Hughes, 1972). The units of this surficial geology map were compiled primarily from air-photo interpretation with minimal field checking.

Areal extent of granular deposits was measured by planimeter. An average thickness for each deposit was estimated from the data mentioned above and reduced according to variables such as drainage, height above the water table and amount of ground ice. A volume of granular material for each deposit was calculated from these considerations of area and thickness. These estimated volumes of available sand and gravel appear in a tabular summary at the end of the report

A bedrock geology map has been prepared as a transparent overlay sheet from the Geological Survey of Canada published bedrock map 30-1963 (Douglas, R.J.W. and MacLean, B., 1963) and from an unpublished manuscript map of a portion of the map area (Cook, D.G. 1972). On the



PHYSIOGRAPHIC REGIONS

BLACKWATER LAKE

1 : 2,500,000

FIGURE #1

after Bostock 1948

GENERAL GEOLOGY & PHYSIOGRAPHY

Two physiographic regions are represented on the Blackwater Lake map. The Great Bear Plain covers most of the map area while the Franklin Mountains are found only in the southwest corner (see figure 1). Deposits of sand and gravel are found within both regions. The deposits vary in size and are widely separated. Bedrock consisting of carbonates and shale outcrops in the Franklin Mountains. Bedrock underlying the Great Bear Plain consists of shale and sandstone.

Unconsolidated Deposits

Glaciofluvial Deposits, G, sand and gravel.

Sand and gravel of glaciofluvial origin found on the Great Bear Plain have formed channel deposits and eskers. Both types of deposits are elongated roughly northwest - southeast. They average 15 feet in thickness except for the larger deposits in the south where the average thickness is 25 feet. Wet lowlands and muskeg cover much of the area between the deposits.

Sand and gravel in the Franklin Mountains formed as glaciofluvial outwash deposits which were contained within an intermontane valley. These deposits are at least 25' in depth, are well drained, and have a low ground ice content.

Approximately 80% of the glaciofluvial granular deposits of both the Great Bear Plain and the Franklin Mountains is available as a granular construction material.

Till, mixed with coarse gravel has formed small deposits of low relief (5') which are ubiquitous in the Blackwater Lake map area. It is felt that these deposits originated as crevasse fillings in the glacier (Hughes, personal communication). On the map they are indicated as short lines (////). The deposits trend roughly northeast-southwest,

i.e. perpendicular to the trend of the channel and esker deposits. Because these crevasse filling deposits are small discontinuous, and contain only a small percentage of coarse material, they are not considered as potential granular resources.

Fluvial deposits, F, sand and gravel

Sand and gravel of fluvial origin occur only in the Franklin Mountains. The sources of material for this deposit are the glacio-fluvial outwash deposits and weathered material from the mountains. This deposit averages 10 feet in depth. Ground ice content is low but the water table and water content are high. Approximately 30% of the fluvial sands and gravel are available as a granular resource.

Lacustrine deposits, Shc, sand and gravel.

Sand and gravel are found south of Great Bear Lake as a "lacustrine shoreline complex." It consists of beach sands and gravels covering a morainal till. The granular material averages 6 feet in depth. The material has been ice and water sorted and is found as ridges. Low-lying areas are covered by a veneer of organic material. Approximately 5% of the material in this deposit is available as construction material.

Bedrock

The bedrock geology of the Blackwater Lake map area can be divided into two groups: the flat-lying bedrock underlying the Great Bear Plain and the uplifted bedrock of the Franklin Mountains.

Cretaceous shale and sandstone underlie the Great Bear Plain. Both rock lithologies weather easily, are flat lying and therefore are rarely exposed in the map area. The depth to bedrock is unknown but postulated to be less than 20 feet.

In general the rocks of the Franklin Mountains are more coherent than rocks underlying the plain to the east. The Devonian carbonate unit is comprised of the Hume and Bear Rock Formations. These formations comprise well bedded, rubbly limestone, dolomite with minor shale, and gypsum. The Ordovician carbonate unit is made up of the Mount Kindle and Franklin Mountain Formations which are mainly dolomite. Shales of Cambrian age comprise the Saline, Cap Mountain, and Mt. Clark Formations. The rock units of the Franklin Mountains are gently to steeply dipping.

MATERIALS

Unconsolidated granular material can be obtained from glaciofluvial, fluvial and lacustrine origin. The glaciofluvial deposits of sand and gravel form relatively ice-free ridges which vary in thickness up to 25'. Between these ridges are wet lowlands covered by muskeg. The sand and gravel deposits of fluvial and lacustrine origin are less than 15' thick. The fluvial deposit has a high water table. The lacustrine deposit is partially covered by organic material. These factors may limit their use as a granular resource.

The deposits of unconsolidated material vary greatly in size and thickness. They are widely separated and there are vast areas which have no unconsolidated granular resources.

The shale and sandstone underlying the Great Bear Plain and the Richardson Mountains can be ripped and used as subgrade material if they exist at a shallow depth. The carbonate rocks of the Franklin Mountains would produce good aggregate material if crushed.

TABULAR SUMMARY

Description & Material	Area sq. mi.	Estimated Average Thickness (ft.)	Estimated Volume of Granular Material ($yds^3 \times 10^6$) total	available
AREA I NORTHWEST CORNER OF MAP AREA				
(a) Gfc; glaciofluvial; channelled; sand and gravel	12.69	15	198.25	158.60
(b) Gf; glaciofluvial; sand and gravel	2.27	15	35.40	28.32
(c) eskers; sand and gravel	4.00 mi.	10	0.16	0.13
AREA II NORTHEAST CORNER OF MAP AREA				
(a) Gfc; glaciofluvial; channelled; sand and gravel	5.04	15	78.70	62.96
(b) Gf; glaciofluvial; sand and gravel	4.72	15	73.80	59.04
(c) Shc; Lacustrine beach complex; sand and gravel	32.60	6	203.74	101.87
(d) eskers; sand and gravel	45.00 mi.	10	1.75	1.40
AREA III CENTRE PORTION OF MAP AREA				
(a) Gfc; glaciofluvial; channelled; sand and gravel	3.00	15	46.95	37.56
(b) Gf; glaciofluvial sand and gravel; small deposits	0.90	15	14.05	11.24
(c) Gf; glaciofluvial; sand and gravel; large deposits	2.27	25	58.98	47.18

Description & Material	Area sq. mi.	Estimated Average Thickness (ft.)	Estimated Volume of Granular Material ($yds^3 \times 10^6$) total	available
AREA IV NORTHEAST OF BLACKWATER LAKE				
(a) Gfc, glaciofluvial; channelled; sand and gravel	3.20	15	50.00	40.00
(b) Gf; glaciofluvial; sand and gravel	0.27	15	4.25	3.40
(c) eskers; sand and gravel	2.00 mi.	10	0.08	0.06
AREA V SOUTHEAST CORNER OF MAP AREA				
(a) Gfc; glaciofluvial; channelled; sand and gravel	0.74	15	11.60	9.28
(b) eskers; sand and gravel	27.52 mi.	10	1.07	0.86
AREA VI EAST OF BLACKWATER LAKE				
(a) Gfc; glaciofluvial; channelled; sand and gravel; small deposits	3.83	15	59.80	47.84
(b) Gfc; glaciofluvial; channelled; sand and gravel; large deposits	16.91	25	440.07	352.05
(c) Gf; glaciofluvial; sand and gravel; small deposits	1.48	15	23.20	18.56
(d) Gf; glaciofluvial; sand and gravel; large deposits	2.34	25	60.98	48.78
(e) eskers; sand and gravel	39.52 mi.	10	1.54	1.23

Description & Material	Area sq. mi.	Estimated Average Thickness (ft.)	Estimated Volume of Granular Material ($yds^3 \times 10^6$) total	available
AREA VII WEST OF BLACKWATER LAKE				
(a) Gfc; glaciofluvial; channelled; sand and gravel	1.37	15	21.35	17.08
(b) Gf; glaciofluvial;	0.31	15	4.90	3.92
AREA VIII FRANKLIN MOUNTAINS				
(a) Gf; glaciofluvial; sand and gravel	8.94	25	232.74	186.19
(b) Gfc;glaciofluvial; channelled; sand and gravel	0.39	15	6.10	4.88
(c) F; fluvial; sand and gravel	1.76	10	18.28	5.48

SOURCES OF INFORMATION

Bostock, H.S.
1948: Physiography of the Canada Cordillera, with special reference to the area north of fifty-fifth parallel; Geol. Surv. Can., Mem. 247.

Bostock, H.S.
1967: Physiographic Regions of Canada; Geol. Surv. Can., Map 1254 A.

Cook, D.G.
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Douglas, R.J.W., MacLean, B.
1963: Geology, Yukon Territory and Northwest Territories; Geol. Surv. Can., Map 30-1963.

Hughes, O.L.
1972: Surficial Geology map of Blackwater Lake NTS 96 B; Geol. Surv. Can., (unpublished).

Mollard, J.D.
1972: Reconnaissance Study of Hydrogeology of the Mackenzie River Valley Region; prepared report for Environment Canada.

Prest, V.K., Grant, D.R., Rampton, V.N.
1967: Glacial Map of Canada; Geol. Surv. Can., Map 1253 A.

APPENDIX I, Part I

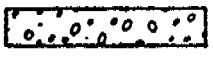
Unconsolidated Granular Materials

Each map sheet has a surficial geology legend (see appendix). This legend, differentiated by means of patterns, only indicates granular material classified by genetic characteristics. In some cases only part of a map unit has been patterned, indicating that only that portion is considered a suitable source for ganular material.

Legend

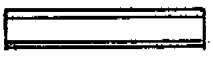
GLACIOFLUVIAL

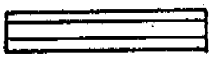

coarse grained granular material: cobbles, pebbles, gravel; may be mixed with some coarse sand


mixed or interbedded sand and gravel


predominantly sand or sand with some fine material

GLACIOLACUSTRINE


coarse grained granular material: cobbles, pebbles, gravel; may be mixed with some coarse sand.

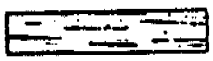

mixed or interbedded sand and gravel


predominantly sand or sand with some fine material

FLUVIAL

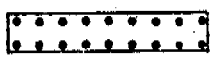

only sand and gravel deposits are patterned

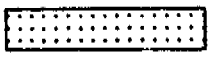
MORAINAL


predominantly till; unsorted matrix of silt, clay, and sand imbedded with pebbles, cobbles and boulders

MARINE


coarse grained granular material: cobbles, pebbles, gravel; may be mixed with coarse sand


mixed or interbedded sand and gravel


predominantly sand or sand with some fine material

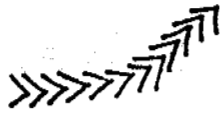
EOLIAN

fine and medium sandy material

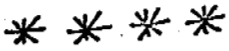
COLLUVIUM

only the patterned area is coarse grained

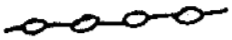
Symbols



eskers



gravel mounds



morainal ridge found within moraine

crevasse fillings

APPENDIX I Part (ii)

Bedrock Geology

(black line overlay)

The rock units which appear on the accompanying overlay are a geological mapping according to gross lithology and age.

These units were derived from a more detailed geological map, whose units were subdivided largely on the basis of airphoto and stratigraphic interpretation. The units are identified by a two component code. The first component is upper case and designates age which is followed by a mnemonic designating gross lithology, e.g. Dls - Devonian limestone. When no lithology follows the age component, the unit is composed of many of the rock types listed below.

Legend

T - Tertiary
K - Cretaceous
J - Jurassic
Tr - Triassic
P - Permian
C - Carboniferous
D - Devonian
S - Silurian
O - Ordovician
Cm - Cambrian
Pc - Precambrian

car - carbonate
limestone and/or dolomite
ls - limestone
dol - dolomite
ss - sandstone
ϕs - siltstone
sh - shale
cong - conglomerate

no mnemonic component indicates unit is composed of many of the above rock types

Symbols

Boundary of bedrock unit (approximate)

Boundary of bedrock unit inferred in areas of surficial cover

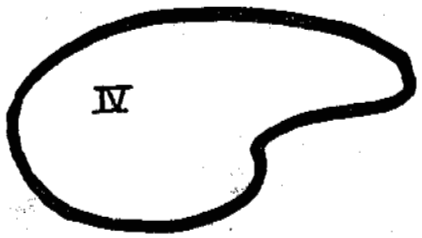
Limit of mapping

All units and symbols are not necessarily on this map

APPENDIX I, (Part iii)

GRANULAR RESOURCE UNITS

Granular Resource area



(see text for corresponding description)

APPENDIX I, Part III

SURFICIAL GEOLOGY AND LANDFORMS

TEXTURE	GENESIS	MORPHOLOGY	SLOPE (superscript)
f fen	O organic	v veneer	1 moderate
p peat	M morainic	p plain	(<5°)
c clay	G glaciofluvial	d drumlin	2 steep
si silt	L lacustrine	s fluted striated	(5° - 15°)
s sand	A alluvial	t terrace	>15° normally
g gravel	fluvial	h hummocky	in Cx unit
b boulder	C colluvial	r ridged	
t till	E eolian	e eroded	
	U upland, rolling	f fan	
	bedrock controlled	m rolling	
	R rock outcrop	c channelled	
	Shc shore line	k kettled	
	complex	thermokarst	
		x complex	

Complex Units:

e.g. in: Mp-fO, fO constitutes 25% to 49% of area
: Mp/fO, fO = 5% - 24% of area

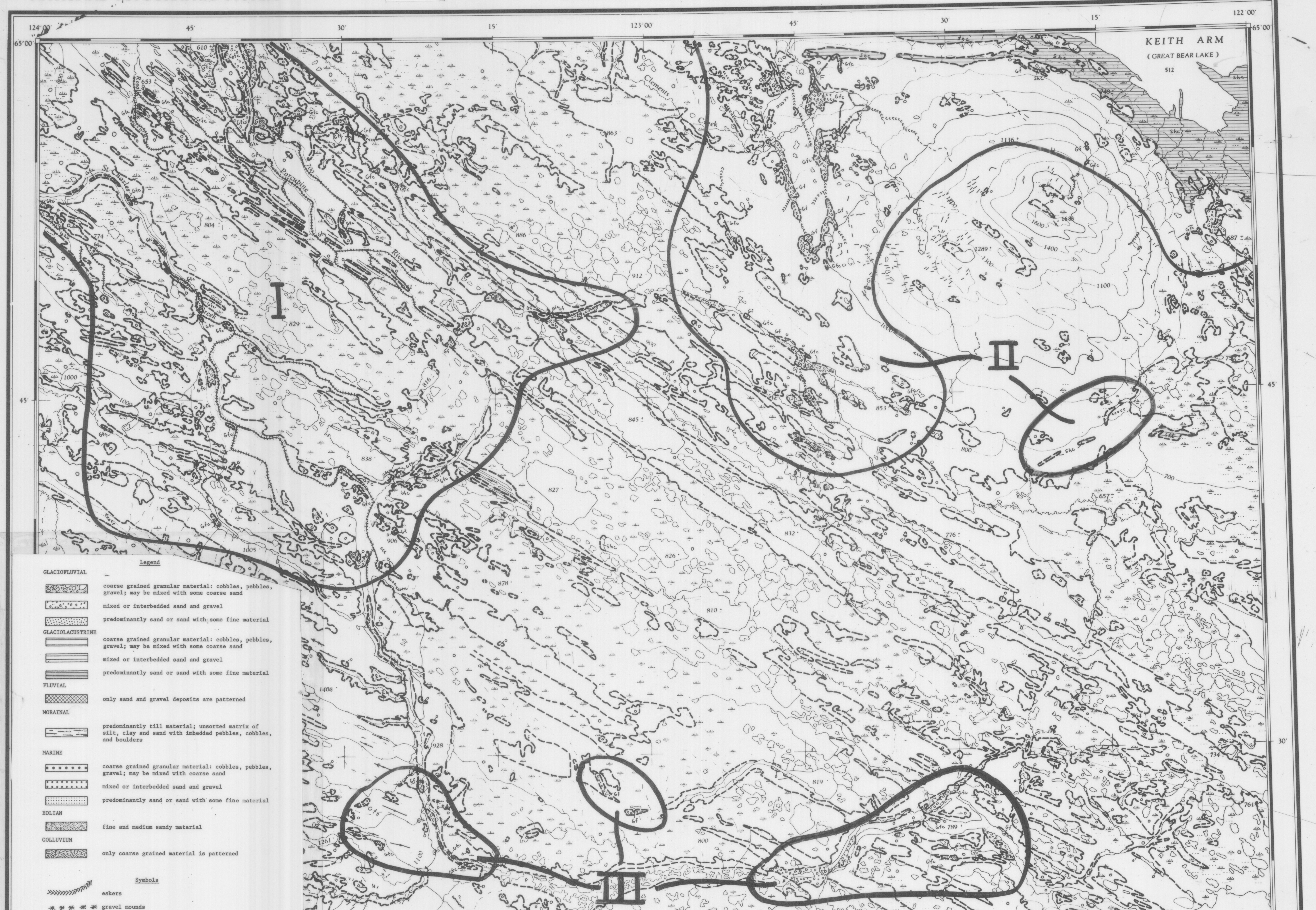
Using all four elements of the legend, a smooth ground moraine surface with moderate slope would be tMp^1; hummocky and ridged glaciofluvial gravel would be gGhr. Note that there are inconsistencies in the use of Mp and Mv mainly because of the difficulty in estimating till thickness.

NATIONAL TOPOGRAPHIC SYSTEM

CANADA

SECOND EDITION

SHEET 96 B



COMPASS NEEDLE, 1958

[redacted]

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Aerial photography by the R.C.A.F. 1950.

BLACKWATER LAKE

GRANULAR RESOURCES

scale 1:125,000

Contour Interval 100 Feet
Elevations in Feet above Mean Sea Level.
Transverse Mercator Projection
North American Datum 1927

66° 96F [redacted] Fo Fran

NATIONAL TOPOGRAPHIC SYSTEM

CANADA

SECOND EDITION

SHEET 96 B

Legend

GLACIOFLUVIAL

- coarse grained granular material: cobbles, pebbles, gravel; may be mixed with some coarse sand
- mixed or interbedded sand and gravel
- predominantly sand or sand with some fine material

GLACIOLACUSTRINE

- coarse grained granular material: cobbles, pebbles, gravel; may be mixed with some coarse sand
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FLUVIAL

- only sand and gravel deposits are patterned

MORAINAL

- predominantly till material; unsorted matrix of silt, clay and sand with imbedded pebbles, cobbles, and boulders

MARINE

- coarse grained granular material: cobbles, pebbles, gravel; may be mixed with coarse sand
- mixed or interbedded sand and gravel
- predominantly sand or sand with some fine material

EOLIAN

- fine and medium sandy material

COLLUVIUM

- only coarse grained material is patterned

Symbols

- eskers
- gravel mounds
- morainal ridge found within moraine

Ksh, ss

COMPASS NEEDLE, 1958

Surveyed, compiled, drawn and printed by the ARMY SURVEY ESTABLISHMENT, R.C.E. 1953-59
Aerial photography by the R.C.A.F. 1950.

BLACKWATER LAKE

BEDROCK GEOLOGY

BLACKWATER LAKE

GRANULAR RESOURCES

scale 1:125,000

Contour Interval 100 Feet
Elevations in Feet above Mean Sea Level.
Transverse Mercator Projection
North American Datum 1927

96F