GRANULAR RESOURCE INVENTORY - MACKENZIE -UPPER RAMPARTS RIVER NTS 106G (1:125,000) Produced for Northern and Indian Affairs by Dept. of Energy, Mines & Resources





GRANULAR RESOURCE INVENTORY - MACKENZIE UPPER RAMPARTS RIVER NTS 106G

SCALE 1:125,000

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> TERRAIN SCIENCES DIVISION MAR 1973 LA DIVISION DE LA SCIENCE DES TERRAINS

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For - Department of Indian and Northern Affairs

SUMMARY

Sand and gravel of glaciofluvial origin occur in abundance north of the Mackenzie Mountains in the Upper Ramparts map area. Granular material of fluvial origin occurs in the upper reaches of streams originating in the mountains. The lower reaches of these streams also contain sand and gravel but have a greater proportion of silt and clay.

Cretaceous shale and sandstone outcrop in the northern half of the map area. Devonian shale, sandstone and carbonate form the Mackenzie Mountain foothills. Precambrian, Ordovician and Silurian carbonate, quartzite and shale occur in the Mackenzie Mountains.

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Figure: Upper Ramparts River - physiographic regions

Maps: 1. Uncosolidated granular material and granular resource areas

2. Bedrock overlay

INTRODUCTION

This report attempts to assess the quality and quantity of granular material available for construction from both unconsolidated deposits and bedrock sources. Sand and gravel of glaciofluvial and fluvial origin are good sources of construction material. Bedrock, such as limestone and sandstone is evaluated as a source of aggregate if it is coherent and resistant to weathering in its natural state. Shale is considered as a source of subgrade material.

The information in this report and on the accompanying maps has been compiled largely from published and unpublished manuscripts of the Geological Survey and from personal communication with officers of the Geological Survey of Canada.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. Some field checking was carried out during the summer of 1972.

The basic document used in this compilation, and from which all areal data were derived, is a surficial geology map of Upper Ramparts River, at a scale of 1:125,000 (Hughes, 1970). It is indexed as G.S.C. Open File 26 and may be viewed at Geological Survey of Canada offices in Ottawa, Calgary and Vancouver. Ozalid copies may be obtained commercially at nominal cost. A derived map of unconsolidated granular material, also at a scale of 1:125,000, has been produced from this surficial geology map, and accompanies this report.

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 such variables 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. A tabular summary of calculated volumes of available sand and gravel is included at the end of this report.

A bedrock geology map has been prepared, as a transparent overlay sheet, from a Geological Survey of Canada unpublished manuscript bedrock geology map (Cook, D.G. 1972) and a Geological Survey of Canada published bedrock Map 30-1963 (Douglas, R.J.W. and MacLean, B., 1963). The rock units of the derived map are grouped according to age and gross lithology which indicate the availability of bedrock as an alternative to unconsolidated material for construction purposes.

For convenience in description, areas of granular material are designated by Roman numerals. Each area is sequentially listed in the tabular summary.



SCALE 1 inchi to 40 miles

FIGURE 1

after BOSTOCK 1967

GENERAL GEOLOGY AND PHYSIOGRAPHY

Three physiographic regions are represented in the Upper Ramparts River map area. The Mackenzie Mountains occupy the southern third of the map area; the Peel Plateau dominates the northern two thirds except for the northeast corner of the map area which lies within the Peel Plain (Figure 1).

Surficial geology has been mapped only on the Peel Plateau and Plain. Bedrock is primarily exposed in the Mackenzie Mountains.

Unconsolidated Granular Deposits

Glaciofluvial Deposits, sand and gravel, G

Sand and gravel of glaciofluvial origin occur in the Upper Ramparts River map area as glacial outwash plains, terrace and channel deposits. The deposits range in area up to 16 square miles. Because the deposits contain coarse grained material and are topographically higher than the surrounding terrain, they probably contain a small amount of ground ice. It is estimated that 80% of the sand and gravel from these glaciofluvial deposits is available for construction purposes.

Fluvial Deposits, sand and gravel, F

Sand and gravel of fluvial origin occur as fluvial terraces, plains and fans on the upper reaches of the major rivers in the map area. Most of these rivers originate in the Mackenzie Mountains. Sand and gravel mixed with increasing amounts of silt and clay are found in the lower reaches of these rivers. In this report only the deposits of the upper reaches are considered as potential areas of granular material.

The maximum thickness of these sand and gravel deposits is estimated to be 15 feet. Because of the high water table and the deposits close proximity to streams and rivers, it is estimated that only 50% of the sand and gravel is available as a granular construction material.

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Bedrock Geology

The bedrock of the Upper Ramparts River map area can be divided into three groups: The flat-lying bedrock underlying the Peel Plateau and Plain; the bedrock of the Mackenzie Mountain foothills; and the uplifted bedrock of the Mackenzie Mountains.

Cretaceous shale and sandstone underlie most of the plain and plateau in this map area. The rock weathers easily and outcrops mainly in the river valleys. Where the shale and sandstone are close to the surface they can be ripped for subgrade material.

The foothills are composed of Devonian shale and sandstone of the Imperial Formation and Devonian carbonate and shale of the Kee Scarp and Hare Indian Formations.

The bedrock of the Mackenzie Mountains consists of Ordovician and Silurian carbonate and Precambrian quartzite and shale. Most of the bedrock from the foothills and the mountains is suitable for construction aggregate.

MATERIALS

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Sand and gravel of glaciofluvial and fluvial origin are abundant north of the Mackenzie Mountains, in the Upper Ramparts River map area. The granular deposits vary in size and thickness. Ground ice content is probably low. Much of the unconsolidated granular material of these deposits is available for construction purposes.

Cretaceous shale and sandstone underlying the Peel Plain and Plateau can be ripped for subgrade material where the overburden is thin. Bedrock of the foothills and Mackenzie Mountains consists of carbonate, quartzite and shale and is a good source of construction material.

TABULAR SUMMARY

ription and Material	Area (Sq. mi.)	Estimated Average Thickness_	Estimate Granular (yds ³	d Volume of Material x 10 ⁶)
		(ft.)	total	available
I Upper reaches of Crans	wick River			
<u>Gfc;</u> Glaciofluvial; channelled; sand and gravel	6.09	20	126.74	101.39
<u>Gf;</u> glaciofluvial; sand and gravel .	5.09	20	108.09	86.47
Fa; fluvial fan; sand and gravel	0.78	10	8.13	4.06
<u>Ft;</u> fluvial terrace; sand and gravel	1.75	10	20.31	10.15
II Lower reaches of Ramp	arts River			
<u>Gfc;</u> glaciofluvial; channelled; sand and gravel.	16.40	40	693.03	546.42
<u>Gf;</u> glaciofluvial; sand and gravel	0.82	40	34.12	27.79
. III West of Arctic Red	River			
<u>Gf;</u> glaciofluvial; sand and gravel	0.55	15	8.55	6.84
<u>Fp;</u> fluvial plain; sand and gravel	12.22	15	190.95	95.47
Fa; fluvial fan; sand and gravel	1.01	20	21.11	10.55
<u>f;</u> Fluvial; sand and gravel	0.78	15 .	12.20	6.10
. IV Upper reaches Arctic	Red River			
<u>Gfc;</u> glaciofluvial; channelled; sand	0.66	20	13.79	11.03
<u>Gf;</u> glaciofluvial; sand and gravel	2.38	20	49.55	39.64

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TABULAR SUMMARY

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ription and Material	Area (sq. mi.)	Estimated Average Thickness (ft.)	Estimate Granular (yd: total	Estimated Volume of Granular Material (yds ³ x 10 ⁶) total available	
		*			
<u>Ft;</u> fluvial terrace; sand and gravel	12.78	20	253.48	152.08	
<u>Fp;</u> fluvial plain; sand and gravel	5.47	20	113.75	68.25	
<u>F;</u> fluvial; sand and gravel	4.92	20	102.36	61.41	
<u>Fa;</u> fluvial fan; sand and gravel	1.44	20	30.04	18.02	
V Upper reaches of Rampar	rts River		•		
<u>Gfc;</u> glaciofluvial; channelled; sand and gravel	9.06	20	188.48	150.78	
<u>Gf;</u> glaciofluvial; sand and gravel	4.57	20	95.04	76.03	
Fa; fluvial fan; sand and gravel	1.29	15	20.15	10.07	
<u>Fp, F;</u> fluvial plain; sand and gravel	13.39	15	209.25	104.62	

SOURCES OF INFORMATION

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

Bostock, H.S.

1967: Physiographic Regions of Canada; Geol. Surv. Can. Map 1254A.

Cook, D.G. Manuscript Bedrock Geology Map, Upper Ramparts River, Geol. Surv. Can. (unpublished).

Hughes, O.L.

1970: Manuscript of Surficial Geology of Upper Ramparts River 106G, Geol. Surv. Can. Open File 26.

Prest, V.K., Grant, D.R., Rampton, V.N.

1967: Glacial map of Canada, Geol. Surv. Can. Map 1253A.

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

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

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

•	٠	٠	٠	•	٠	٠
- <u>-</u>						

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

* * * *

-0-0

-0-

gravel mounds

morainal ridge found within moraine

APPENDIX I Part (ii)

Bedrock Geology

(black line overlay)

The rock units which appear on the accompanying overlay are grouped 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 code designating gross lighology, 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

Age

\mathbf{T}		Tertiary
К	-	Cretaceous
JR		Jurassic
TR		Triassic
Pr	-	Permian
С	-	Carboniferous
D		Devonian
S		Silurian
Ó		Ordovician
€	-	Cambrian
Р	_	Precambrian



Lithology

- car carbonate
 - limestone and/or dolomite
- 1s limestone
- dol dolomite
- ss sandstone sh - shale

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 area of surficial cover

Limit of mapping

All units and symbols do not necessarily appear on this map.

APPENDIX I, Part (iii)

GRANULAR RESOURCE UNITS

GRANULAR RESOURCE AREAS (black)

IV

granular resource area (see text for corresponding description)

APPENDIX I, Part III

SURFICIAL GEOLOGY AND LANDFORMS

(v)

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

Complex Units:

e.g. in: Mp-f0, f0 constitutes 25% to 49% of area : Mp/f0, f0 = 5% - 24% of area

using all four elements of the legend, a smooth ground moraine surface with moderate slope would be tMp¹; hummocky and ridged glaciofluvial gravel would be gChr. Note that there are inconsistencies in the use of Mp and Mv mainly because of the difficulty in estimating till thickness.