





GRANULAR RESOURCE INVENTORY-MACKENZIE PORTIONS OF BLOW RIVER NTS 117A, DEMARCATION POINT NTS 117C,

AND HERSCHEL ISLAND NTS 117D

SCALE (1:125,000)

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SUMMARY

Sand and gravel of glaciofluvial and fluvial origin is abundant in the Blow River, Demarcation Point, and Herschel Island map areas. In general, the ground ice and organic content are low. A large percentage of unconsolidated granular material for construction purposes is available from each deposit.

Bedrock is exposed in the British and Richardson Mountains, on the Porcupine Plateau, and in the river valleys of the Yukon Coastal Plain. The carbonate rocks of the British Mountains and foothills could provide aggregate if crushed. Sandstone found in the Buckland Hills and on the Yukon Coastal Plain could also be used for aggregate. Shale of the coastal plain could be ripped for subgrade material.

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INTRODUCTION

This report attempts to assess the quality and quantity of granular material available for construction from both unconsolidated 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. Shales and siltstones are considered sources for subgrade material.

The information in this report and on the accompanying maps has been compiled largely from published and unpublished Geological Survey manuscripts and from personal communication with officers of the Geological Survey of Canada.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.

The basic documents used in this compilation and from which all areal data were derived, are surficial geology maps of portions of Blow River (1174), Demarcation Point (117C), and Herschel Island (117D), at a scale of 1:250,000 (Rampton, 1970). These maps are indexed as G.S.C. Open File Number 21 and may be viewed at Geological Survey of Canada offices in Ottawa, Calgary and Vancouver. Ozalid copies may be obtained commercially at nominal cost. Maps of unconsolidated granular material have been produced from these surficial geology maps, at a scale of 1:125,000.

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

Bedrock geology maps of portions of these three map areas have been prepared as overlay sheets from a published Geological Survey of Canada map (Douglas, R.J.W. and MacLean, B., 1963) and from an unpublished Geological Survey manuscript map (Norris, D.K., 1972). The rock units on these overlayshave been grouped according to age and gross lithology and indicate the availability of bedrock for construction purposes as an alternative to unconsolidated material.

For convenience in description, areas of granular material are numbered in Roman numerals on the granular resource maps. Each area is sequentially listed in the tabular summary of materials in the report.

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GENERAL GEOLOGY AND PHYSIOGRAPHY

This report assesses the granular material within portions of the Blow River, Demarcation Point and Herschel Island map areas. Sources of granular materials in the three map areas are described in a single report because of their similarity of occurrence and the relatively small areas of concern.

Sand and gravel of glaciofluvial and fluvial origin are found extensively within the Yukon Coastal Plain. There are many glaciofluvial and fluvial deposits covered with 10'-15' of organic material. These deposits have not been considered in this report because of the abundance of organic-free deposits.

Bedrock is well exposed in the British and Richardson Mountains and on the Porcupine Plateau. Exposures of bedrock on the Yukon Coastal Plain are limited to river valleys near the foothills of the mountains. Unconsolidated Deposits

Glaciofluvial Deposits, sand and gravel, 10

Sand and gravel deposits of glaciofluvial origin are abundant in the Herschel Island and Blow River map areas. No glaciofluvial deposits exist in the Demarcation Point map area. These deposits form kame deltas and terraces, and kettled outwash fans. The glaciofluvial deposits consist largely of gravel-sized material except the deposits at the mouth of Deep Creek (on Herschel Island map area) which are mainly sand. In general the glaciofluvial deposits are greater than 10 feet in thickness. Because the material is coarse grained and the deposits are well drained, the ground ice content is low. Vertical ice wedges are common. It is estimated that 80% of the sand and gravel in these deposits is available as unconsolidated granular construction material.

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Fluvial Deposits, sand and gravel, 2,4

Sand and gravel of fluvial origin occur in all three map areas. Low fluvial terraces parallel present day streams. Low gradient alluvial fans form at the base of the British Mountains between the Firth River and the Alaska/Yukon border. Both these deposits average 25 feet in thickness. Because very little fine material is associated with these deposits and the ice content is low it is estimated that 90% of the material in these deposits (marked as 2 on the map) is available as a granular resource.

High fluvial terraces also parallel present day streams; these deposits are up to 150 feet thick and are usually covered by a thin layer of organic material and some silt. Ice content in the sand and gravel is low but the silt layer usually has a higher ground ice content. Vertical ice wedges are present also in these deposits. Fifty per cent of the granular material of these deposits (indicated as 4 on the map) is available as construction material.

Bedrock Geology

Bedrock is well exposed in the British and Richardson Mountains and on the Porcupine Plateau. On the Yukon Coastal Plain bedrock is exposed only in the river valleys near the highlands. No bedrock is exposed on the seaward edge of the plain and it is estimated that more than 200 feet of overburden covers this bedrock (Rampton, personal communication).

In the Demarcation Point map area, rocks of the Precambrian Neruokpuk Formation underlie the Yukon coastal Plaim. This unit consists of argillite (highly compacted shale) interbedded with limestone, dolomite

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and sandstone. Rocks of this unit underlie parts of the Herschel Island map area as well.

Limestone and dolomite of the Carboniferous Lisburne Group are found in the foothills of the British Mountains. These rocks are resistant to weathering but are highly shattered. The bedding thickness of these rocks is less than five feet.

In the Herschel Island map area, the Jurassic Kingak Formation consists of shales and siltstones. These rocks are fissile, soft and not well exposed. Shale, sandstone and limestone form the other Jurrasic unit which is more coherent and form the Buckland Hills.

North of these Jurassic units and continuing into and underlying most of the mapped portion of the Blow River map area is a Cretaceous shale, siltstone and sandstone unit. The shale and siltstone are soft and easily weathered and therefore poorly exposed. The sandstone which is more coherent outcrops as small topographic "highs" of the Yukon Coastal Plain.

The rocks underlying the Yukon Coastal Plain are generally flat lying while the bedding of the rocks found in the foothills and highland areas is gently to steeply dipping.

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MATERIALS

Unconsolidated granular material is abundant in the study area. Sand and gravel occur in glaciofluvial and fluvial deposits. Some of these deposits are covered by an organic layer up to 15' thick, but this report considers only the deposits without a thick organic layer. In general the sand and gravel are well drained and have a low ice content.

Bedrock outcrops extensively in the British and Richardson Mountains and Porcupine Plateau while on the Yukon Coastal Plain it is exposed only in river valleys near the highlands. The limestone and dolomite of Carboniferous age found in the British Mountains would make excellent aggregate material if crushed. Since this rock is already highly shattered crushing would be minimal. Precambrian argillite, limestone, dolomite and sandstone would also prove satisfactory as construction materials. The sandstone members of the Jurassic and Cretaceous units may also be crushed or ripped for aggregate. The shales of these rock units could be used for subgrade material.

Description and Ma	Material Area Estimated Estimated Vol (sq. mi.) Average Granular Mate		ed Volume of r Material		
			(ft.)	(yds	3×10^{6}
	•	· · ·	•= - ••	total	available
DEMARCATION POINT		•	· · · · · · · · · · · · · · · ·		
Area I CANADA-U.S	S. BORDER	•			
a) <u>2</u>		1.17	25	30.48	27.43
fluvial; low te	erraces;		· · ·		
gravel and sand	1.				
Area II CRAIG CREE	EK			•	
a) <u>4</u>		4.29	40	179.88	89.44
fluvial; high t	terraces;				
gravel and sand	1.			•	
Ъ) <u>2</u>		4.88	25	127.03	114.32
fluvial; low te	erraces;	-•	···		
gravel and sand	1.				
c) <u>4</u>		1.75	40	73.18	36.59
fluvial; high t	erraces;				
gravel and sand	1.		2		
Area III CLARENCH & BACKHO	E LAGOON DUSE RIVER		•		
a) <u>2</u>		24.59	25	640.24	576.21
fluvial; low te	rraces;			•	
gravel and sand	ι.				
Area IV EAST OF BACKHOUSE	RIVER	· .			
a) <u>2</u>	•	.11	25	2.99	2.69
fluvial; low te	erraces;				
gravel and sand	l .		•		
b) <u>2</u>		.97	25	25.40	22.86
fluvial; low te	rraces;		. :		
gravel and sand	l		•		
Area V NORTH OF F CREEK	ISH				
a) <u>2</u>	•	1.36	25	35.56	32.00
fluvial; low te	rraces;				

gravel and sand.

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De	scripti	on and Ma	terial	Area (sq. mi.)	Estimated Average Thickness • (ft.)		Estimate Granular (yds	ed Volume of Material ³ x 10 ⁶)
DE	MARCATI	ON POINT	(Con't)				total	available
Ar	ea VI	KOMAKUK BEACH						
a)	2	,		17.56	25	•	457.31	411.57
	fluvia	1; low te	rraces;					
	gravel	and sand	•				•	
ь)	<u>4</u>			.07	40		3.19	1.59
	fluvia	l; high t	erraces;					
	gravel	and sand	•					•
c)	4		- ~	.07	40		3.19	1.59
	fluvia	L; high to	erraces;			• .		

gravel and sand.

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			- ·	
	- 9 -	-		
Description and Material	Area (sq. mi.)	Estimated Average	Estimate Granular	d Volume of Material
		Inickness (ft.)	(yds ³	x 10 ⁶)
HERSCHEL ISLAND			to tal	availabie
Area I WEST OF FIRTH RIVER	•			
a) <u>2</u>	40.79	25	1061.99	955.79
fluvial; low terraces;				
gravel and sand.				
b) <u>4</u>	7.80	40	325.25	162.62
fluvial; high terraces;		· · · · · ·		
gravel and sand.				
•c) <u>4</u>	1.24	40	51.98	25.99
fluvial; high terraces;				
gravel and sand.	1 05	• •	01 01	· · · · · ·
(1) <u>4</u> flumial, high tarraces.	τ.γς	40	ΔΤ· ΟΤ	40.65
arovel and sand.				•
p) 4	1.44	40	60.11	30.05
fluvial: high terraces;	⊥₄яя ,			0.02
eravel and sand.				
f) 10	.03	20	.79	.63
elaciofluvial;	•			
gravel.	1	• •		
g) <u>10</u>	.19	20	4.06	3.24
glaciofluvial;				·
gravel.				•
h) <u>10</u>	.39	20	8.12	6.49
glaciofluvial;		· · · ·		
gravel.				
i) <u>10</u>	.07	20	1.59	1.27
glaciofluvial;		•		· · · · · ·
gravel.		· · · · · ·		
•				. · · ·
				•
· · ·		· · ·		· .

Description and Material	Area (sq. mi.)	Estimated Average	Estimated Yolume of Granular Material		
HERSHEL ISLAND (con't)	•	Thickness (ft.)	$(yds^3 \times 10^6)$		
Area II EAST OF FIRTH RIVER			total	available	
a) <u>2</u>	5.85	25	152.43	137.18	
fluvial; low terraces;	•				
gravel and sand.		•			
b) <u>4</u>	2.14	40	89.44	44.72	
fluvial; high terraces;			•		
gravel and sand.					
c) <u>2</u>	1.56	25	40.65	36.58	
. fluvial; low terraces;				·····.	
gravel and sand.		· -			
d) <u>2</u>	2.34	25	60.97	54.87	
fluvial; low terraces;					
gravel and sand.					
e) <u>4</u>	1.95	40	81.31	40.65	
fluvial; high terraces;					
gravel and sand.			•		
f) <u>10</u>	2,92	20	60.93	48.74	
glaciofluvial;					
gravel.					
g) <u>10</u>	2.34	20	48.75	39.00	
glaciofluvial;					
gravel.					
h) <u>10</u>	2.34	20	48.75	39.00	
glaciofluvial;	•				
gravel.	•				
i) <u>10</u>	2.14	20	44.68	35.74	
glaciofluvial;			•		
gravel.					
j) <u>10</u>	1.56	20	32.50	26.00	
glaciofluvial;		• •			
gravel.					

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Description and Material	nd Material Area Estimated Estimated Volume o (sq. mi.) Average Granular Material		ne of Lal		
HERSHEL ISLAND (con't.)		(ft.)	(yd ³ x 10 ⁶)	x 10 ⁶)	
			total availa	able	
k) <u>10</u>	10.01	20	213.19 170.36	5	
glaciofluvial;		· · · ·			
gravel (36 deposits	· •				
evenly scattered		•			
throughout area)					
Area III SPRING RIVER		• •	•		
a) 2)	31.23	20	813.00 731.70)	
				•	
• gravel and sand.					
b) 2	.97	25	25.40 22.86	j	
fluvial; low terraces;	-				
gravel and sand.					
c) 2	.19	25	5.08 4.57	,	
fluvial; low terraces;		~~~			
gravel and sand.	-		•		
d) 4	.58	40	24.39 12.19	,	
fluvial: high terraces:			,		
gravel and sand.		•			
e) 4	1.17	40	48.78 24.39)	
fluvial: high terraces:	,	40			
gravel and sand.					
f) 4	- 58	40	24.39 12.19		
fluvial: high terraces:		40	24.39 22.29		
gravel and sand					
g	. 58	40	24 39 12 19	ŀ	
fluvial: high terraces.		40	24.39 12.19		
gravel and cand		-	•		
b) 10	2.06	20	13 70 34 04		
alaciofingial.	4.00	20	43.70 34.94		
erantor tuvrer,					
BIGVCI.					

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Description and Material	Area Estimated Estimated Volume of (sq. mi.) Average Granular Material			
HERSCHEL ISLAND (con't.)		(ft.)	(yd ³	x 10 ⁶)
			total	available
Area IV SOUTH OF		•	•	
KAY POINT				
a) <u>4</u>	1.36	40	56.91	28.45
fluvial; high terraces,	×			
gravel and sand.		•	•	
b) <u>4</u>	8.39	40	349.64	174.82
fluvial; high terraces;				
gravel and sand.		•	•	
c) <u>4</u>	2,92	40	121.96	60.98
fluvial; high terraces;		•		
gravel and sand.			1. 1.	
d) <u>2</u>	.38	25	10.16	9.14
gravel and sand.				
e) 2	34.16	25	889.22	800.29
fluvial; low terraces;	-			
gravel and sand.				
f) 4	.71	40	29.33	14.66
fluvial; high terraces;		•		
gravel and sand.				
g) 10	13.77	20	286.77	229.41
glaciofluvial;				
gravel.				
h) 10	1.17	20	24.37	19.49
glaciofluvial;				
sand.				
i) 10	1.36	20	28.43	22.74
glaciofluvial;				
gravel.		•		
j) 10	1.36	20	28.43	22.74
glaciofluvial;		•		
gravel.				

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De	scription and Material	Area (sq. mi.)	Estimated Average	ted Estimated Volum e Granular Materi	ed Volume of r Material	
HE	RSCHEL ISLAND (con't.)		Thickness (ft.)	$(yd^3 \times 10^6)$		
	•	,		total	available	
k)	<u>10</u>	1.44	20	30.03	24.02	
	glaciofluvial;					
	gravel.					
1)	<u>10</u>	.97	20	20.31	16.24	
	glaciofluvia1;		•			
	gravel.			•		
m)	<u>10</u>	•97	20	20.31	16.24	
	glaciofluvial;			·		
•	gravel.		•			
n)	<u>10</u>	.85	20	17.84	14.27	
	glaciofluvial;					
	sand.					
o)	<u>10</u>	6.14	20 ·	129.43	103.61	
	glaciofluvial;					
	gravel.	-			•	
	(21 deposits					
	scattered throughout					
	man area)					

Description and Material	Area Estimated Estimated Volume of (sq. mi.) Average Granular Material		d Volume of Material	
		Inickness (ft.)	(yds ³	x 10 ⁶)
BLOW RIVER			tötal	available
Area I GRAVEL CREEK		•		
a) 2	1.94	25	50.80	45.72
fluvial; low terraces;		• • •		
gravel and sand.				
b) <u>4</u>	.58	40	24.39	12.19
fluvial; high terraces;	- -		•	
gravel and sand.		•		
c) <u>4</u>	.16	40	8.13	4.06
fluvial; high terraces;				
gravel and sand.				
Area II BABBAGE RIVER				
a) <u>10</u>	.78	20	16.25	13.00
glaciofluvial;		•		
gravel.				
b) <u>10</u>	.58	20	12.18	9.74
glaciofluvial;				
gravel.				
c) <u>10</u>	1.36	20	28.43	22.74
glaciofluvial;	·	•		
gravel.			•	
d) <u>10</u>	1.56	20	32.50	26.00
glaciofluvial;				
gravel.				•
e) <u>10</u>	.78	20	16,25	13.00
glaciofluvial;				
gravel.				
f) <u>10</u>	.58	20	12.18	9.74
glaciofluvial;				
gravel.	•			
g) 10	,32	. 20	7.15	5.71
glaciofluvial;	•	· •		
gravel.		•		
(5 deposits scattered		· .		• .

throughout map area)

Descr	iption and Material	Area (sq. mi.)	Estimated Average Thickness	Estimate Granular (yds ²	ed Volume of Material x 10 ⁶)
BLOW	RIVER (con't.)		(ft.)	4-4-1	
h) 2		13 66	25	10LAI 355 60	320 12
	untals low tormeson	13.00	ZJ	555.05	520.12
	uvial; low terraces;	•	•		
r St	aver and sand.	EO	05	15 94	10 71
1) <u>2</u>		• 28	25	15.24	13./1 4
II.	uvial; low terraces;	• •		•	
gr	avel and sand.				
<u>j) 4</u>		2.14	40	89.44	44.72
• fl	uvial; high terraces;		н. 1		
gr	avel and sand.				
k) <u>4</u>	· · · · ·	1.63	40	68.24	34.12
f1	uvial; high terraces;		•		
gr	avel and sand.		•		
1) <u>4</u>		1.75	40	73.18	36.59
f 1	uvial; high terraces;				
gr	avel and sand.				
m) <u>4</u>		.78	40	32.52	16.26
f1	uvial; high terraces;				
gr	avel and sand.				
n) <u>4</u>		3.70	40	154.49	77.24
f1	uvial; high terraces;			-	
gr	avel and sand.				
·. –					
o) 4		1.56	40	65.05	32.52
f1	uvial; high terraces;	•			
gr	avel and sand.		•	,	
р) 4		.39	40	16.26	8.13
	uvial: high terraces:				
gr	avel and sand.				
0-	· · · · · · · · · · · · · · · · · · ·				

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Description and Material	and Material Area Estimated Estimated Vol (sq. mi.) Average Granular Mater Thickness (yds ³ x 10)		d Volume of Material x 10 ⁶)	
BLOW RIVER (con't.)		~ ,	total	available
Area III WEST OF BLOW		•		
RIVER		· .		
a) <u>10</u>	3.90	20	81.25	65.00
glaciofluvial;		•		
gravel.			· .	
b) <u>10</u>	.39	. 20	8.12	6.49
glaciofluvial;		•		
• gravel.		. •		
c) <u>10</u>	.09	20	2.03	1.62
glaciofluvial;				
gravel.		•		
d) <u>10</u>	1.44	20	30.03	24.02
glaciofluvial;				
gravel.	•		•	
e) <u>10</u>	.70	20	14.58	11,66
glaciofluvial;				
gravel.			•	
f) 10	.39	20	8.12	6.49
glaciofluvial;		6	•	
gravel.				
g) <u>10</u>	.39	20	8.12	6.49
glaciofluvial;				•
gravel.	. •	·		
h) <u>4</u>	.39	- 40	15.90	7.90
fluvial; high terraces;				
gravel and sand.		•	•	, ,
1) <u>4</u>	.03	40	1.59	.79
fluvial; high terraces;	· ·			
gravel and sand.				•
j) <u>2</u>	.58	25 .	15.24	13.71
fluvial; low terraces;				
gravel and sand.	а. С			

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			<u> </u>	—	
De	scription and Material	Area (sq. ml.)	Estimated Average	Estimat Granula	ed Volume of r Material
BL	LOW RIVER (con't.)		(ft.)	(yds	³ x 10 ⁰)
	•	· · ·	• •	total	available
k)	2_	.97	25	25.40	22.86
	fluvial; low terraces; gravel and sand.				
1)	2	9.36	25	243.90	219.51
	fluvial; low terraces;		· .	· · ·	
	gravel and sand.			2010 - 12 12	
Ar	ea IV BLOW RIVER			•	
a)	<u>10</u>	.31	20	6.46	5.16
•	glaciofluvial;				
	gravel.				
b)	<u>10</u>	.31	20	6.46	5.16
	glaciofluvial;		• • • • • •		
	gravel.				
c)	<u>4</u>	9.74	40	407.84	212.95
	fluvial; high terraces;	•			
	gravel and sand.				
	(several deposits				
	scattered evenly through	nout		с. 14	
	map area).		•		
d)	2	21.70	25	565.98	529.35
	fluvial; low terraces;				
	gravel and sand.				• •
	(several deposits scatte	≥red		• .	
	evenly throughout map an	rea).			• •
Are	≥a V WEST OF YUKON - N.W.T. BOUNDARY	•		· · · · · · · · · · · · · · · · · · ·	
a)	<u>10</u>	.39	20	8.12	6.49
	glaciofluvial;				
	gravel.			,	
b)	<u>10</u> .	.58	20	12.18	9.74
	glaciofluvial;		•	,	•
	gravel.				
	•		· · · · · · · · · · · · · · · · · · ·		•

		•	•	•
	- 18	3 -		
Description and Material	Area Estimated (sq. mi.) Average Thickness (ft.)		Estimated Volume of Granular Material (yds ³ x 10 ⁶)	
	-	-, ⁻	total	available
c) <u>2</u> fluvial; low terraces;	1.36	25	35.56	32.00
gravel and sand.	•			
<pre>d) <u>2</u> fluvial; low terraces; gravel and sand.</pre>	1.56	25	40.65	36.58
e) 4	.58	40	. 24 30	12 10
fluvial; high terraces; gravel and sand.		40	64.JJ	12.13
f) 4	. 19	40	0 1 2	4 06
fluvial; high terraces; gravel and sand.	•17	40	0.13	4.00
g) <u>4</u>	1.95	40	81.31	40.65
oravel and cand				
Area VI EAST OF YUKON - N.W.T. BOUNDARY			•	
a) <u>2</u> fluvial; low terraces;	2.14	25	55.89	50.30
gravel and sand.		•	•	
b) <u>2</u>	.03	25	.99	.89
fluvial; low terraces;				
gravel and sand.				
<pre>c) <u>4</u> fluvial; high terraces;</pre>	.39	40	16.26	8.13
gravel and sand.			1. C.	

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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

0	•	٠	٠	•	٠	•
						-

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

(11)

EOLIAN

fine and medium sandy material

COLLUVIUM

only the patterned area is coarse grained

>>>>==== * * * *

Symbols

eskers

gravel mounds

morainal ridge found within moraine

(iii)

APPENDIX I Part (ii)

Bedrock Geology

(black line overlay)

The rock units on the accompanying overlay are a geological grouping 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

Age .

T - Tertiary K - Cretaceous JR - Jurassic TR - Triassic Pr - Permian C - Carboniferous D - Devonian S - Silurian O - Ordovician € - Cambrian P - Precambrian

Symbols

Lithology

car - carbonate limestone and /or dolomite ls - limestone dol - dolomite ss - sandstone ss - siltstone sh - shale no mnemonic component indicates unit is composed of many of the above rock types

Boundary of bedrock unit (approximate)

Boundary of bedrock unit inferred in area of surficial cover

Limit of mapping

Æ,

APPENDIX I, Part (iii)

GRANULAR RESOURCE UNITS

GRANULAR RESOURCE AREAS (black)



Granular resource area (see text for corresponding description)

APPENDIX I, Part (iv)

	SURFICIAL GEOLOGY AND LANDFORMS	
	107 B W/2, 117A, 117C, 117D	
	Legend - after V.N. Rampton	
Unit	Geomorphology	Material
1	modern floodplain	gravel and sand
	(lacking vegetation)	
2, 2a*	fluvial deposits	gravel and sand
3	marine beach deposits	pebbly gravel
4, 4a	terraced fluvial deposits	gravel and sand
5	alluvial fan deposits	• silt and sand
6	deltaic and alluvium deposits	fine sand, silt
7	lacustrine and bog	clay, silt, sand, muck and peat
8	undifferentiated surficial	mainly till
	deposits	
9a, 9b**, 9c**	morainal deposits and	till, sometimes covering
-,	glacially deformed	clays, silts, sands and
	marine and fluvial deposits	gravels
10, 10a	glaciofluvial deposits	gravel and sand
11	silt	
12, 13	pediment	bevelled bedrock
14	drumlinized till and fluted	till and bedrock outcrops
	bedrock	
15	bedrock and colluvium	bedrock

* 'a' following the unit number indicates an organic cover up to 15'.
** 'b' and 'c' following the unit number indicate an organic cover up to 10'.