

Aggregate Resources of the Cross Lake Area

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Aggregate Report AR87-3

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MAP

Map AR87-3-1: Cross Lake area	in pocket
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INTRODUCTION

Objectives

Surficial geology mapping of the Cross Lake area was carried out in order to:

- 1) delineate the aggregate resources at a scale of 1:50 000;
- 2) locate alternative sources of concrete sand;
- 3) identify potential quarry sites, particularly near the community of Cross Lake; and
- 4) access the aggregate resources in terms of future land-use management.

Location and Access

The Cross Lake area includes Twps. 64 to 66, and Rges. 1-4 (Fig.1) in central Manitoba. The area is situated approximately 70 km north of Lake Winnipeg within the Nelson River system. The community of Cross Lake is the only service centre in the area.

Access to the study area is available by road, air or by boat. The primary route is by road, from Provincial Highway 6, east on Provincial Road 373 (known locally as the Norway House Highway), and then 37 km north on the Cross Lake Road. The ferry crossing across the north arm of the Nelson River is operational during the summer season for business hours. From freeze up the Oxford House winter road, which intersects the Cross Lake road at Sand Bay, also is accessible. The Cross Lake airport has regularly scheduled flights via Thompson and Winnipeg. It is also used for emergency medical and private flights. Boats are used extensively by local residents for transportation purposes.

Methodology

Field investigations were conducted during the summer of 1987. On-site observations were combined with information interpreted from aerial photographs to produce the surficial geology map (Map 87-1, in pocket). Sediment logs from natural exposures, hand dug holes, backhoe test pits and sand, gravel and clay pits are given in Appendix A. Emphasis was directed to the identification and description of aggregate deposits (Map AR87-1, in pocket).

Deposit boundaries were delineated on 1:15 850 scale photographs and transferred to the 1:50 000 base map. Reserve calculations were calculated from the map and should be considered approximate. Reserve values were obtained by taking the area by the averaged depth and subtracting the sterilized or depleted portions.

On-site data collected include lithology, stratigraphy, and general land-use factors. Where sand or gravel was encountered, samples of the matrix and the pebble constituents, were collected.

Aggregate samples were analyzed in two stages. In the field, samples weighing between 75 and 100 kilograms were sieved utilizing 7.5 cm (3"), 3.8 cm (1.5") and 1.9 cm (0.75") screens. The weights of the fractions were recorded and a representative sample of the < 1.9 cm fraction was retained for additional processing.

Pebble counts on the 1.9 - 3.8 cm fraction were done to separate the pebbles into carbonate, granite, volcanic, argillite-greywacke, gneiss-schist, quartzite, and sandstone lithologies. These groups were then further subdivided into good, fair, poor and deleterious constituents.

Previous Work

The surficial geology of the area was mapped by Klassen and Netterville (1980) at 1:250 000 scale and the Quaternary history of the area discussed by Klassen (1985).

A preliminary map, at 1:50 000 scale, of the surficial geology and aggregate resources was previously published (Mihychuk, 1987).

Regional bedrock geology has been mapped by Rousell (1965) and Corkery and Lenton (1984).

Acknowledgements

Kim Proctor, Wayne Sherman, Jerry Raduy and Caroline de Hedervary provided field assistance. Manny Carvalho drafted the maps and figures. The manuscript was edited by D. A. Baldwin.

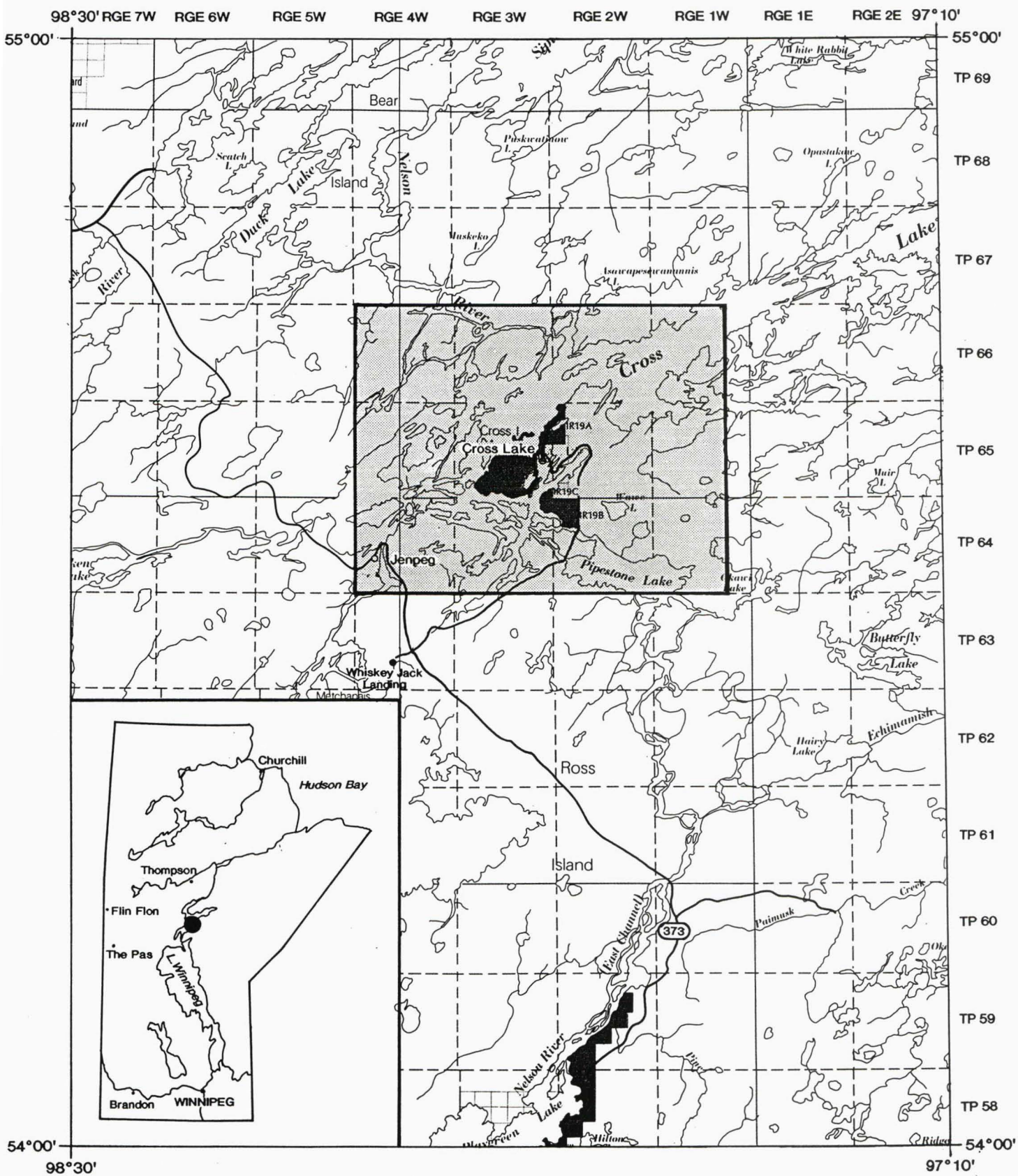


Figure 1: Location map of the Cross Lake study area.

GEOLOGY

Physiography

The area lies within the Molson-Sipiwesk Bedrock Plain physiographic region (Bostock, 1969). The Cross Lake area comprises flat to gently rolling low relief plains and numerous swamps and wetlands. Highest elevations occur north of Pipestone Lake on a moraine complex that is 30 m higher than the surrounding area. The study area is drained by the Nelson River drainage system.

Surficial geology

The most common surficial deposits in the Cross lake area are glaciolacustrine silt and clay units, organic swamp deposits, and sand and gravel related to recessional ice contact environments (Fig. 2). A generalized stratigraphic column is shown in Figure 3. Surficial deposits were mapped according to their relative age (Map 87-1) and are therefore described in that sequence.

Organic deposits (map unit 6) and wetlands constitute approximately 30 per cent of the surficial landscape. Peat deposits are shallow, generally less than 30 cm thick (Fig. 4).

Lake Agassiz glaciolacustrine sediments (map unit 5) form 50 percent of the surficial sediments. The sediments are fine grained, consist of silt and clay, and range in thickness from a few centimeters to more than 3 m. A massive brown clay grades downward into silt rhythmites (Fig. 5). There are 2 clay pits (Fig. 6) located at the intersection of the highway and the Cross Lake pit road (SW21-65-2W).

A 3 km long esker (unit 4) is located 4 km northeast of the community of Cross Lake. It trends southwest and

reaches a maximum height of 14 m. Morphologically it consists of two pronounced esker beads that are separated by a sand plain.

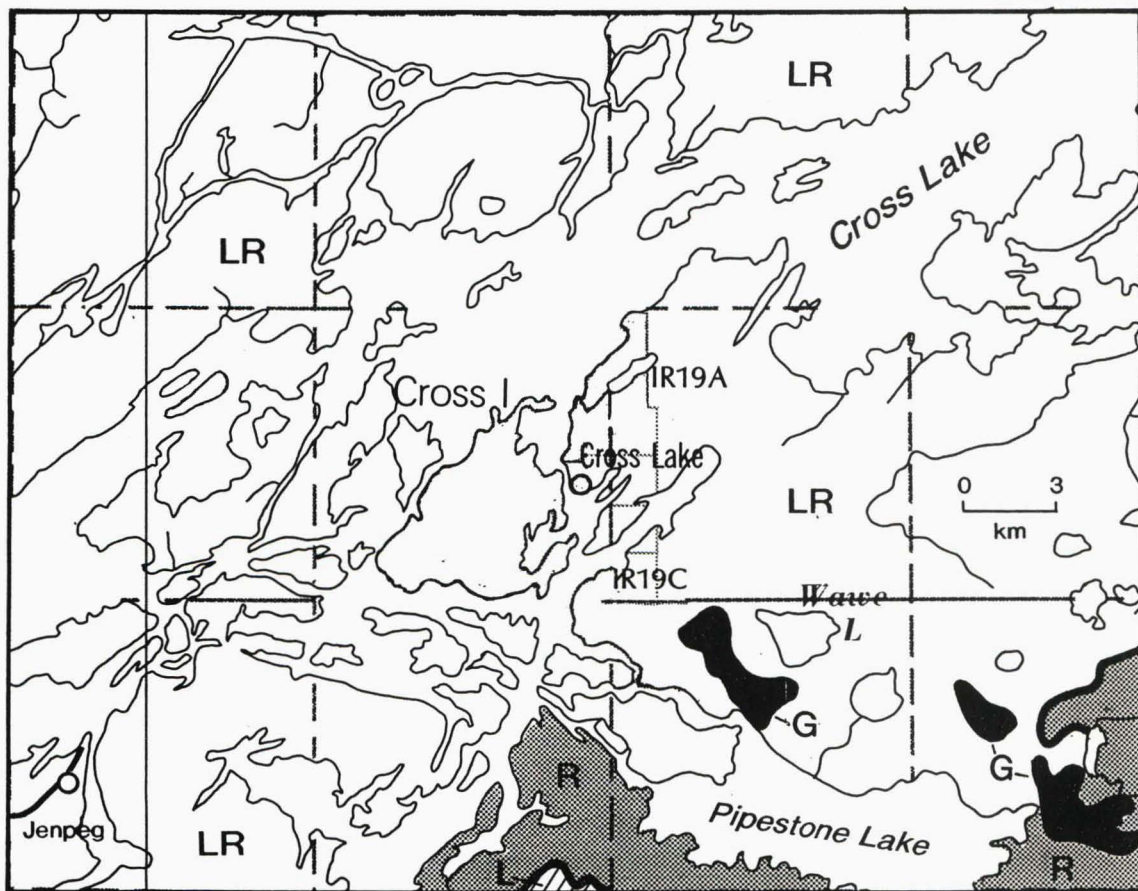
A major ice-contact deposit (unit 3) is located north of Pipestone Lake and west of Wawe Lake. It appears to form part of a discontinuous moraine system that is over 50 km long and trends northwest to southeast in a broad arc that appears to mark an ice frontal position during retreat in the late Wisconsinian ice sheet.

Till (unit 2) exposures were limited to the lee-side of bedrock outcrops in roadcuts. The till is generally stony with a sandy to silty matrix. Clasts are subangular to sub-rounded, some with striated surfaces. Lenses of sand, and boulder lags or concentrations, occur locally in association with the till.

Bedrock geology

Bedrock (unit 1) comprises approximately 10 percent of the area. Outcrops predominate along shorelines and in numerous roadcuts. Bedrock surfaces are striated and one ice flow that ranges from 221 to 242 degrees with a mean value of 235 degrees was determined from measurements made at 19 sites. Striae recorded on Rousell's map (Rousell, 1965) are included on Map AR87-1 (in pocket).

The general bedrock geology of the area (Fig.7) comprises Precambrian granodiorite gneiss overlain by volcanic and sedimentary rocks of the Pipestone Lake and Cross Lake groups (Corkery and Lenton, 1984).



Glaciolacustrine basin deposits : clay and silt



Rock : outcrops and rock with thin cover



Glaciofluvial ice contact deposits : sand and gravel



Glaciolacustrine deposits : discontinuous veneer over rock

Figure 2: Regional surficial geology of the Cross Lake study area (modified from Klassen and Netterville, 1985).

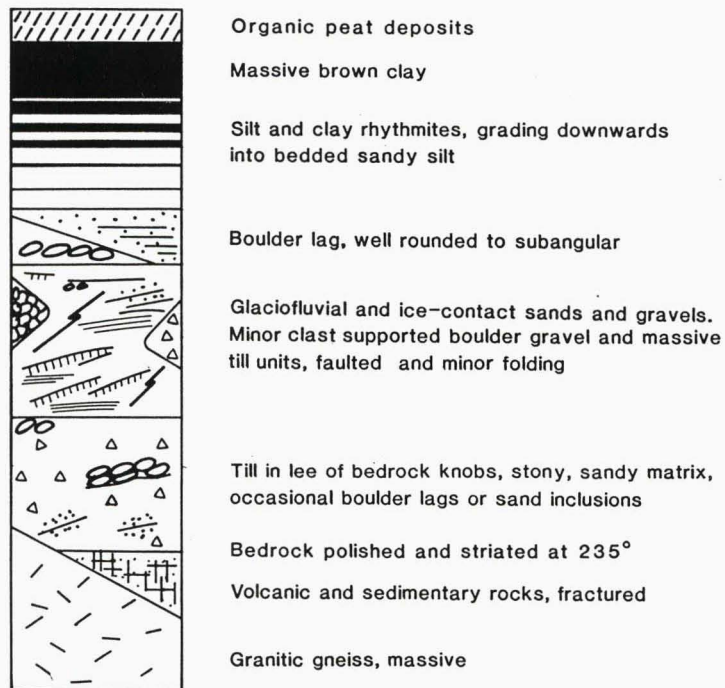


Figure 3: Generalized stratigraphic column for the Cross Lake study area (from Mihychuk, 1987).



Figure 4: Peat deposit at site CL021, unit thickness is approximately 0.3 m. Peat is used locally for landscaping purposes.



Figure 5: Clay rhythmites, dark units are clay and the white laminae are silt with very fine sand.



Figure 6: Clay pit located in the northwest corner of the intersection of the highway and the Cross Lake pit road. The brown massive clay unit is extracted for local uses by the community.

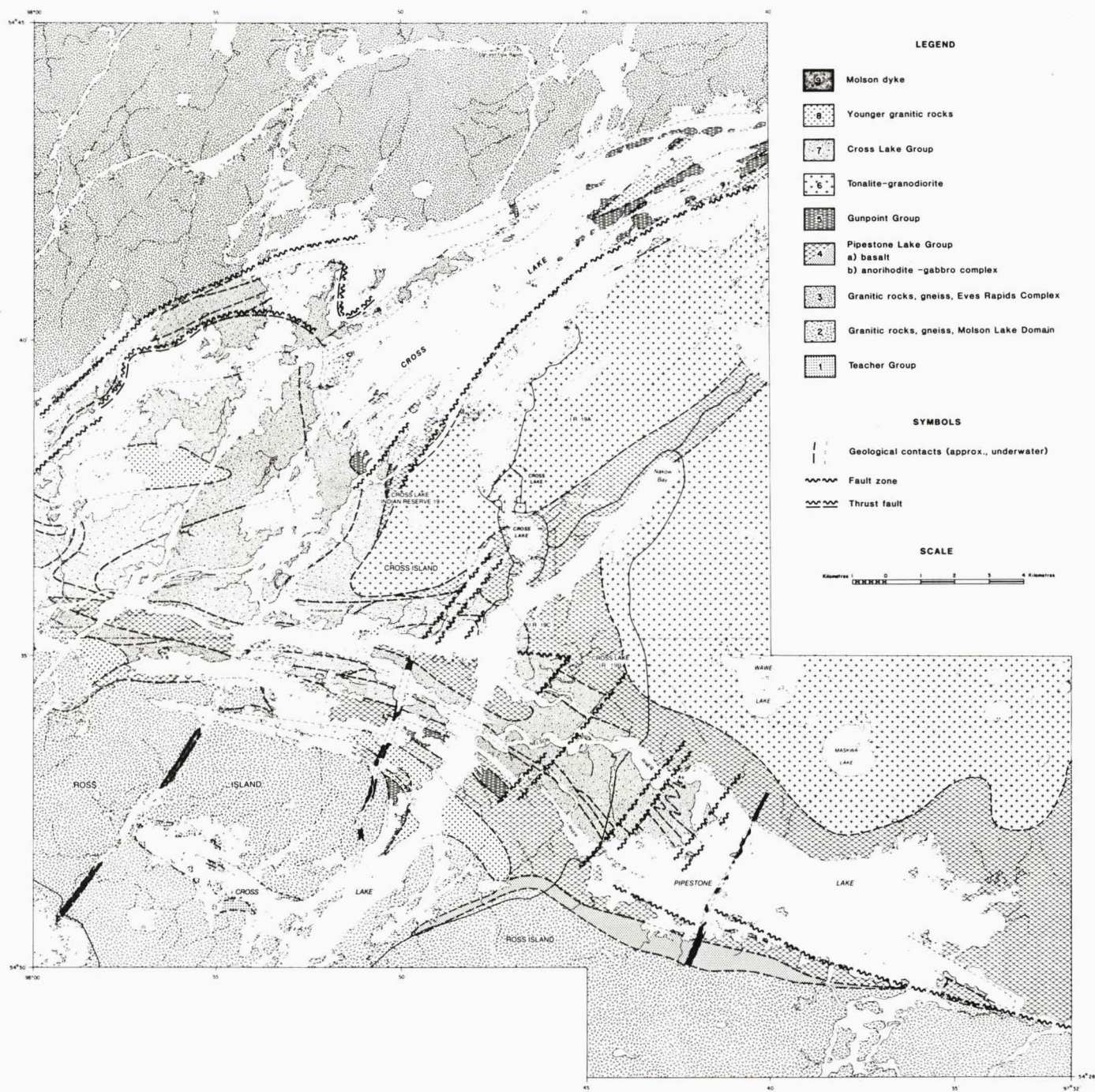


Figure 7: Simplified bedrock geology of the Cross Lake study area (Corekry and Lenton, 1984).

AGGREGATE RESOURCES

Introduction

Economic deposit of aggregate resources occur primarily between Sand Bay and Pipestone Lake north of the Nelson River in the western part of the study area. The locations of producing and past producing (inactive) aggregate pits in addition to the locations of undeveloped aggregate resources in the Cross Lake area are identified on Map AR87-1. Undeveloped aggregate resources are separated into sand and gravel, and bedrock deposits; their locations are shown in figure 8.

Granite was quarried near Jenpeg during the construction of the generating station and dam. Basalt is quarried 2 km northeast of the community of Cross Lake; it is preferred to granite because of the relative ease with which it can be blasted and crushed.

Sand and Gravel Resources

The value or quality of a sand and gravel deposit is based on the properties of the material (Table 1), depth to the water table and location.

TABLE 1
CRITERIA FOR ACCESSING AGGREGATE QUALITY

Physical Characteristics	Aggregate Quality		
	Good	Moderate	Poor
% Stone	>30	15-30	<5
% Sand	<35	35-70	>70
% Fines	0-7	7-17	>17
Deleterious	low	medium	high
Thickness	>5m	2-5m	<2m
Uniformity	high	medium	low

Grain size distribution of the sand and gravel samples collected in the Cross Lake area are given in Appendix B. This information, compared to the aggregate grading specifications (Appendix C), can be used to determine whether or not the material will produce the desired product (e.g. A Base, Concrete Sand, D Traffic). Appendix D presents the size limits of granular descriptive terms (e.g. pebble gravel). Petrographic information on the clast population is detailed in Appendix E. A summary of the data is presented in Table 2.

Economic sand and gravel locations are found in four areas;

- 1) Cross Lake
- 2) Sand Bay
- 3) Wawe Lake, and
- 4) Oxford House winter road.

Cross Lake Deposit

The Cross Lake deposit is located at the northeast termination (27 & 28-65-02W) of an esker complex located between Cross Lake and Sand Bay; it consists of two pits (Fig. 9), separated by approximately 100 meters. The esker is composed of a sand and gravel core, flanked by till and

laminated fines (silt and clay). In general the deposit becomes finer (sandier) westward.

In the east pit (CL010), aggregate sediments layers thicken from 2 m in the east wall, to over 5 m in the west wall (Fig. 10). Sediments in the deposit have the characteristics of an ice-contact esker (Fig. 11), including rapid changes laterally and stratigraphically, and in sediment type, deformation structures such as diapirism, folding and faulting. Sediments range from well sorted fine sand to coarse cobble gravel with boulders and to unsorted diamictons.

The material in the east pit has an average grain size distribution of 36% stone, 60% sand and 4% fines (silt and clay) and is classified as cobbly sandy pebble gravel. On average, the stone fraction has 8% greater than 1.5 inch in diameter.

Overburden on the crest of the esker ridge consists of 30 cm of top soil. On the flanks overburden comprised of till, silt and clay is greater than 2 m (Fig. 12).

Processing of this aggregate material requires screening because of the presence of coarse stone. Crushing is used when end use specifications require a certain percentage of crushed material. The till unit may be a suitable source of binder. The thickness of the overburden on the flanks restricts economic extraction. Extraction has also been limited by the water table, but good potential for additional reserves exist below the water table.

The west part of the Cross Lake pit (site CL129), is substantially larger and sandier than the east pit (Fig. 13). The sediments have characteristics similar to those in the east pit including rapid changes in sediment type and deformation structures (Fig. 14). Trough crossbedded sand and minor gravel beds are exposed in the west face.

The wide variability of aggregate allows for selective extraction based on end use specifications. Overburden thickness and depth to the water table also limit extraction in this pit. Overburden rapidly increases in thickness on the flanks. Laminated silt and clay overlay the till overburden exposed in the northeast face (Fig. 15).

Sand Bay Deposit

The Sand Bay deposit is east-trending and terminates at Sand Bay. The flanks of the deposit are mantled by silt and clay deposited by Glacial Lake Agassiz. The Sand Bay deposit is part of the esker system which includes the Cross Lake Deposit.

The Sand Bay Pit (site CL002) is located west of the Cross Lake highway along the shore of Nakow Bay (Sand Bay) in the western termination of the Cross Lake esker (Fig. 16 and 17).

Approximately 4 m of pebbly sand and very sandy pebble gravel, comprising three distinct aggregate units, is exposed in the east face of the pit (Fig. 18). The top unit is 1.5 m thick, contains very fine silty sand, with 24% of the material finer than #200 sieve (silt and clay). The middle

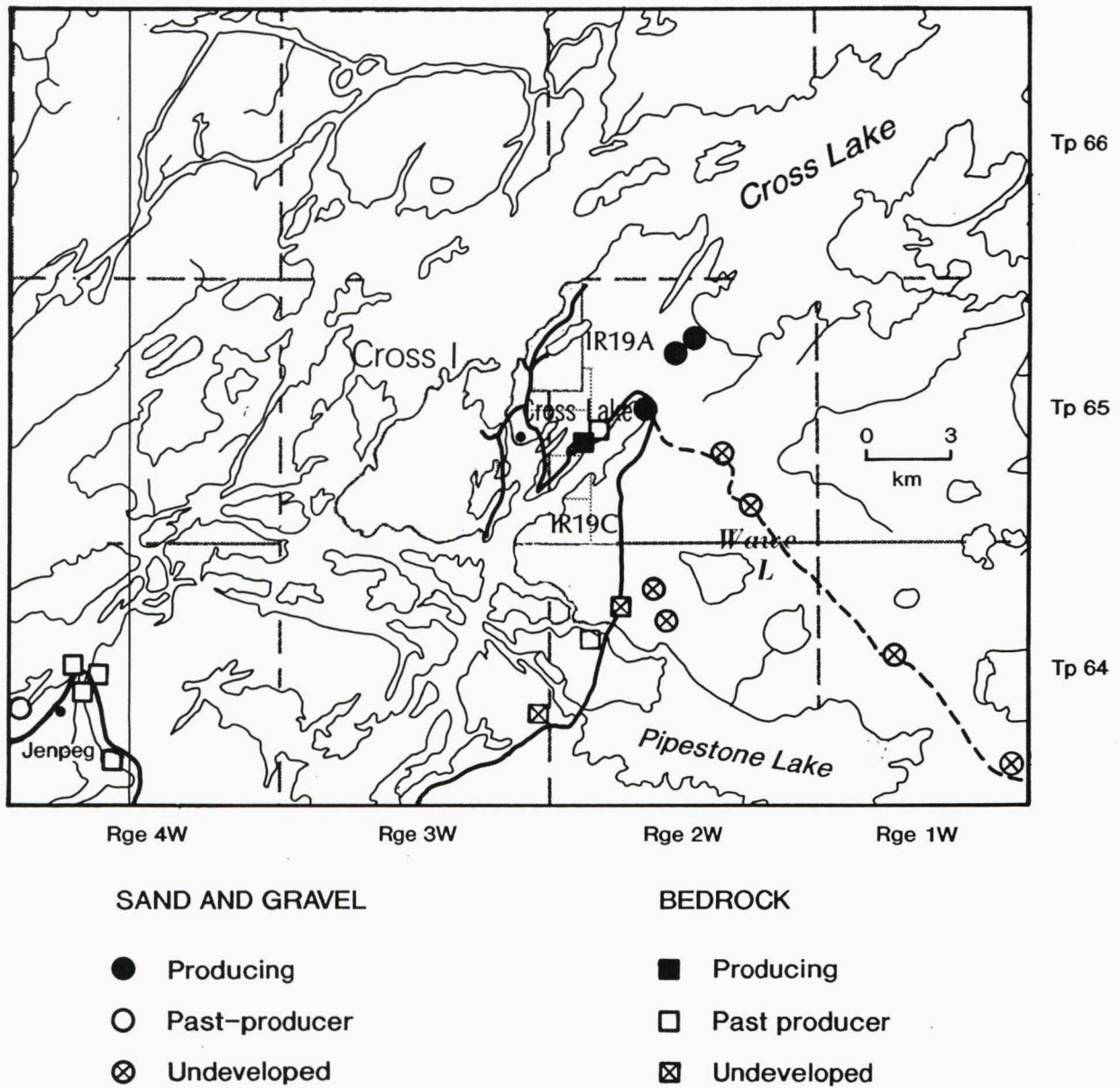


Figure 8: Aggregate deposit locations and production status in the Cross Lake study area.

TABLE 2
SUMMARY TABLE OF THE AGGREGATE ASSESSMENT CRITERIA FOR THE SAND AND GRAVEL DEPOSITS
IN THE CROSS LAKE STUDY AREA

DEPOSIT NUMBER	NUMBER OF SITES	NUMBER OF SAMPLES	OVER- BURDEN (M)	WATER TABLE (M)	UNIFORMITY	ECONOMIC THICKNESS	LOCAL ACCESS	REGIONAL SIGNIFI- CANCE	DEPOSIT QUALITY	COMMENTS
32101	2	6	0.1-1.5	7.0	VARIABLE	2.0-6.0	EXCELLENT	HIGH	HIGH	CROSS LAKE DEPOSIT
32102	18	24	0.1-0.3	N/A	UNIFORM	1.0-4.0	EXCELLENT	HIGH	MEDIUM	SAND BAY DEPOSIT
32103	1	3	0.1-0.3	N/A	MODERATE	1.5	POOR	LOW	LOW	OXFORD HOUSE WINTER ROAD, EXCESS FINES
32104	3	3	0.1	N/A	MODERATE	1.0-2.0	POOR	LOW	LOW	OXFORD HOUSE WINTER ROAD, EXCESS FINES
32105	1	1	0.1	N/A	N/A	2.0	POOR	LOW	MEDIUM	OXFORD HOUSE WINTER ROAD
32106	5	4	0.1	N/A	VARIABLE	0.1-1.5	POOR	LOW	MED-LOW	OXFORD HOUSE WINTER ROAD
32107A	6	6	0.1-1.5	2.5	MODERATE	2.0	GOOD	MODERATE	MED-LOW	WAVE LAKE DEPOSIT, CLAY ON FLANKS, VERY SANDY
32107B	1	1	0.1	N/A	UNIFORM	4.0	GOOD	LOW	LOW	WAVE LAKE DEPOSIT, LIMITED EXTENT
32107C	9	14	0.1	N/A	VARIABLE	0.4-4.0	POOR	MODERATE	HIGH	WAVE LAKE DEPOSIT, NO ACCESS, GOOD MATERIAL
32108	1	1	0.1	1.5	UNIFORM	0.0	EXCELLENT	LOW	MEDIUM	JENPEG GARBAGE DUMP, DEPOSIT DEPLETED

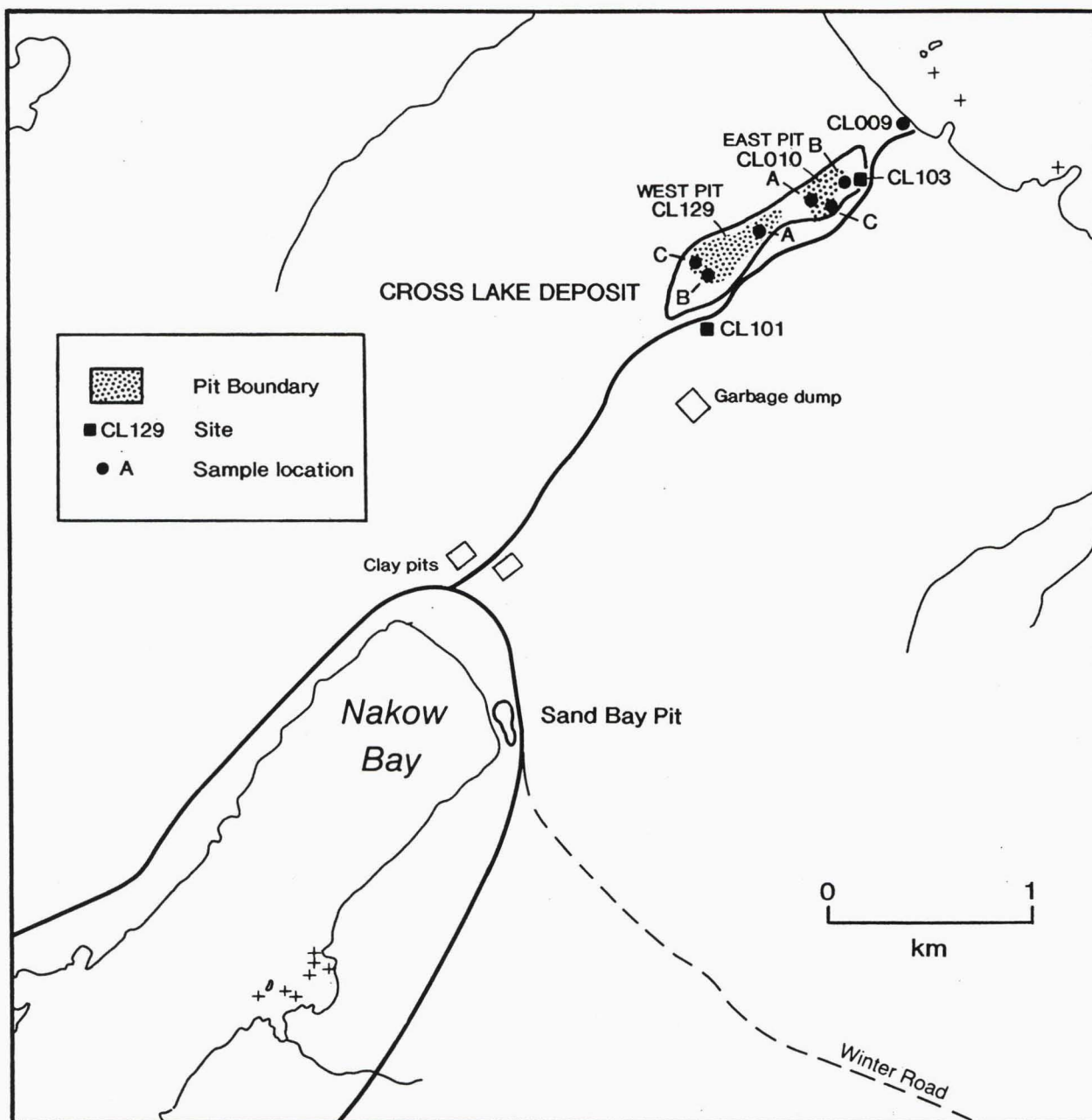


Figure 9: Cross lake deposit with site locations.



Figure 10: East pit of the Cross Lake deposit (site CL010). View to the west.



Figure 11: West wall of east Cross Lake esker pit. Approximately 3.5 m of interbedded sand, gravel and diamict units.



Figure 12: Overburden in south wall of pit CL010, Cross Lake east pit. Sediments are silt and sand with minor units of diamicton (till).



Figure 13: Photograph of the west Cross Lake pit (site CL129). View from the east end of the pit.



Figure 14: Ice contact sediments exposed in CL129, west Cross Lake pit. Deformed fine sand unit overlies a till unit in the upper portion of the section. At the base cobbly pebble gravel is exposed.



Figure 15: Overburden of silt and clay rhythmites over till. Southeast wall of the west Cross Lake pit.



Figure 16: Photograph of the esker at Nakow (Sand) Bay.



Figure 17: Sand Bay pit. Photo taken from the Cross Lake highway.



Figure 18: Pebbly sand of the Sand Bay deposit. Total exposure approximately 4.0 m.

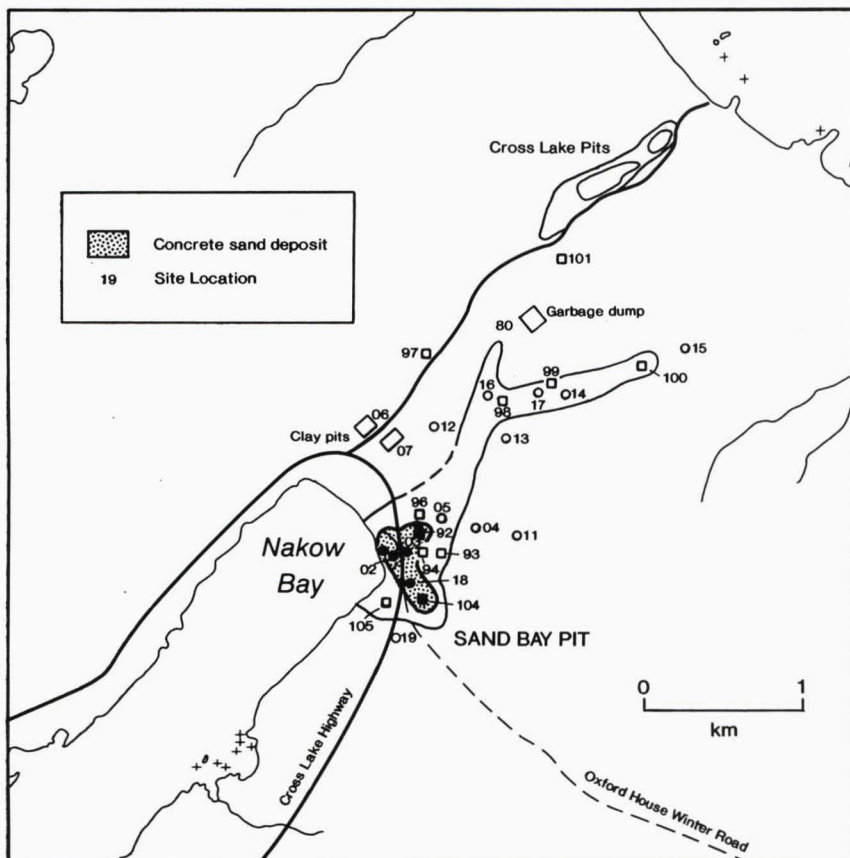


Figure 19: Location of the concrete sand deposit, Sand Bay deposit.

unit, consists 1.2 m of fine pebble gravel (47% stone and 52% sand). In the lower 1.3 m the sediments fine downward to coarse sand at the base of the section. Averaged grain size for this unit is 17.5% stone, 81.5% sand and less than 1% silt and clay. Mid- and lower-units are cross-stratified.

This pit is the major source of concrete sand for the Cross Lake area. Testing was conducted to define the extent of the Sand Bay deposit and specifically concrete sand aggregate. Additional concrete sand reserves extend east and south of the highway (Fig. 19).

Wawe Lake Deposit

The Wawe Lake deposit is located north of the Nelson River and south of Wawe Lake in sections 27, 28 and 33 of township 64, range 2 west (Fig. 20).

Access is fair to most parts of the deposit by a local forestry road. No road access is available to the most southern part of the deposit. A trail leads from the Nelson River to this area.

The deposit appears to occur in a recessional moraine that extends, in a broad arch, southeast for 50 km to Butterfly Lake (Klassen, 1986). The deposit forms a prominent ridge that rises 30 m above surrounding topography.

The Wawe Lake deposit is composed of sand, and sand and gravel.

Glacial Lake Agassiz silt and clay cover the flanks of the deposit. Three economic zones of sand or gravel were identified; these are labelled deposit number 32107A, B and C (Fig. 20 and Map 1). Deposits 32107A and B are primarily sand deposits of marginal economic value. Stratigraphic, grain size and reserve information for sites and samples in the deposit are presented in appendices A, B and F.

Deposit 32107C appears to have excellent potential to become economic. Material sampled from backhoe sites CL114 and CL115, in 32107C, meet specifications for concrete sand and some of the material sampled at site CL055 contains up to 44% stone (coarser than #4 screen). Depth of the gravel at CL055 could not be determined below 1.5 m.

At the time of this study, there had been no mining in this deposit.

Oxford House Winter road

The third area where sand and gravel resources are identified is along the Oxford House Winter Road. Access is difficult because of extensive wetland areas.

The deposits appear to be glaciofluvial and are probably related to the Wawe Lake deposit in terms of depositional environment. The majority of deposits are primarily sand (Fig. 21); gravel was located in the large deposit at the east end of Pipestone Lake (deposit 32106, Map AR87-1, in pocket). Economic development of these deposits is limited by accessibility and relatively poor quality of the aggregate.

Stratigraphy, logs, petrography, and sieve analyses are presented in Appendices A, B and E.

Bedrock Aggregate Resources

Crushed basalt and granite are used to supplement sand and gravel resources that supply the needs of the community of Cross Lake and the surrounding area. Granite was the primary source of aggregate for the Jenpeg development.

Fine grained, dark grey-green, highly fractured basalt, of the Pipestone Lake Group, is the preferred rock type for aggregate in the Cross Lake area. This is because of its relative ease of blasting and crushing.

Thickness of overburden, access and depth to the water table are limiting factors to quarrying. When these factors are taken into account the amount of quarriable basalt is reduced substantially (Fig. 21).

Basalt is presently quarried for aggregate on the south side of the Cross Lake highway 2.5 km northeast of the community (Fig. 22 and 23). Reserves are restricted by the proximity of the lake and the highway. Undeveloped basalt reserves were identified on the highway, 1.5 km north of the Nelson River Ferry crossing. Over 2 m of fine grained, highly- fractured, chloritized basalt is exposed in a highway road cut. This unit continues south to the river. At site CL121 disseminated sulfides occur in the basalt; sulphide is a deleterious substance to some aggregate uses. Basalt bedrock outcrops with aggregate potential are identified and assigned deposit numbers (Map AR87-1, in pocket).

Granitic rocks form the most common bedrock in the area. Granite-gneissic rocks were the primary source of aggregate for the Jenpeg Hydro development project. These quarries are inactive, and many are flooded (Fig. 24). A potential granite quarry that could supply aggregate material if the existing winter road is upgraded, was identified 7 km north of the community of Cross Lake.

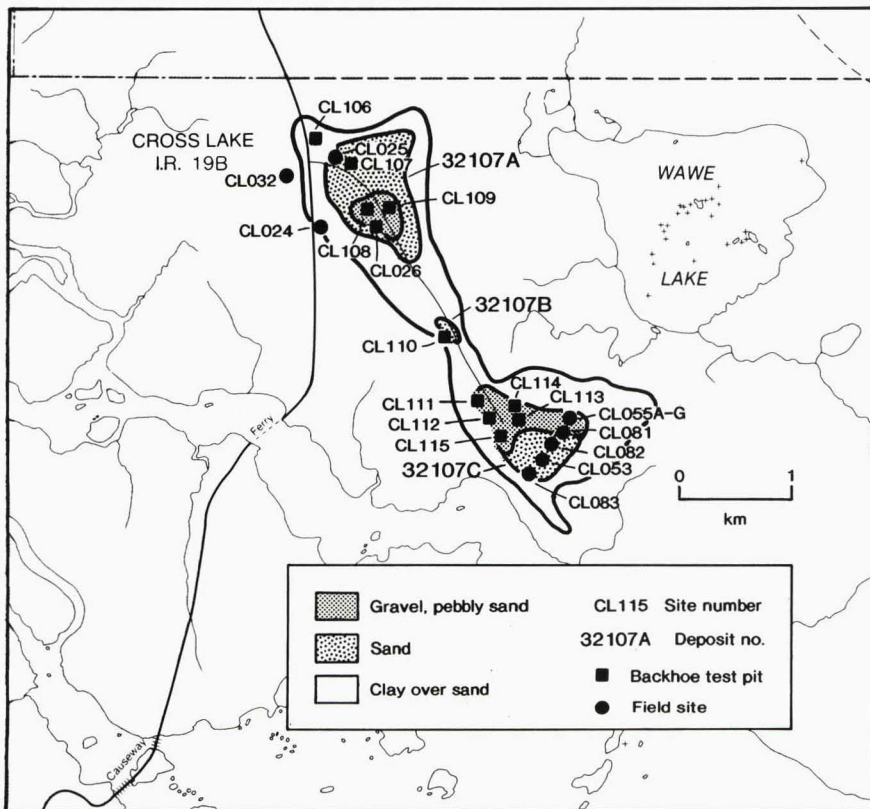


Figure 20: Wawe Lake deposit including site locations.



Figure 21: Sand ridge (deposit 32103) on the Oxford House winter road.



Figure 22: Active basalt quarry (CL030) 2.5 km northwest of the community of Cross Lake.



Figure 23: Highly fractured basalt, height 5.5 m at site CL030.



Figure 24: Flooded granite quarry (CL091) used during construction of Jenpeg generating station.

SUPPLY AND DEMAND

Supply is determined by taking the calculated area and the known or estimated depth of the deposit to obtain the volume or amount of aggregate in the deposit; amounts are given in cubic meters.

Resource values are calculated by quarter section and are given in Appendix F. From the total area calculated, a depletion factor is applied, which includes the area unavailable due to presence of permanent cultural features and those areas previously extracted. The result is an estimate of the amount of aggregate available.

Sand and gravel deposits are classified into high, medium and low quality (Table 3) based on the criteria discussed earlier in this report. It is estimated that 1.7 million cubic metres can be classified as high quality. Most of the material, 4.4 million cubic metres, is considered low quality, primarily due to the lack of stone.

**TABLE 3
SAND AND GRAVEL QUALITY BY DEPOSIT**

Deposit No.	High (m ³)	Medium (m ³)	Low (m ³)	Total (m ³)
32101	379 500	498 300		877 800
32102		170 700		170 700
32103			31 050	31 050
32104			605 175	605 175
32105		629 000		629 000
32106		185 000	3 236 880	3 421 880
32107A			324 000	324 000
32107B			207 000	207 000
32107C	1 392 000			1 392 000
32108		1 395		1 395
Total	1 771 500	1 484 395	4 404 105	7 660 000

When economic development factors such as, depth to water table, access, overburden, regional significance (a comparison of the relative abundance and quality of aggregate

in the vicinity to the deposit in question) and thickness of aggregate unit are considered (Table 4), there are only two deposits in the area that have good economic potential. They are the Cross Lake and Sand Bay deposits.

**TABLE 4
ECONOMIC SIGNIFICANCE OF SAND AND GRAVEL
DEPOSITS IN THE CROSS LAKE STUDY AREA**

Deposit No.	Good	Moderate	Poor
32101	877 800		
32102	170 700		
32103			31 050
32104			605 175
32105			629 000
32106			3 421 880
32107A		324 000	
32107B		207 000	
32107C		1 392 000	
32108			1 395
Total	1 048 500	1 923 000	4 688 500

Demand for aggregate material is expected to be relatively strong to support regional needs such as:

- 1) upgrading of the provincial road system;
- 2) maintaining community roads;
- 3) providing aggregate for additional housing developments; and
- 4) possible expansion of the Cross Lake Reserve road to the north east.

The limited amount of good quality, accessible, gravel for aggregate purposes in the Cross Lake area combined with continued strong demand for aggregate puts the resource under intense pressure. As a result, the reliance upon bedrock resources is expected to increase. Known aggregate resources must be protected to ensure future needs are met.

LAND USE FACTORS

Continued growth and development in the Cross Lake area has resulted in increasing demands on adjacent natural resources, including the aggregate resources. Land use pressures are greatest near the community of Cross Lake where mineral development, recreational space and the need for housing development compete. Aggregate resources, particularly sand and gravel are very limited. The Cross Lake pits are the main source of material and the Sand Bay pit is the only active source of concrete sand.

The Sand Bay area is also a prime recreational site. A small picnic/ day park has been developed adjacent to the Sand Bay pit. There is further recreational interest in the water front area at the pit location. Additionally, the area east of the Cross Lake highway has been identified for a housing development. Non-reserve land near the community of Cross Lake has been utilized for housing purposes. Ease of development and the natural beauty of Sand Bay make it the prime location for a housing subdivision.

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APPENDICES

APPENDIX A TEST PIT LOGS

CL001

East 6 km of Jenpeg on an island in Cross Land

- 0.0 - 0.3 m Dark brown, massive, compact clay
- 0.3 - 0.5 m Laminated white fine sandy silt and clay

CL002A

Sand Bay Pit

- 0.0 - 1.5 m Fine sand, well sorted, finely laminated, abrupt contact with lower unit
- 1.5 - 2.7 m Fine pebble gravel, well sorted, well rounded clasts, cross stratification, fining downwards
- 2.7 - 4.0 m Pea gravel, cross stratified, fining downwards to coarse sand

CL002B

Sand Bay Pit

- 0.0 - 3.0 m Pebbly sand, herringbone cross-stratified bedding

CL003

Bulldozer test pit east across highway from the Sand Bay pit

- 0.0 - 0.1 m Organics
- 0.1 - 0.6 m Pebbly sand, oxidized
- 0.6 - 1.2 m Silt, massive, compact, contains organic debris (wood, leaves)
- 1.2 - 1.5 m Medium sand, appears to be coarsening downwards into pebbly sand

CL004

0.75 km east of Sand Bay pit

- 0.0 - 0.6 m Massive reddish brown clay, fine blocky structure grading to silt
- 0.6 - 0.8 m Silt with clay interbeds, clay units include silt inclusions, unit coarsening downwards to sandy unit

CL005

East of highway on ridge, 0.5 km northeast of Sand Bay pit

- 0.0 - 0.1 m Pebbly sand, occasional boulder on surface
- 0.1 - 0.5 m Fine grained red sand, well sorted, oxidized, coarsens down to coarse sand

CL006

Northwest corner of highway and Cross Lake pit road; clay pit

- 0.0 - 0.6 m Massive brown clay
- 0.6 - 0.7 m White very fine sand and silt

Clay used for the community as fill and landscaping.

CL007

South side of Cross Lake pit road; clay pit

- 0.0 - 0.5 m Massive brown clay
- 0.5 - 0.6 m White silty sand

Stripping to the silty sand layer.

CL008

Cross Lake garbage dump

- 0.0 - 0.6 m Brown clay

CL009

Shore of Cross Lake at east end of Cross Lake pit road

- 0.0 - 0.5 m Bedrock outcrop, striations and grooves molded around shape of outcrop (average 240 degrees)

CL010A

West wall of Cross Lake east pit

0.0 - 2.0 m Pebble gravel with cobbles, carbonate encrustation on clasts

Overburden stripped from pit face westwards.

CL010B

Cross Lake east pit, east wall

0.0 - 2.5 m Sloped wall, inactive for 10-15 years

CL010C

Cross Lake east pit, south wall

0.0 - 1.5 m Overburden, flow diamicton with boulders averaging 34 cm inversely graded, deformation structures, contortions, including lenses of contorted laminated fine sand

1.5 - 7.0 m Sandy pebble gravel with occasional cobble and boulder, interbedded sand, gravel, and coarse cobble lags

Gravel removed from esker core, no aggregate remaining along north side, overburden too thick on east wall. Screener and oversized stock pile in pit.

CL129B

Cross Lake west pit, west wall

0.0 - 3.5 m Fine to medium pebbly sand, occasional 10 cm cobble cross-laminated sand beds

Active pit

CL129C

Cross Lake pit, south face

0.0 - 2.5 m Sandy pebble gravel

2.5 - 6.5 m Pebble gravel, stratified, occasional cobble

CL011

1.25 km northeast of Sand Bay pit

0.0 - 0.3 m Massive reddish brown clay, noncalcareous

Lowland area

CL012

Cross Lake pit road, 0.8 km northeast

0.0 - 0.1 m Organics

0.1 - 0.5 m Light reddish-brown massive clay, blocky structure minor fine sand inclusions

CL013

Southeast of Cross Lake dump

0.0 - 0.3 m Massive brown clay

Water table at 15 cm

CL014

Cross Lake dump area

0.0 - 0.1 m Clayey diamicton, unsorted, unstratified

0.1 - 0.9 m Interbedded sand, pebbly sand and, coarse sand, well sorted

Site on top of a slight ridge, pebbles litter surface.

CL014B

0.0 - 0.2 m Silty clay

0.2 - 0.5 m Fine sand

CL015

Cross Lake dump area

0.0 - 0.3 m Massive, light reddish brown clay

CL016

Cross Lake dump area

0.0 - 0.75 m Well sorted medium sand

CL017

Cross Lake dump area

0.0 - 0.8 m Medium sand, well sorted, occasional small pebble, oxidation to 55 cm

CL018

Intersection of Cross Lake and Oxford House Winter road

0.0 - 0.4 m Medium sand

0.4 - 0.9 m Coarse sand, occasional pebble, very well stratified

Extension of the Sand Bay deposit.

CL019

Ditch cut, 0.5 km south of Oxford House winter road

0.0 - 0.6 m Brown clay, minor beds of white silt

CL020

2 km south of Oxford House winter road

0.0 - 0.6 m Massive brown clay

0.6 - 0.75 m Leese side till, subangular to subrounded clasts, fissile structure

0.75 m Granodiorite bedrock

Sediments located in lee of bedrock high, striation measured average 238°.

CL021A

On Cross Lake highway, 5 km south of Oxford House road

0.0 - 0.3 m Organic peat deposit

0.3 m Water table

Peat mined for local use.

CL021B

South of CL021A, bedrock knoll

0.0 - 1.0 m Clay

1.0 - 1.3 m Leese side till

Bedrock striated, average flow 238°.

CL022A

North shore of Nelson River Ferry crossing

0.0 - 0.35 m Finely laminated clay and silt

0.35 - 1.2 m Rhythmites thicken to 15 cm, fine sand and clay beds

CL022B

Bedrock outcrop north of Nelson River Ferry crossing

0.0 - 3.0 m Bedrock outcrop of finely bedded basalt, average foliation 10 cm. Striated at 235°.

Good potential as aggregate source.

CL023

Inactive sawmill 1 km north of Ferry crossing

0.0 - 0.5 m Laminated clay with silt beds

0.5 - 0.7 m Bedrock

CL024

2 km north of Ferry crossing, prominent hill

0.0 - 0.5 m Massive brown clay

0.5 - 1.5 m Rhythmites, becoming coarser and thicker downwards

1.5 - 2.5 m Medium grained sand

2.5 m Water table

Coarsening down sequence. Occasional rounded cobble in rhythmite unit.

CL025

2.5 km north of Ferry crossing, 0.3 km east on local forestry road

0.0 - 1.0 m Medium sand, oxidized to 35 cm, well sorted, a few pebbles scattered on surface

Stockpile of sand, used for local purposes.

CL026

Southeast on forestry road 0.9 km from highway

0.0 - 0.3 m Medium fine sand, oxidized,

0.3 - 0.9 m Sandy pebble gravel, coarse sand matrix, well sorted

CL027

1 km north of the forestry road turnoff

0.0 - 1.0 m Brown clay

1.0 - 1.5 m Pebbly coarse sand

1.5 m Water table

CL028

Community of Cross Lake, across from batch plant

0.0 - 1.0 m Massive brown clay

1.0 - 1.1 m Medium brown till, some thin and discontinuous gravelly lenses

1.1 - 2.0 m Striated at 242* bedrock.

CL029

Borrow pit 1 km northeast of the community

0.0 - 0.4 m Clay

0.4 - 0.5 m Till

0.5 m Bedrock

CL030

Bedrock quarry 3 km from the community of Cross Lake

0.0 - 0.1 m Clay, thin and discontinuous, some till-like material

0.1 - 7.0 m Fractured basalt, average size of blasted rock 12 cm

7.0 m Water table

CL031

Inactive bedrock quarry, 100 m north of active quarry

0.0 - 3.0 m Basalt bedrock quarry, surface striae average 226*

CL032

100 m west of forestry road

0.0 - 0.1 m Organics

0.1 - 0.35 m Massive brown clay

CL033

Bedrock high, elevation 223 m, 1 km west of the forestry road

0.0 - 0.1 m Organics

0.1 m Bedrock, fine grained, dark grey basalt

CL034

Borrow pit, 0.8 km south of the Ferry crossing

0.0 - 0.1 m Clay

0.1 - 2.5 m Bedrock, striae at 234*

Clay and leeside till in lee of rock outcrop.

CL035

Borrow pit, 0.7 km west of Causeway on Cross Lake highway

0.0 - 0.5 m Laminated silt and clay

0.5 - 0.6 m Well sorted pebble gravel

0.6 - 1.6 m Diamicton (till), sandy matrix, 1 cm average clast size

1.6 - 2.2 m Boulder lag, average diameter 30 cm, subrounded

2.2 - 2.5 m Bedrock, basalt, striae at 235*

CL036

Bedrock outcrop on road, 2 km southwest of Causeway on Cross Lake highway

0.0 - 0.7 m Peat

0.7 m Clay

Water table

Striae at 233*.

CL037

Bedrock road cut, 2.3 km southwest of Nelson River Ferry crossing

0.0 - 2.0 m Leeside till, sandy, moderately bouldery (average 30 cm)

Striae at 230*.

CL038

South of Cross Lake map area on west side of highway

0.0 - 2.0 m Very sandy pebble gravel

CL039

Northeast of Cross lake community along trail

0.0 - 1.0 m Massive brown clay

CL040

Borrow pit 2.5 km southeast of the Nelson River causeway

0.0 - 1.5 m Massive brown clay

1.5 - 1.7 m Discontinuous thin layer of till

1.7 m Bedrock, striated (average 238 degrees)

1.7 m Water table

CL041

Borrow pit southeast of Cross Lake highway causeway

0.0 - 2.0 m Massive brown clay

2.0 m Water table

Bedrock exposed at bottom of pit.

CL042

Borrow pit southeast of Cross Lake highway causeway approximately 200 m off highway

0.0 - 0.3 m Variety of sediments; clay, till, and gravel

Material reserves depleted.

CL043

Jenpeg garbage dump, depleted pit

0.0 - 1.5 m Bedrock, striae 235*

0.0 - 0.2 m Medium sand

Sediment removed to bedrock.

CL044

Jenpeg airfield

0.0 - 0.5 m Clay

Rock outcrops make up highs and clay in the lows.

CL045

Jenpeg airfield south end

0.0 - 0.1 m Organics

0.1 - 0.5 m Massive brown clay

0.5 m Water table

CL046

Jenpeg area along highway

0.0 - 0.2 m Massive clay

0.2 - 1.25 m Laminated silt and clay

CL047

Jenpeg stockpile

0.0 - 2.0 m Crushed bedrock mixed with sand

CL048

Oxford House winter road 0.8 km southeast of Cross Lake highway

0.0 - 0.3 m Massive brown clay

Sand deposit terminates approximately 200 m from intersection

CL049A

East flank of ridge on Oxford House winter road 2.7 km from intersection with Cross Lake highway

0.0 - 0.8 m Medium fine sand with pebbles, very well sorted pebbles average 1 cm

Site on east flank of ridge.

CL049B

On crest of ridge on Oxford House winter road

0.0 - 1.5 m White medium fine sand with pebbles (average diameter 2 cm), moderately well sorted

CL049C

West flank of ridge on Oxford House winter road

0.0 - 1.0 m Pebbly sand, white, well sorted, rounded pebbles

CL050

Oxford House winter road

0.0 - 0.2 m Oxidized medium sand with occasional cobbles and boulders

0.2 - 0.8 m Leese side silty till, matrix rich, small pebbles

Bedrock ridge, sediments on flanks.

CL051

Oxford House winter road

0.0 - 0.5 m Tan to orangey till

CL052

Oxford House winter road, 1 km north of Wawe Lake

0.0 - 0.1 m Oxidized medium sand

0.1 - 0.2 m Pebble gravel

0.2 - 0.8 m Sand with occasional pebbles

Large sand deposit.

CL053

Wawe Lake deposit, 2 km east of ferry crossing; no road access

0.0 - 0.3 m Sand and gravel

Deposit of sand and gravel appears to be extensive from the river northeast 1 km, depth of the deposit unknown, see CL055.

CL054

Molson Dike, Pipestone Lake

0.0 - 2.0 m Coarse grained gabbro, striae 221*

CL055A

Wawe Lake deposit

0.0 - 1.5 m Coarse pebble gravel, rounded stones, well sorted, coarse sand matrix

Depth of deposit unknown. No boulders.

CL055B

Wawe Lake deposit, 68 m northwest on 300 bearing

0.0 - 1.5 m Pebble gravel

Depth of the deposit unknown

CL055C

Wawe Lake deposit, 60 m northwest at 296 bearing

0.0 - 0.3 m Pebble gravel, clayey, poorly sorted

M.3 - 1.0 m Interbedded sandy fine pebble gravel and fine to medium sand

1.0 - 1.5 m Pebble gravel, coarse sand matrix, well sorted

Depth of deposit unknown.

CL055D

Wawe Lake deposit, 60 m northwest at 296 bearing

0.0 - 0.25 m Medium grained sand

0.25 - 0.4 m Massive brown clay

CL055E

Wawe Lake deposit

0.0 - 1.0 m Sand

0.1 - 0.5 m Clay

CL055F

Wawe Lake deposit, between CL055C and CL055D, 45 m northwest of

CL055C

0.0 - 0.7 m Coarse sand with pebbles

0.7 - 0.9 m Massive brown clay

CL055G

Wawe Lake deposit

0.0 - 0.6 m Pebble gravel, well sorted, well rounded pebbles

0.6 - 0.9 m Clayey diamicton, fine subangular pebbles, very compact

CL055H

Wawe Lake deposit, 100 m west of CL055B

0.0 - 0.05 m Well sorted medium sand

0.05 - 0.2 m Clay

CL056

Oxford House winter road

0.0 - 0.1 m Sand with occasional pebbles, leached AE horizon

0.1 - 0.3 m Oxidized red orange medium sand

0.3 - 0.6 m Medium fine sand, grading down to fine sand, sharp contact with underlying gravel unit

0.6 - 0.7 m Fine pebble gravel, well sorted, well rounded

0.7 - 1.0 m Fine sand, very compact, with organics

Fine pebbles litter the surface.

CL057

Oxford House winter road, 1 km north of Wawe Lake

0.0 - 0.8 m Medium fine sand, well sorted, occasional pebble or cobble

0.8 m Organic, very thin layer

0.8 - 0.9 m Very well compacted fine white sand

CL058

Oxford House winter road, 1.2 km east of Wawe Lake

0.0 - 0.05 m Medium sand

0.05 - 0.3 m Massive brown clay

0.3 - 0.5 m Laminated silt and clay

CL059

Oxford House winter road

0.0 - 0.3 m Organics

0.3 m Clay

0.3 m Water table

Lowland, swampy area.

CL060

Oxford House winter road

0.0 - 0.3 m Light brown massive clay

CL061

Oxford House winter road, 2 km east of Maskwa Lake

0.0 - 0.3 m Brown clay

CL062A

Oxford House winter road, 2 km east of Maskwa Lake

0.0 - 7.0 m Bedrock ridge, Granitoid gneiss

CL062B

Oxford House winter road, 2 km east of Maskwa Lake

0.0 - 0.5 m Intercalated till and sand units

CL063

Oxford House winter road

0.0 - 1.0 m Medium grained oxidized sand

1.0 m Organic layer

1.0 - 1.5 m Pebble gravel, well sorted, well rounded

1.5 - 1.6 m Medium fine sand, well compacted

Boulders and cobbles litter surface

CL064

Oxford House winter road

0.0 - 0.3 m Massive brown clay

CL065

Oxford House winter road

0.0 - 0.5 m Bedrock outcrop, foliated granite

Swampy area with occasional bedrock outcrop

CL066

Oxford House winter road

0.0 - 1.0 m Fine sand, moderately silty, fining down to silty fine sand

1.0 m laminated silt and clay

Boulders at surface.

CLO67

East of Pipestone Lake, on Oxford House winter road

0.0 - 0.3 m Sand with occasional pebbles

0.3 - 1.0 m Fine silty sand, no pebbles, massive

1.0 m Discontinuous organic layer <2 cm thick

1.0 - 1.1 m Massive, very compact white silt

Boulders at surface, some over 60 cm in diameter

CLO68

South east of CLO67, on east side of Pipestone Lake, on Oxford House winter road

0.0 - 0.2 m Medium to fine sand with occasional pebbles

0.2 - 0.4 m Massive brown clay

Sand at surface with occasional sub-rounded pebbles.

CLO69

South east of CLO68, east of Pipestone Lake on Oxford House winter road

0.0 - 1.0 m Medium to fine-grained sand

1.0 - 1.3 m Fine pebbly sand (pebbles average 3 mm)

- CLO70**
1 km south east of CLO69, east of Pipestone Lake on Oxford House winter road
0.0 - 1.1 m Pebbly sand with boulders and gravel, poorly sorted, numerous sub-rounded boulders with average diameter 10 - 30 cm
- CLO71**
3.5 km east of Pipestone Lake, on Oxford House winter road
0.0 - 1.0 m Bedrock outcrop, granite.
- CLO72**
3.0 km east of Pipestone Lake, on Oxford House winter road
0.0 - 1.5 m Poorly sorted, silty, sandy gravel, resembling gravely melt-out till, with no obvious bedding
Site located ridge; pebbly gravel appearance at surface.
- CLO73**
Beginning of north-east trail
0.0 - 0.8 m Massive brown clay, blocky structure, grading to rhythmites at 70 cm.
- CLO74**
0.4 km north of CLO73, on north-east trail
0.0 - 0.2 m Brown, fine blocky clay, massive structure.
- CLO75**
0.5 km north of CLO73, on north-east trail
0.0 - 0.5 m Clay
 0.5 m Bedrock, granite.
- CLO76**
1.0 km north of CLO75, on north-east trail
0.0 - 0.75 m Clay
The whole area is extensively covered in clay.
- CLO77**
0.75 km north of CLO76, on north east trail
0.0 - 0.20 m Peat deposit
Water table encountered at depths between 20 - 30 cm
- CLO78**
On the the north east trail
0.0 - 0.75 m Clay
The deposit in this area is the same as CLO76.
- CLO79**
0.5 km south east of CLO78, at the end of the north east trail
0.0 - 0.1 m Clay
Granite bedrock.
- CLO80**
Wave Lake deposit
0.0 - 4.0 m Bedrock, granite hill
Clay mantle on top of hill.

CL081

Wawe Lake deposit

0.0 - 0.6 m Pebbly sand, medium grained matrix

Soil development to 40 cm.

CL082

Wawe Lake deposit

0.0 - 0.6 m Medium grained sand, oxidized, well sorted

CL083

Wawe Lake deposit

0.0 - 0.7 m Well sorted fine sand

CL084

0.4 km west on Cross Island Hydro line from Cross Island road

0.0 - 1.0 m Bedrock, gabbro

1.0 m Water table

Striae at 242*.

CL085

0.8 km west on Cross Island Hydro line from Cross Island road

0.0 - 0.3 m Massive brown clay, fine blocky structure

Bedrock outcrop to the west.

CL086

1.5 km west on Cross Island Hydro line from Cross Island road

0.0 - 2.0 m Bedrock, fractured and sheared, weak sulphide mineralization, foliated

Clay on flanks of outcrop.

CL087

Hydro line, 3.0 km west of Cross Island road intersection

0.0 - 0.2 m Organics

0.2 m Water table

Low lying swampy area.

CL088

Hydro line, 4.2 km west of Cross Island road intersection

0.0 - 0.1 m Well sorted medium to fine sand

0.1 - 0.4 m Poorly sorted diamicton, clay matrix

0.4 m Bedrock

Occasional rounded boulder on surface

CL089

Hydro line, 4.8 km west of Cross Island road intersection

0.0 - 0.3 m Massive brown clay

Clay plain.

CL090

On Cross Lake highway near causeway

0.0 - 0.5 m Clay

Clay plane and isolated bedrock outcrops that have patches of lee side till.

CLO91

Flooded quarry in backbay of Jenpeg dam

0.0 - 0.5 m Bedrock, granite

CLO92

North-east of Sand Bay Pit

0.0 - 1.20 m Medium grained sand with beds of coarse sand, occasional small pebbles

Laminated, well sorted, oxidized to approximately 60 cm.

CLO93

North-east of Sand Bay

0.0 - 4.0 m Medium to fine-grained sand, well sorted, clean

Appears massive, but could be finely laminated.

CLO94

North-east of Sand Bay

0.0 - 1.0 m Well sorted, medium-grained sand, oxidized to approximately 60 cm

1.0 m Organic layer

1.5 - 3.0 m Medium coarse sand, grading to fine grained sand.

CLO95

0.25 km north of CLO93

0.0 - 2.0 m Medium to fine-grained sand, occasional pebbles at approximately 2 metres

2.0 - 4.0 m Massive white sand

CLO96

Sand Bay deposit

0.0 - 3.5 m Medium fine grained sand

Scattered pebbles litter surface.

CL097

Cross Lake pit road

0.0 - 0.6 m Massive brown clay, sharp lower contact

0.6 - 3.0 m White medium fine sand, well sorted, moderately compact

CL098

Sand Bay deposit, south west of garbage dump

0.0 - 0.5 m Oxidized, orange, medium grained sand

0.5 - 0.65 m Massive brown clay

0.65 - 3.3 m White, medium fine sand, well sorted

Back hoe test pit dug on crest of low relief ridge.

CL099

Sand Bay deposit, south west of garbage dump

0.0 - 0.7 m Oxidized, orange sand, occasional fine pebble at surface

0.7 - 4.0 m Medium to medium coarse sand, horizontally laminated well sorted

Sample taken of lower unit.

CL100

Sand Bay deposit, south west of the Cross Lake garbage dump

0.0 - 3.0 m Cross-stratified, coarse to medium-grained sand, occasional bed of pebbly sand

Pebbles litter surface.

CL101

North east 1.5 km on the Cross Lake pit road

- 0.0 - 1.0 m Massive brown clay
- 1.0 - 3.5 m Laminated silt and clay, grading to compact, fissile silt
- 3.5 m Very fine sand

Material coarsens downwards.

CL103

Cross Lake pit

- 0.0 - 1.0 m Massive brown clay
- 1.0 - 2.25 m White silty sand, laminated
- 2.25 - 4.5 m Silty fissile till

CL104

Intersection of Cross Lake highway and Oxford House winter road

- 0.0 - 1.0 m Well sorted pebbly sand, oxidized to 70 cm
- 1.0 - 2.5 m Sand, well sorted, occasional bed of fine pebbles
- 2.5 - 3.5 m Pebbly sand with rare cobble, compact structure, 'till like' appearance

CL105

South end of Sand Bay deposit west of Cross Lake highway

- 0.0 - 3.25 m Medium to fine-grained sand, well sorted

CL106

2.2 km north of Nelson River ferry crossing

- 0.0 - 0.5 m Massive brown clay
- 2.0 m Water table
- 0.5 - 3.5 m White, fine sand, well sorted, some coarse sand beds near base of backhoe pit

CL107

2.0 km north of ferry crossing, Wawe Lake deposit

- 0.0 - 4.0 m Medium to fine sand, well sorted, laminated
- Occasional pebble on surface.

CL108

North of ferry crossing, Wawe Lake deposit

- 0.0 - 3.5 m Medium to fine, white sand, laminated
- Pebbles scattered on surface.

CL109

Wawe Lake deposit

- 0.0 - 1.0 m Medium to coarse pebbly sand
- 1.0 - 1.3 m Very fine white sand, well sorted
- 1.3 - 1.9 m Pebble gravel, average pebble size 3/4", coarse sand matrix
- 1.9 - 3.9 m Massive white sand

CL110

Wawe Lake deposit, north of ferry crossing

- 0.0 - 0.3 m Sand, oxidized, red
- 0.3 - 1.5 m Medium sand with occasional pebbles,
- 1.5 - 4.0 m White sand

Pebbles scattered on surface of site.

CL111

Wawe Lake deposit, 1 km north of Nelson River

- 0.0 - 0.4 m Pebbly sand, oxidized, pebbles average 3/4" diameter
- 0.4 - 1.0 m Sand with pebbles, pebbles range in size from 1/2 to 3" diameter
- 1.0 - 4.0 m Fine pebbly sand
- 4.0 - 4.6 m White fine sand

Surface scattered with pebbles, cobbles and boulders.

CL112

Wawe Lake deposit, 1 km north of Nelson River

- 0.0 - 0.5 m Oxidized sand with pebbles and cobbles
- 0.5 - 3.0 m Pebble gravel, pebble average size 1/2" diameter
- 3.0 - 4.5 m Well sorted medium sand with pebbles

Boulders and cobbles at surface.

CL113

Wawe Lake deposit, 1 km north of Nelson River

- 0.0 - 0.6 m Oxidized pebbly medium sand, pebbles average 3/4-1" diameter
- 0.6 - 1.2 m Massive brown clay, blocky, grading down to rhythmites
- 1.2 - 2.5 m White, well sorted medium fine sand

CL114

Wawe Lake deposit 1 km north of Nelson River

- 0.0 - 1.0 m Medium grained sand
- 1.0 - 2.3 m Very coarse pebble gravel, little matrix
- 2.3 m Boulder lag
- 2.3 - 4.0 m Coarse sand, granular with fine pebbles

CL115

Wawe Lake deposit, north of Nelson River

- 0.0 - 1.0 m Oxidized fine sand with occasional very fine pebbles, well sorted
- 1.0 - 2.0 m Fine sandy pebble gravel, moderately well sorted,
- 2.0 - 3.3 m Medium sand, no stones

CL116

East side of Jenpeg dam

- 0.0 - 2.0 m Massive brown clay
- 2.0 m Till/bedrock, striae 224*

CL117

4 km south east of Jenpeg dam

- 0.0 - 5.0 m Bedrock, 'black granite'

CL118

2.0 km south of Sand Bay 2 km on Cross Lake highway

- 0.0 - 0.6 m Brown clay
- 0.6 - 1.8 m Silt and very fine sand and clay rhythmites
- 1.8 m Bedrock, striae 238*

CL119

Borrow pit 2.5 km south of Sand Bay along the Cross Lake highway

0.0 - 0.3 m Clay

0.0 - 1.5 m Bedrock, striae 237*

Thin patches of till in rock scours.

CL120

1 km north of the Nelson River ferry crossing on the Cross Lake highway

0.0 - 2.3 m Bedrock, dark, fine grained basalt, extensively fractured, chloritized, deformed garnets, sheared, pillow structures evident, same rock type as the basalt quarried near the community of Cross Lake

Potential quarry site on west side of highway; overburden increases to more than 1 m on east side of highway.

CL121

0.5 km north of the Nelson River ferry on Cross Lake highway

0.0 - 3.2 m Bedrock, fine grained, dark basalt, extremely sheared and fractured, contains fine disseminated sulfides, chloritized, has rusted appearance along shear planes fractured

Excellent potential quarry site.

CL122

2.0 km south of the Nelson House ferry crossing on Cross Lake highway

0.0 - 4.0 m Bedrock, fractured

Striae, average 243*.

CL123

1.0 km west of causeway on Cross Lake highway

0.0 - 2.6 m Bedrock, finely fractured basalt

Possible quarry site.

CL124

1.5 km south west of causeway on Cross Lake highway

0.0 - 3.3 m Bedrock, basalt

Possible quarry site.

CL125

2.3 km south west of causeway on Cross Lake highway

0.0 - 2.0 m Bedrock, megacrystalline anorthosite

CL126

5.0 km south of causeway on Cross Lake highway

0.0 - 4.0 m Bedrock, granite and anorthosite, striae at 235*

CL127

2 borrow pits on east side of highway south east of Jenpeg dam,

0.0 - 0.8 m Clay

0.8 - 1.75 m Till

1.75 - 2.0 m Bedrock

Boulders litter surface.

CL128

West 0.3 km of Jenpeg garbage dump

0.0 - 0.3 m Clay

0.3 - 1.2 m Bedrock

1.2 m Water table

APPENDIX B: CROSS LAKE AGGREGATE SAMPLE DESCRIPTION

DEPOSIT # 032101

LEGAL DESC.	SAMPLE	PERCENT PASSING													GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
NW 27 065 02W	CL010A	PRESENT	PRESENT	100	94	91	81	69	54	38	27	18	10	5	SANDY GRAVEL
NW 27 065 02W	CLO10B	PRESENT	PRESENT	100	90	77	68	58	41	22	11	6	4	3	PEBBLE GRAVEL
SW 27 065 02W	CL129A	PRESENT	PRESENT	100	95	80	71	58	42	22	9	4	3	2	PEBBLE GRAVEL
SE 28 065 02W	CL129B	NONE	PRESENT	100	99	95	82	72	57	42	31	26	14	4	GRAVELLY SAND
SE 28 065 02W	CL129C	NONE	PRESENT	100	94	87	82	73	59	38	17	7	3	1	GRAVELLY SAND
SE 28 065 02W	CL129D	NONE	PRESENT	100	100	100	94	84	75	65	58	49	40	33	SANDY SILT

DEPOSIT # 032102

LEGAL DESC.	SAMPLE	PERCENT PASSING													GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
NW 16 065 02W	CL002A	NONE	NONE	100	100	100	100	100	100	100	100	99	71	24	SILTY FINE SAND
NW 16 065 02W	CL002B	NONE	PRESENT	100	98	93	71	53	34	17	7	3	1	1	PEBBLE GRAVEL
NW 16 065 02W	CL002C	NONE	NONE	100	100	96	82	67	50	34	19	5	1	1	SANDY PEBBLE GRAVEL
NW 16 065 02W	CL002D	NONE	NONE	100	100	99	99	98	95	90	83	13	2	0	MEDIUM SAND
SW 21 065 02W	CL003A	NONE	NONE	100	100	100	90	83	72	57	42	29	17	5	FINE PEBBLY SAND
SW 21 065 02W	CL005A	NONE	NONE	100	100	100	100	100	99	98	96	88	66	40	SANDY SILT
NE 21 065 02W	CL014A	NONE	NONE	100	100	100	99	98	95	91	58	19	9	5	COARSE SAND
NE 21 065 02W	CL016A	NONE	NONE	100	100	100	100	100	100	99	99	92	52	16	FINE SAND
NE 21 065 02W	CL017A	NONE	NONE	100	100	100	100	100	99	99	96	83	29	7	MEDIUM FINE SAND
NW 16 065 02W	CL018A	NONE	NONE	100	100	100	99	96	88	75	56	32	13	5	GRANULAR SAND
SW 21 065 02W	CL092A	NONE	NONE	100	100	100	100	98	93	85	74	49	20	5	MEDIUM SAND
SW 21 065 02W	CL092B	NONE	PRESENT	100	99	99	93	83	68	48	28	13	6	4	PEBBLY SAND
SW 21 065 02W	CL092C	NONE	NONE	100	100	100	100	96	85	52	17	5	2	1	COARSE SAND
SW 21 065 02W	CL092D	NONE	NONE	100	100	98	94	86	76	59	43	28	14	6	PEBBLY SAND
SW 21 065 02W	CL093A	NONE	NONE	100	100	100	100	100	100	100	100	93	26	6	MEDIUM FINE SAND
SW 21 065 02W	CL094A	NONE	NONE	100	100	100	100	99	99	98	96	91	57	17	FINE SAND
SW 21 065 02W	CL095A	NONE	NONE	100	100	100	100	100	100	99	97	88	64	32	FINE SANDY SILT
SW 21 065 02W	CL096A	NONE	NONE	100	100	100	100	100	100	100	99	76	17	5	MEDIUM FINE SAND
NE 21 065 02W	CL098A	NONE	NONE	100	100	100	100	100	100	100	100	99	46	28	SILTY FINE SAND
NE 21 065 02W	CL099A	NONE	NONE	100	100	100	100	100	100	99	77	21	3	1	MEDIUM SAND
NE 21 065 02W	CL100A	NONE	NONE	100	100	100	100	100	99	97	71	13	2	1	MEDIUM SAND
NW 16 065 02W	CL104A	NONE	NONE	100	100	100	100	98	95	85	67	36	13	5	GRANULAR MEDIUM SAND
NW 16 065 02W	CL104B	NONE	NONE	100	100	100	99	97	93	86	75	49	25	18	SILTY GRANULAR SAND
NW 16 065 02W	CL105A	NONE	NONE	100	100	100	100	100	100	99	97	68	68	10	FINE SAND

DEPOSIT # 032103

LEGAL DESC.	SAMPLE							PERCENT PASSING							GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
NE 10 065 02W	CL049A	NONE	NONE	100	100	100	99	96	93	88	81	65	46	28	GRANULAR SILTY SAND
NE 10 065 02W	CL049B	NONE	NONE	100	100	100	97	94	92	88	84	71	55	32	PEBBLY SANDY SILT
NE 10 065 02W	CL049C	NONE	NONE	100	100	100	99	97	94	88	81	68	48	34	SANDY SILT

DEPOSIT # 032104

LEGAL DESC.	SAMPLE							PERCENT PASSING							GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
SW 02 065 02W	CL052A	NONE	NONE	100	100	100	100	98	95	90	85	78	66	42	GRANULAR SANDY SILT
SW 02 065 02W	CL056A	NONE	NONE	100	100	100	92	90	87	82	76	68	59	46	PEBBLY SANDY SILT
SW 02 065 02W	CL057A	NONE	NONE	100	100	100	100	99	99	98	97	95	66	34	SANDY SILT

DEPOSIT # 032105

LEGAL DESC.	SAMPLE							PERCENT PASSING							GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
SE 20 064 01W	CL063A	NONE	NONE	100	100	100	93	87	80	72	62	48	39	36	PEBBLY SANDY SILT

DEPOSIT # 032106

LEGAL DESC.	SAMPLE							PERCENT PASSING							GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
SE 16 064 01W	CL067A	NONE	NONE	100	100	100	100	99	98	96	94	89	74	42	SANDY SILT
SW 10 064 01W	CL069A	NONE	NONE	100	100	100	100	98	96	92	86	78	63	38	SANDY SILT
SE 10 064 01W	CL070A	PRESENT	PRESENT	100	91	88	82	76	69	61	52	38	22	10	GRAVELLY SAND
SW 11 064 01W	CL072A	NONE	PRESENT	100	95	92	85	79	71	61	50	38	26	16	PEBBLY SAND

DEPOSIT # 032107A

LEGAL DESC.	SAMPLE							PERCENT PASSING							GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
SE 32 064 02W	CL024A	NONE	NONE	100	100	100	100	100	100	100	100	99	97	78	SANDY SILT
NE 32 064 02W	CL025A	NONE	NONE	100	100	100	100	100	100	100	100	90	31	6	FINE SAND
SW 33 064 02W	CL026A	NONE	NONE	100	100	100	91	83	73	59	38	16	6	2	MEDIUM SAND
NE 32 064 02W	CL107A	NONE	NONE	100	100	100	100	100	100	100	98	71	23	8	FINE SAND
SW 33 064 02W	CL108A	NONE	NONE	100	100	100	100	100	100	99	99	95	71	49	SANDY SILT
SW 33 064 02W	CL109A	NONE	NONE	100	100	98	88	75	62	48	32	17	10	5	PEBBLY SAND

DEPOSIT # 032107B

LEGAL DESC.	SAMPLE	PERCENT PASSING												GENERAL DESCRIPTION	
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100		#200
NW 28 064 02W	CL110A	NONE	NONE	100	100	100	100	100	100	100	99	87	23	6	FINE SAND

DEPOSIT # 032107C

LEGAL DESC.	SAMPLE	PERCENT PASSING													GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
SW 27 064 02W	CL055A	NONE	PRESENT	100	90	79	70	56	42	30	21	10	5	3	PEBBLE GRAVEL
SW 27 064 02W	CL055B	NONE	NONE	100	99	97	96	90	82	75	67	41	17	8	MEDIUM SAND
SW 27 064 02W	CL055C	NONE	PRESENT	100	98	92	85	73	60	47	37	25	14	9	GRAVELLY SAND
SW 27 064 02W	CL055F	NONE	PRESENT	100	100	100	96	91	82	74	59	21	5	2	MEDIUM SAND
SW 27 064 02W	CL055G	NONE	PRESENT	100	94	84	78	71	64	56	45	26	12	9	GRAVELLY SAND
SW 27 064 02W	CL081A	NONE	PRESENT	100	100	100	93	91	87	84	79	62	25	10	FINE SAND
SE 28 064 02W	CL082A	NONE	NONE	100	100	100	100	99	99	98	96	66	11	2	MEDIUM SAND
NE 21 064 02W	CL083A	NONE	NONE	100	100	100	100	100	100	100	99	98	93	63	SANDY SILT
SE 28 064 02W	CL111A	NONE	NONE	100	100	100	98	97	94	86	70	47	36	32	SANDY SILT
SE 28 064 02W	CL112A	NONE	NONE	100	100	100	99	97	89	69	47	34	26	23	SILTY SAND
SE 28 064 02W	CL113A	NONE	NONE	100	100	100	95	92	89	83	72	58	21	6	MEDIUM SAND
SE 28 064 02W	CL113B	NONE	NONE	100	100	100	100	100	99	99	98	97	61	38	SANDY SILT
SE 28 064 02W	CL114A	NONE	PRESENT	100	100	98	94	90	82	67	40	18	7	3	PEBBLY SAND
NE 21 064 02W	CL115A	NONE	NONE	100	100	100	99	96	92	83	61	29	9	3	MEDIUM SAND

DEPOSIT # 032108

LEGAL DESC.	SAMPLE	PERCENT PASSING													GENERAL DESCRIPTION
		>6.0	<6.0	3.0	1.5	3/4	3/8	#4	#8	#16	#30	#50	#100	#200	
SW 18 064 04W	CL043A	NONE	NONE	100	100	100	99	98	96	95	93	90	61	38	SANDY SILT

APPENDIX C: AGGREGATE GRADING SPECIFICATIONS

1988

PROVINCE OF MANITOBA AGGREGATE GRADING SPECIFICATIONS

*NOTE: N.S. = Not Specified
F.M. = Fineness Modulus

PASSING SIEVE SIZE		BITUMINOUS PLANT MIX			BASE COURSE					GRANULAR FILL	CURB/VEGET. GRAVEL	TRAFFIC TYPE						CONCRETE			SEAL COAT COVER				PASSING SIEVE SIZE	
					"A"	"A"	"B"	"C"	"C"									"A" COURSE			"A"	"B"	Cover "C"	Blotter "D"		
Metric	Imp.	"A"	"B"	"C"	Gravel	Lime- stone	All	Gravel	Lime- stone			"A"	"A" Lime- stone	"B"	"C"	"C" Lime- stone	"C" Quarried rock	Fines	65% Lime- stone	Gravel	"A"	"B"			Metric	Imp.
50 mm	2"								100	3" 100															50 mm	2"
37.5mm	1½"							100	N.S. 100		100														37.5mm	1½"
25 mm	1"			100										100	100	100				100					25 mm	1"
19 mm	¾"				100	100	100					100	100			85-100	100		100	90-100					19 mm	¾"
16 mm	5/8"		100		80-100																	100			16 mm	5/8"
12.5mm	1/2"	100										75-90		70-90	60-95			100			100	80-100	100	100	12.5mm	1/2"
9.5 mm	3/8"	70-95	70-90															96-100	20-55	20-55					9.5 mm	3/8"
4.75mm	#4	55-70	55-70	60-90	40-70	35-70	30-75	25-80	25-80		N.S. 25-80	45-70	35-60	40-70	30-70	35-60	30-60	90-100	0-10	0-10	0-60	0-65			4.75mm	#4
2.00mm	#10	35-55	35-55	35-80	25-55		25-65																		2.00mm	#10
1.18mm	#16																	50-80							1.18mm	#16
600um	#30																	25-60							600um	#30
425um	#40	17-29	17-29	20-50	15-30	10-30	15-35	15-40				10-35		10-35	5-35						0-15	0-15	0-25	0-50	425um	#40
300um	#50																	10-30							300um	#50
180um	#80	N.S. < 10	N.S. < 10																						180um	#80
75 um	#200	3-8	3-8	5-12	8-15	6-17	4-18	8-20 4-20	5-20	0-15	N.S. 4-20	8-15	6-17	0-15	0-15	0-17	0-10	0-3	0-2	0-2	0-4	0-5	0-5	0-10	75um	#200
MINIMUM CRUSH		50%	50%		35%		25%					35%	100%	35%	25%	100%	100%				30%	20%			MINIMUM CRUSH	
MAXIMUM SHALE		T 3% B 7%	T 3% B 7%		12%		12%	12%			N.S. 15%	12%		12%	15%						3%	4%			MAXIMUM SHALE	
MAXIMUM L.A.		35%	35%		35%	35%	35%	35%	35%			45%	45%	45%	45%	45%			28%	28%	35%	35%			MAXIMUM L.A.	
MAXIMUM DELETERIOUS																		2%	1.5%	1.5%					MAXIMUM DELETERIOUS	
MAXIMUM IRONSTONE																		F.M. 2.3-3.5			5%	5%			MAXIMUM IRONSTONE	
MAXIMUM ABSORPTION																			2.25%	2.25%					MAXIMUM ABSORPTION	
SPEC NUMBER		920	920	920	900	900	900	900	900	520		910	910	910	910	910	910	930	930	930	940	940	940	940	SPEC NUMBER	

APPENDIX D: GRAIN SIZE CLASSIFICATION

Screen (mm)		Wentworth size class*	
Field Processing	Sample is 100% Passing 3" (76.1mm)	Boulders	-8 phi (256mm)
	1 1/2" (38.1mm)	Cobbles	
	3/4" (19.1mm)	Coarse	-6 phi (64mm)
	3/8" (9.5mm)	Medium	
Laboratory Processing	#4 (4.8mm)	Fine	
	#8 (2.4mm)	Granules	-2 phi (4mm)
	#16 (1.2mm)	Coarse	-1 phi (2mm)
	#30 (0.6mm)	Medium	
	#50 (0.3mm)	Fine	
	#100 (0.15mm)		
	#200 (0.07mm)		
	< 200		
		Fines	
		Silt & Clay	+4 phi (0.063mm)

* modified from Folk, 1974

**APPENDIX E
PETROGRAPHIC ANALYSIS**

DEPOSIT	SITE	GOOD							FAIR			POOR				DELETERIOUS		
		CARB	GRAN	VOL	WACKE	GNEISS	QTZ	SDST	CARB	GRAN	SDST	CARB	GRAN	VOL	GNEISS	CHRT	WEATH	MINRL
32101	CL010A	28	42	19	0	0	0	3	0	4	1	0	0	0	0	1	2	0
32101	CL010B	23	52	20	0	1	0	0	0	0	0	0	1	0	0	2	1	0
32101	CL129A	24	53	18	0	0	1	1	0	0	0	0	0	0	0	0	3	1
32101	CL129B	23	57	10	0	0	0	1	0	2	0	1	8	0	0	3	0	0
32101	CL129C	19	52	21	1	0	1	0	0	0	0	0	2	0	0	0	0	0
32102	CL002	2	86	8	0	0	3	0	0	0	0	0	1	0	0	0	0	0
32102	CL003	8	81	5	0	0	1	3	0	0	0	0	0	0	0	0	2	0
32102	CL014	20	45	28	0	0	0	0	0	2	0	2	0	0	0	1	1	0
32102	CL092	3	76	10	0	0	2	0	0	0	0	6	0	0	1	1	1	0
32103	CL049	10	54	27	0	0	0	1	0	0	0	0	0	0	0	1	6	0
32105	CL063	10	53	15	0	0	0	1	0	0	0	0	12	0	0	0	10	0
32106	CL070	1	67	21	0	0	1	1	0	0	0	0	3	0	0	0	6	0
32106	CL072	7	59	27	0	0	0	0	0	0	0	0	1	0	0	2	4	0
32107A	CL026	17	69	13	0	0	0	0	1	0	0	0	0	0	0	1	0	0
32107A	CL109	16	64	10	0	0	1	0	0	0	1	0	5	0	0	1	2	0
32107C	CL055A	9	63	21	0	0	0	3	0	0	0	0	1	0	1	0	0	0
32107C	CL055B	12	49	24	0	0	2	1	0	0	0	1	2	0	0	0	0	0
32107C	CL055C	11	69	18	0	0	0	0	0	0	1	0	0	0	0	0	0	0
32107C	CL055G	0	81	17	0	0	0	0	0	0	0	1	0	0	1	0	0	0
32107C	CL114	14	58	12	0	0	1	1	0	0	0	0	6	0	3	0	0	0
0	CL027	16	62	15	0	0	0	1	1	0	0	0	3	1	0	0	0	0
0	CL035	7	51	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	CL050	29	34	29	0	0	0	1	0	0	0	0	0	0	0	0	0	0
0	CL102	22	64	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**APPENDIX F
SAND AND GRAVEL RESERVES**

DEPOSIT #032101(CROSS LK DEPOSIT)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NW-27-065-02W	891000	70	267300	CROWN(PROVINCIAL)/CROWN	
SW-27-065-02W	511500	80	1102300	CROWN(PROVINCIAL)/CROWN	
SE-28-065-02W	1270500	60	508200	CROWN(PROVINCIAL)/CROWN	
	DEPOSIT RESERVES		877800		

DEPOSIT #032102 (SAND BAY DEPOSIT)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NW-16-065-02W	30000	70	9000	CROWN(PROVINCIAL)/CROWN	
SW-21-065-02W	231000	30	161700	CROWN(PROVINCIAL)/CROWN	
	DEPOSIT RESERVES		170700		

DEPOSIT #032103 (OXFORD HOUSE WINTER RD)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NE-10-065-02W	0	0	0	CROWN(PROVINCIAL)/CROWN	
NW-11-065-02W	34500	10	31050	CROWN(PROVINCIAL)/CROWN	
	DEPOSIT RESERVES		31050		

DEPOSIT #032104 (OXFORD HOUSE WINTER RD)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NE-02-065-02W	208500	5	198075	CROWN(PROVINCIAL)/CROWN	
NW-02-065-02W	174000	0	174000	CROWN(PROVINCIAL)/CROWN	
SE-02-065-02W	18000	20	14400	CROWN(PROVINCIAL)/CROWN	
SW-02-065-02W	243000	10	218700	CROWN(PROVINCIAL)/CROWN	
	DEPOSIT RESERVES		605175		

DEPOSIT #032105 (OXFORD HOUSE WINTER RD)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NE-20-064-01W	324000	0	324000	CROWN(PROVINCIAL)/CROWN	
SE-20-064-01W	370000	30	259000	CROWN(PROVINCIAL)/CROWN	
NW-21-064-01W	46000	0	46000	CROWN(PROVINCIAL)/CROWN	
DEPOSIT RESERVES			629000		

DEPOSIT #032106 (OXFORD HOUSE WINTER RD)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NW-02-064-01W	162000	0	162000	CROWN(PROVINCIAL)/CROWN	
NE-03-064-01W	23000	0	23000	CROWN(PROVINCIAL)/CROWN	
NE-09-064-01W	194400	5	184680	CROWN(PROVINCIAL)/CROWN	
SE-09-064-01W	46400	0	46400	CROWN(PROVINCIAL)/CROWN	
NE-10-064-01W	729000	0	729000	CROWN(PROVINCIAL)/CROWN	
NW-10-064-01W	555000	10	499500	CROWN(PROVINCIAL)/CROWN	
SE-10-064-01W	589500	15	501075	CROWN(PROVINCIAL)/CROWN	
SW-10-064-01W	486000	15	413100	CROWN(PROVINCIAL)/CROWN	
NW-11-064-01W	69000	0	69000	CROWN(PROVINCIAL)/CROWN	
SW-11-064-01W	139500	5	132525	CROWN(PROVINCIAL)/CROWN	
SW-15-064-01W	370000	0	370000	CROWN(PROVINCIAL)/CROWN	
SE-16-064-01W	324000	10	291600	CROWN(PROVINCIAL)/CROWN	
DEPOSIT RESERVES			3421880		

DEPOSIT #032107A (WAVE LK DEPOSIT)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NE-32-064-02W	93000	0	93000	CROWN(PROVINCIAL)/CROWN	
SE-32-064-02W	162000	15	137700	CROWN(PROVINCIAL)/CROWN	
NW-33-064-02W	208000	0	208000	CROWN(PROVINCIAL)/CROWN	
SW-33-064-02W	740000	10	666000	CROWN(PROVINCIAL)/CROWN	
DEPOSIT RESERVES			1104700		

DEPOSIT #032107B (WAVE LAKE DEPOSIT)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NW-28-064-02W	1016000	10	914400	CROWN(PROVINCIAL)/CROWN	
SW-33-064-02W	18000	0	18000	CROWN(PROVINCIAL)/CROWN	
	DEPOSIT RESERVES		932400		

DEPOSIT #032107C (WAVE LAKE DEPOSIT)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
NE-21-064-02W	69500	0	69500	CROWN(PROVINCIAL)/CROWN	
NW-22-064-02W	11500	0	11500	CROWN(PROVINCIAL)/CROWN	
SW-27-064-02W	417000	0	417000	CROWN(PROVINCIAL)/CROWN	
SE-28-064-02W	1480000	5	1406000	CROWN(PROVINCIAL)/CROWN	
	DEPOSIT RESERVES		1904000		

DEPOSIT #032108 (JENPEG GARBAGE DUMP)

LOCATION	INITIAL RESERVES CUBIC M.	PERCENT DEPLETED CUBIC M.	REMAINING RESERVES CUBIC M.	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
SW-18-064-04W	139500	99	1395	CROWN(PROVINCIAL)/CROWN	
	DEPOSIT RESERVES		1395		

DEPOSIT #032109 (NO DEPOSIT)

LOCATION	INITIAL RESERVES	PERCENT DEPLETED CUBIC METRES	REMAINING RESERVES CUBIC METRES	OWNER (SURFACE/GRAVEL)	OWNER 2 (SURFACE/GRAVEL)
SW-11-064-01W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NE-16-064-01W	100	99	1	CROWN(PROVINCIAL)/CROWN	
SW-21-064-01W	100	99	1	CROWN(PROVINCIAL)/CROWN	
SE-30-064-01W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NW-15-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NE-18-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
SE-18-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
SW-18-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NW-20-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NE-25-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NE-29-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NW-29-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
SE-29-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
SW-29-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NE-32-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	
NW-32-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN	

SW-32-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-36-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-36-064-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-02-064-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-02-064-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-03-064-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-07-064-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-11-064-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-12-064-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-12-064-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-12-064-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-03-064-04W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-07-064-04W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-10-064-04W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-10-064-04W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-16-064-04W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-17-064-04W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-18-064-04W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-18-064-04W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-16-064-07W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-05-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-05-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-07-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-08-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-10-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-11-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-16-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-16-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-17-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-21-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-21-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-21-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-22-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-27-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-28-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-31-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-32-065-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-02-065-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-02-065-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-03-065-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-04-065-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-04-065-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-05-065-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-12-065-03W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-04-066-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NW-05-066-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SW-05-066-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
NE-08-066-02W	100	99	1	CROWN(PROVINCIAL)/CROWN
SE-08-066-02W	100	99	1	CROWN(PROVINCIAL)/CROWN

DEPOSIT RESERVES

65

TOTAL REPORT RESERVES

9678165

APPENDIX G

AGGREGATE

Any inert, construction material (sand, gravel, slag, crushed stone or other mineral material).

AGGREGATE RESERVES

Aggregate in a deposit which is proven and is economically significant.

ALLUVIUM

Alluvium is a general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during postglacial time by a stream.

BEACH DEPOSITS

These are relatively narrow, linear features formed at the shores of glacial lakes that existed during deglaciation. Well developed beaches are usually less than 20 feet (6 m) thick. The aggregate is well sorted and stratified and sand-sized material commonly predominates.

BEDROCK

In-place pre-Quaternary material exposed at the surface or underlying the surficial material.

BINDER

Material that produces or promotes consolidation in loosely aggregated sediments. Usually mud or clay, sometimes till is used for binder.

CARBONATE ROCKS

A broad term referring to those sedimentary rocks consisting chiefly of carbonate minerals, mainly limestone and dolostone.

CLAST

An individual constituent, grain, or fragment of a sediment or rock, produced by the mechanical weathering of a large rock mass. Synonyms include particle and fragment.

CROWN LAND

Land reserved and administered by the Crown. Sand and gravel usually administered by the Crown.

CROWN SAND AND GRAVEL

Sand and gravel reserved and administered by the Crown.

DELETERIOUS LITHOLOGY

A general term used to designate those rock types which are chemically or physically unsuited for use as construction or road-building aggregates. Such lithologies as chert, shale, siltstone, and sandstone may deteriorate rapidly.

DEPOSIT

An accumulation of sediments left in a new location by a natural transportative agent such as water, wind, ice, or gravity.

An aggregate deposit is a deposit of sand and gravel considered to be of economic significance.

DIRT

See fines.

DOLOMITE (DOLOSTONE)

A carbonate sedimentary rock consisting chiefly of the mineral dolomite and containing relatively little calcite (dolomite is also known as dolostone).

DRIFT

A general term for all unconsolidated rock debris transported from one place and deposited in another; distinguished from underlying bedrock. In North America, glacial activity has been the dominant mode of transport and deposition of drift. Synonyms include overburden and surficial deposit.

DURABLE ROCK

A rock fragment which is hard and inert and can be used as aggregate without breaking, crumbling or reacting with the cementing material.

EOLIAN

Pertaining to wind action.

EPOCH

A geological-time unit longer than an age and a subdivision of a period.

ESKERS

Eskers are narrow, sinuous ridges of sand and gravel. They vary greatly in size. Many eskers consist of a central core of poorly sorted and stratified gravel. The core material is often draped by better sorted and stratified sand and gravel.

FINES

A general term used to describe the size fraction of an aggregate which passes (is finer than) the No. 200 mesh screen (0.074 mm). Also described informally as "dirt", these particles are in the silt- and clay-size range.

FLUVIAL

Pertaining to rivers or streams.

GLACIOFLUVIAL DEPOSITS

Material deposited by streams flowing from, on, or within melting glacier ice, generally composed of sorted, stratified sand and gravel; includes outwash, kame, esker, etc.

GLACIOLACUSTRINE DELTAS

These features were formed where streams or rivers of glacial meltwater flowed into lakes and deposited their suspended sediment. Such deposits tend to consist mainly of sand and abundant silt. However, in near-ice or ice-contact positions, coarse material may be present.

GLACIOLACUSTRINE DEPOSITS

Material deposited in lakes affected by glacier ice or by meltwater flowing directly from glaciers; composed of well-sorted clay, silt, or sand.

GRANULAR BASE COURSE

Components of a road placed on subgrade and designed to provide strength, stability, and drainage, as well as support for surfacing materials. Several types have been defined: Granular Base Course A consists of crushed and processed aggregate and has relatively stringent quality standards in comparison to Granular Base Course B and C which are usually pit-run or other unprocessed aggregate.

GROUND MORaine

A deposit of till with a flat or undulating surface.

HOLOCENE

An epoch of the Quaternary period covering the time period from the retreat of the continental glaciers to the present, about 10 000 years.

HUMMOCKY

An irregular or knob and kettle surface.

HUMMOCKY MORaine

A landscape composed primarily of till with a hummocky surface.

ICE-CONTACT DEPOSIT

Material deposited in contact with glacier ice by meltwater; includes kames, eskers, kame terraces, etc.

ICE-CONTACT TERRACES

These are glaciofluvial features deposited between the glacial margin and a confining topographic high, such as the side of a valley. The structure may be similar to outwash deposits.

KAMES

Kames are mounds of poorly sorted sand and gravel deposited by meltwater in depressions or fissures on the ice surface or at its margin. The deposits consist mainly of irregularly bedded and cross-bedded, poorly sorted sand and gravel. Deposits include single mounds, linear ridges (crevasse fillings) or complex groups of landforms.

LACUSTRINE DEPOSIT

Material deposited in a lake.

LITHOLOGY

The description of rocks on the basis of such characteristics as color, structure, mineralogic composition, and grain size. Generally, the description of the physical character of a rock.

MELTwater CHANNEL

A drainage way produced by water flowing away from a melting glacier margin.

MORaine

A distinct accumulation of glacial drift. Could represent an ice marginal position.

OUTWASH

Outwash deposits consist of sand and gravel laid down by meltwaters beyond the margin of the ice lobes. They occur as sheets

or as terraced valley fills (valley trains) and may be very large in extent and thickness. Well developed outwash deposits have good horizontal bedding and are uniform in grain-size distribution. Outwash deposited near the glacier's margin is much more variable in texture and structure.

PIT RUN

Unprocessed aggregate removed from pit. Generally consists of fine pebble gravel with minor amounts of material coarser than 38 mm (1 1/2"). It is used for road maintenance, upgrading and resurfacing.

PLEISTOCENE

An epoch of the recent geological past including the time from approximately 1.8 million years ago to 10 000 years ago. Much of the Pleistocene was characterized by extensive glacial activity.

QUATERNARY

The second period of the Cenozoic era, thought to cover the last 2-3 million years. It consists of two epochs: The Pleistocene and the Holocene.

RESOURCE

An aggregate deposit or environment which may or may not be proven and is presently not economically significant.

SHALE

A fine-grained, sedimentary rock formed by the consolidation of clay, silt, or mud and characterized by well developed bedding planes, along which the rock breaks readily into thin layers. The term shale is also commonly used for fissile claystone, siltstone, and mudstone.

SPILLWAY

Large drainage valley formed by meltwater flowing from a glacial lake. Spillways often have gravel terraces.

STONE

That component of aggregate coarser than 4.76 mm or the #4 sieve, includes pebbles, cobbles and boulders.

SURFICIAL GEOLOGY

A form of geological mapping dealing with all materials occurring at surface in an area: unlithified or lithified (sediments or bedrock).

TERRACE

A relatively flat, stair-stepped, depositional or erosional surface bounded by an ascending slope on one side and a descending slope on the other.

TILL

Unsorted and unstratified rock debris, deposited directly by glaciers, and ranging in size from clay to large boulders.

WISCONSINAN

Pertaining to the last glacial stage of the Pleistocene Epoch in North America. It began approximately 100 000 years ago and ended approximately 10 000 years ago. The glacial deposits and landforms of southern Manitoba are predominantly the result of glacial activity during the Wisconsinan Stage.