

SAND AND GRAVEL RESOURCES OF THE PELICAN
(WEST CENTRAL PORTION OF 83P)
MAP AREA, ALBERTA

Open File Report 87-2
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1987

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ABSTRACT

The aggregate materials present in the west central portion of the Pelican (NTS 83P) map area were studied in 1986 to provide information on the distribution and characteristics of the resource. The study area is 3,350 km² in size and was investigated at the enhanced reconnaissance level. The program consisted of compiling existing information, air photo interpretation plus some site and laboratory analyses.

Sand and gravel materials are distributed unevenly and are of variable quality. Currently exploited (all season) deposits include sand and gravel from a kame deposit west-southwest of Rock Island Tower, sand and gravel from meltwater deposits west of the Marten Hills airstrip, gravels from preglacial deposits southwest, north and southeast of Marten Hills gas plant (within a 7 km radius), and sand from a significant eolian deposit in the southeast corner of the map area. Potential sources include glaciofluvial sand in scattered deposits in generally the southwest quarter of the map area, esker gravels north of Howard Lake, alluvial gravels in the upper reaches of the Fawcett River, creek valley outwash gravels in the northwest corner of the mapped area, largely eolian sands in the northeast corner of the map area, and fluvial-lacustrine (outwash and beach deposits) adjacent to and north of Calling Lake. Throughout the map area, small, discontinuous and sometimes dirty, sandy, glaciofluvial deposits occur. Most Recent alluvium has little or no aggregate potential. The few water well logs available indicate appreciable amounts of sand beneath thick overburden in the area between Rock Island Lake and Calling Lake. Three deposits, one north, one south and one southeast of the mapped area, may offer alternative sources for aggregate.

INTRODUCTION

This study is part of a program initiated in 1976 by the Alberta Research Council and Alberta Forestry, Lands and Wildlife to provide information on the aggregate resources of the Province of Alberta. The area of study (Fig. 1), level of detail and materials to be investigated were determined by the Resources Evaluation and Planning Division (REAP) of Alberta Forestry. The actual investigations were conducted by the Geological Survey Department of the Alberta Research Council.

The study was completed at the enhanced reconnaissance level (category 4, Table 1). This type of mapping is designed to provide a minimum data level for local and regional planning and management of aggregate resources in the province and to form a base from which further exploration can proceed.

The Pelican map area, more appropriately called the Calling Lake area, is bounded by longitudes 113°00' and 114°00' west and latitudes 55°15' and 55°45' north. Total area is approximately 3350 km². Economic activities include hunting, trapping, tree harvesting and gas and petroleum exploration/exploitation. Population is concentrated on the east side of Calling Lake within the settlement of Calling Lake and the Jean Baptiste Gambler Indian Reserve 183. Total population probably does not exceed 950 people. Recreation facilities (camping, fishing, boating) are situated on the south and west perimeters of Calling and Rock Island Lakes respectively.

ACKNOWLEDGMENTS

Thanks are due to Julian Fox and Dixon Edwards of Alberta Research Council for suggestions. Campbell Kidston performed the laboratory analyses and Monica Price gave her usual competent assistance in the office.

Funds for the project were provided by Resource Evaluation and Planning Division of Alberta Forestry.

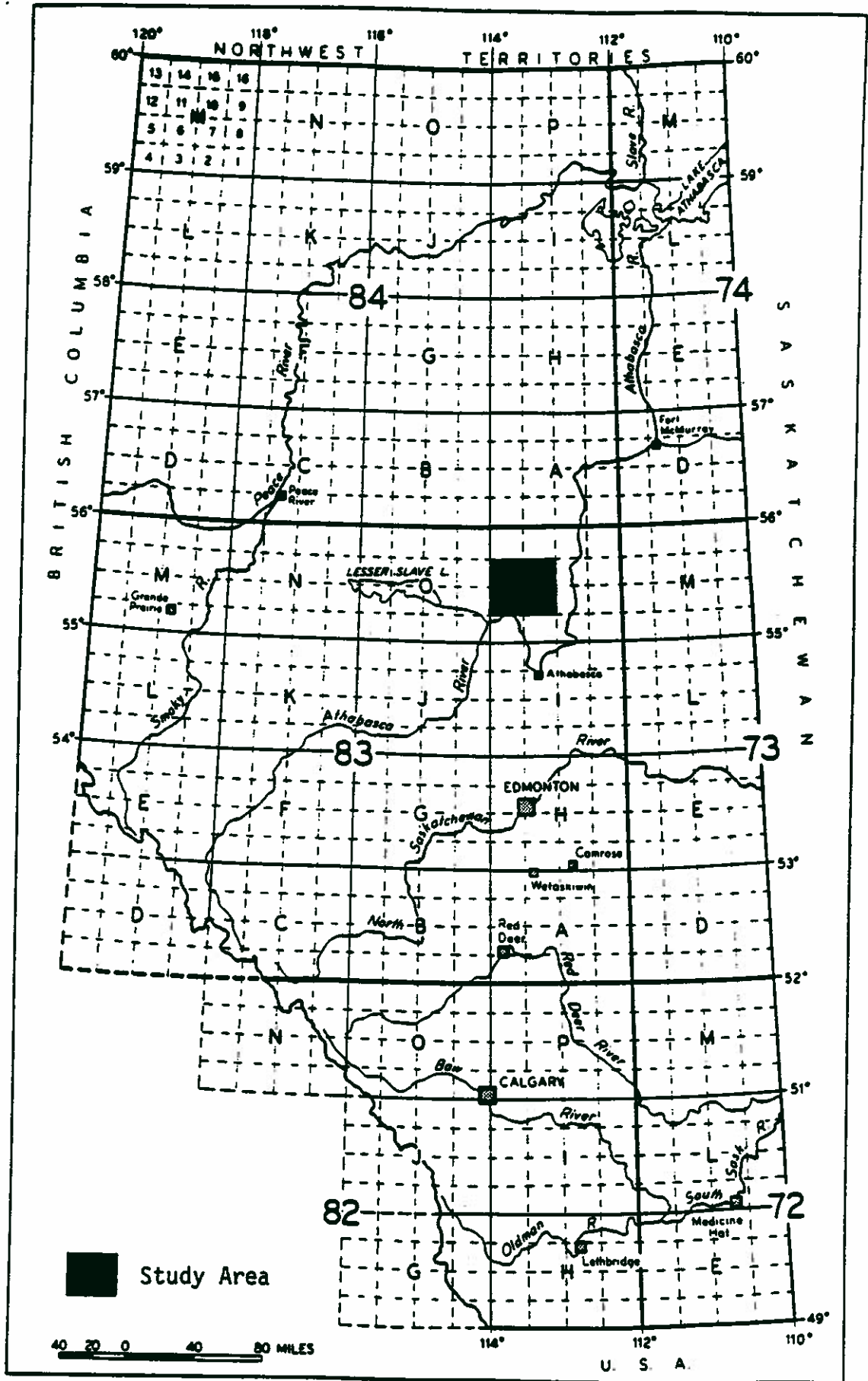


Figure 1: Location Map

Table 1. AGGREGATE INVENTORY MAPPING LEVELS

Format	Reconnaissance Study 5	Enhanced Reconnaissance Study 4	Regional Mapping 3	Detailed Mapping 2	Deposit Evaluation 1
Scale (Common)	1:250,000 (approx. 11x14 townships)	1:250,000 (approx. 11x14 townships)	1:50,000 (approx. 3x3 townships)	1:10,000	1:10,000 or larger
Mapping Methodology	Derived from existing surficial geology information. Aerial photograph interpretation.	Derived from existing surficial geology information. Aerial photograph interpretation. Some field traverses and site examination.	Aerial photograph interpretation Field traverses. Site examinations. Selected deposit testing. Laboratory testing.	Sedimentological studies. Site examination. Deposit testing. Laboratory testing.	Test pitting on an established grid. Hole logging. Materials analysis.
Uses	Broad scale planning. Preliminary aggregate exploration.	Broad scale planning. Preliminary aggregate exploration. Preliminary resource assessment.	Land use planning. Resource management. Resource estimates.	Land management. Reserve estimates. Deposit management.	Deposit evaluation. Development plan preparation.
Comments	Only potential areas suitable for finding deposits shown. Fairly quick and in- expensive to produce.	Potential areas suitable for finding deposits are shown. Some deposits are examined. A map will take 6 months to a year to produce.	Estimates deposit boundaries and gives quality and quantity estimations. A map may take 8 months to a year to produce.	Establishes deposit boundaries. Refines quantity/quality information. Fairly expensive survey.	Precise quality and quantity estimates. Deposit variations identified. Very expensive survey.
Output	2 map sheets per prof-year.	1 map sheet per prof-year.	2 to 3 map sheets per prof-year.	Special projects only.	Special projects only.

Helicopter time was provided by Alberta Forest Service. Special acknowledgment also is given to Alberta Forest Service employees in Calling Lake and Slave Lake for their assistance.

METHODS

The study was initiated with the review and compilation of existing information such as water well logs from the Alberta Environment Department and data provided by the Alberta Transportation Department. A preliminary surficial geology map was produced by L. D. Andriashek of the Terrain Science Department of the Alberta Research Council prior to field investigation. Additional air photo interpretation of the area was performed by the principal investigators. A number of sites were identified within the map areas as possible locations for sampling or for site descriptions during the field component of the study.

Field work was conducted in June, 1986 by foot, three-wheeled motorcycle and truck followed by helicopter flights in July. Access to normal vehicular traffic is very limited. All the most important geological features were visited and sampled. Whenever appropriate, samples were taken for grain-size analysis. A limited number of geophysical traverses using a Geonics EM 31 were made to detect possible buried granular material.

This report is based mainly on surficial geology interpretation, with limited field checking and laboratory data.

GEOLOGY

Physiography and Bedrock

Pelican Mountain and the Fawcett Plain cover most of the study area (Fig. 2). The Amadou Hills and Wabasca Plain cover smaller parts of the region. Total relief of the area is approximately 500 m. The flat top of Pelican Mountain is at approximately 900 m and the lowest elevation on the Wabasca Plain is about 600 m. Most of the area is heavily

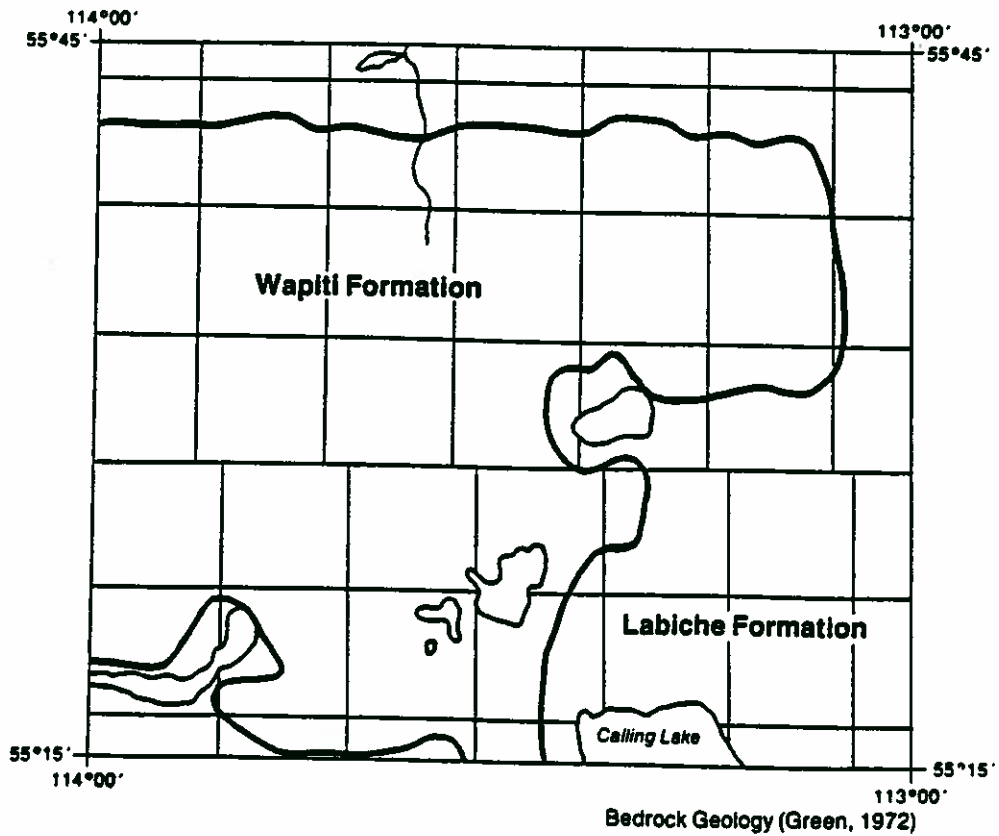
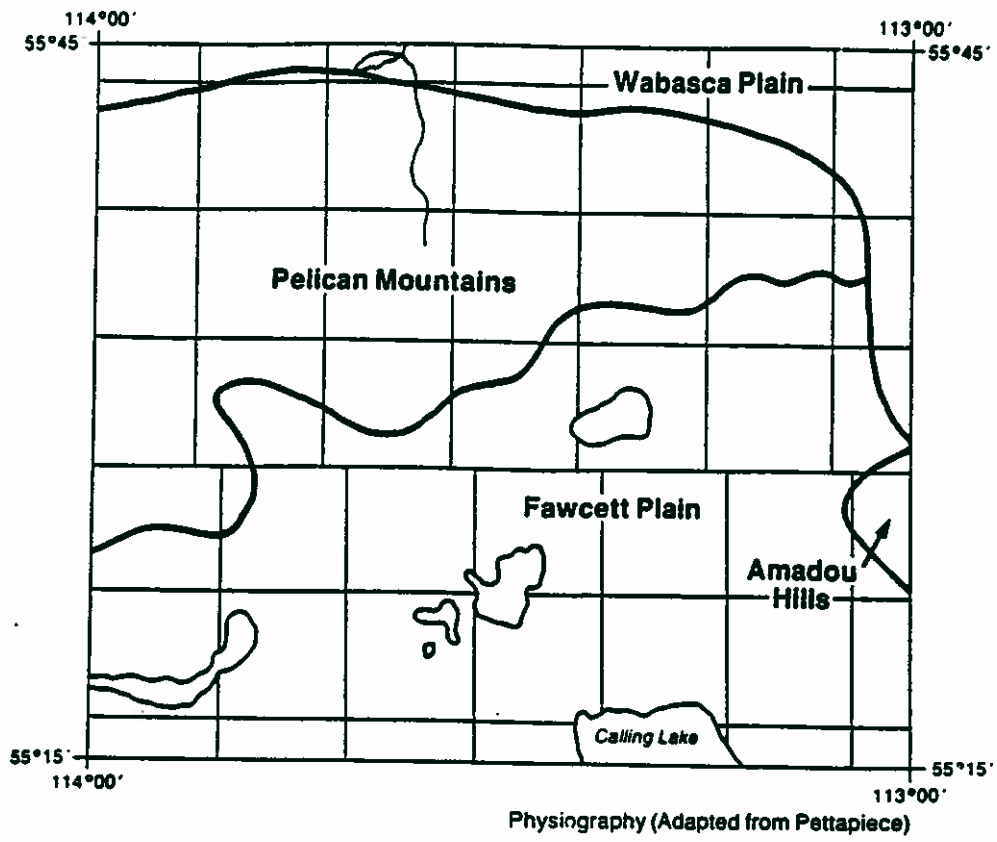


Figure 2: Physiography and bedrock geology of Calling Lake area

forested and swampy. No major rivers traverse the map area. Most waters eventually drain to the Athabasca River. A small area in the northwest drains to the Wabasca River.

Only the southeast trending boundary of that part of the Wabasca Plain physiographic subdivision (Pettapiece, 1984) present in the map area approximates an underlying bedrock boundary (Fig. 2). Other physiographic subdivision boundaries apparently are unrelated to the boundaries of the Cretaceous Wapiti or La Biche Formations.

Surficial Geology

No detailed studies are published for the surficial geology of the study area. The description of surficial material is based on a preliminary surficial geology map, some detailed air photo interpretation and field ground checks, combined with water well and Alberta Transportation data.

Glaciation, the latest major geological event throughout this area, was followed by a period of erosion and deposition which determined the general contour of much of the present surface. During glacial events in Pleistocene time, abundant unconsolidated material was deposited. This is evident today in the mapped area particularly at higher elevations, such as on top and on the slopes of Pelican Mountain and the highlands in the southwest quarter of the mapped area, where till predominates. The lower land in the east half is occupied primarily by post glacial sphagnum/sedge peat in bogs/fens. By far the most abundant unconsolidated material in the mapped area is till. Till, a mixture of clay, silt, sand and gravel, is composed mainly of material derived from the local bedrock but other material from as far away as the Precambrian Shield is present. This material, as expressed by ground/hummocky moraine, dominates Pelican Mountain and the western half of the Fawcett Plain. Much of the moraine in the eastern half of the Fawcett Plain and the Wabasca Plain is obscured by moss peat bogs. Glacial fluting within the Amadou Hills indicates north to south ice movement.

Slope wash and stream alluvial materials comprise the second most abundant deposits. Stream alluvium for the most part, consists of silt and fine sand. Sediments, derived from slopewash from Pelican Mountain, near the source of the Fawcett River, however, are predominately coarse grained. Although the slopewash does not appear to be rich in sand and gravel there may be irregular and linear concentrations. There also appears to be a good deal of slopewash on the northern flanks of Pelican Mountain.

Glaciofluvial deposits, commonly a good aggregate source, are widespread. The most significant deposits occur on the western half of the Fawcett Plain, however there are some in the northeast corner of the map area as well. Sand and gravel materials are associated with glaciofluvial landforms such as meltwater channels and outwash. Ice contact features are few. There is one kame west of Rock Island Tower and a very minor one east of Paul Lake. Small eskers are present north of Howard Lake. A few crevasse fillings occur in the eastern half of the Fawcett Plain.

Eolian sands, probably derived from the area around the lakes to the northwest (Pelican, Sandy, Osland Lake etc.), occur about the eastern end of Pelican Mountain. Eolian deposits are excellent sources of fine to medium sand.

Glaciolacustrine sediments may contain very fine sand locally but for the most part are composed of silt and clay material. There are glaciolacustrine areas to the east of Calling Lake and south of Fawcett Lake. Raised beaches are present at the north end of Calling Lake and may be a source of sand and gravel.

Extensive bedrock exposures, or broken rock, are present at the upper elevations of Pelican Mountain. These areas, associated with post glacial weathering and/or glacial erosion, normally are not sources of aggregate.

SAND AND GRAVEL RESOURCES

Gravel and sand deposits in the area are variable. Their composition and origin vary widely and they are distributed unevenly. Some deposits may be extensive, others are only scattered, small bodies of gravel, and some are just a thin sheet of sand.

Deposit, pit, site description and/or sample locations are shown in figure 3 (in pocket). Evaluation of the aggregate resources in the study area are given in figure 4 (in pocket). Deposit, pit and site descriptions and laboratory data are in appendix 1. Deposits with potential require further investigation and this is noted in the descriptions in appendix 1.

The gravel and sand bearing deposits are classified on the basis of origin into the three major types listed below:

1. Preglacial alluvial deposits
2. Glaciofluvial deposits
3. Recent deposits

1. Preglacial Alluvial Deposits

Most of the preglacial gravel is situated at elevations above 900 m (3000 feet) on Pelican Mountain. At least three all season pits exist within these deposits at the western end of the mapped area. The westernmost pit (Tp75, R26) is located in gravel under 1 m overburden and a similar pit in Tp75, R25 (Pl. 1) contains 60 percent clasts. The gravel consists primarily of quartzite clasts and locally may exceed 25 m in thickness. It was deposited during preglacial time, most likely during the Middle to Late Tertiary period.

Known gravel reserves exist east and north of the abandoned Pelican Tower. Overburden varies from 0.1 to 5 m and gravel thickness varies from 0.6 to 5 m. Testing shows that some areas may contain as much as 70 percent gravel. The total amount of sand and gravel

on Pelican Mountain may be extremely large. Further investigation is highly recommended.

2. Glaciofluvial Deposits

Glaciofluvial deposits are widespread on the Fawcett and Wabasca Plains and are probably the second largest source of sand and gravel in the mapped area. A kame west southwest of Rock Island Tower and a meltwater channel west of the Marten Hills airstrip are the primary sources of material. Rich sand and gravel eskers may exist north of Howard Lake. Other possible sources are the many streams exiting from Pelican Mountain that may contain outwash not seen during helicopter reconnaissance. This is suggested by a sand and gravel showing in an unnamed creek draining Pelican Mountain in the northwest corner of the mapped area.

3. Recent Deposits

The most promising source of sand and gravel from Recent deposits is from the Fawcett River and the north feeder creek of Calling Lake. The Fawcett River could yield considerable quantities of gravel (Pl. 2). The feeder creek probably will yield mostly sand. Other systems probably will yield only small widely separated pockets of gravel and sand, e.g. the small streams flowing down the north slopes of Pelican Mountain. Gravelly sand may be found within the raised beaches along the north shore of Calling Lake.

4. Buried Deposits

Buried deposits of sand, gravelly sand and gravel are indicated from water well log data between Rock Island Lake and Calling Lake in Township 73 to 75 and Range 22. Overburden is 0.6 to 8 m and deposit thickness is from 13 to 45 m. Quality and origin of the material are unknown.

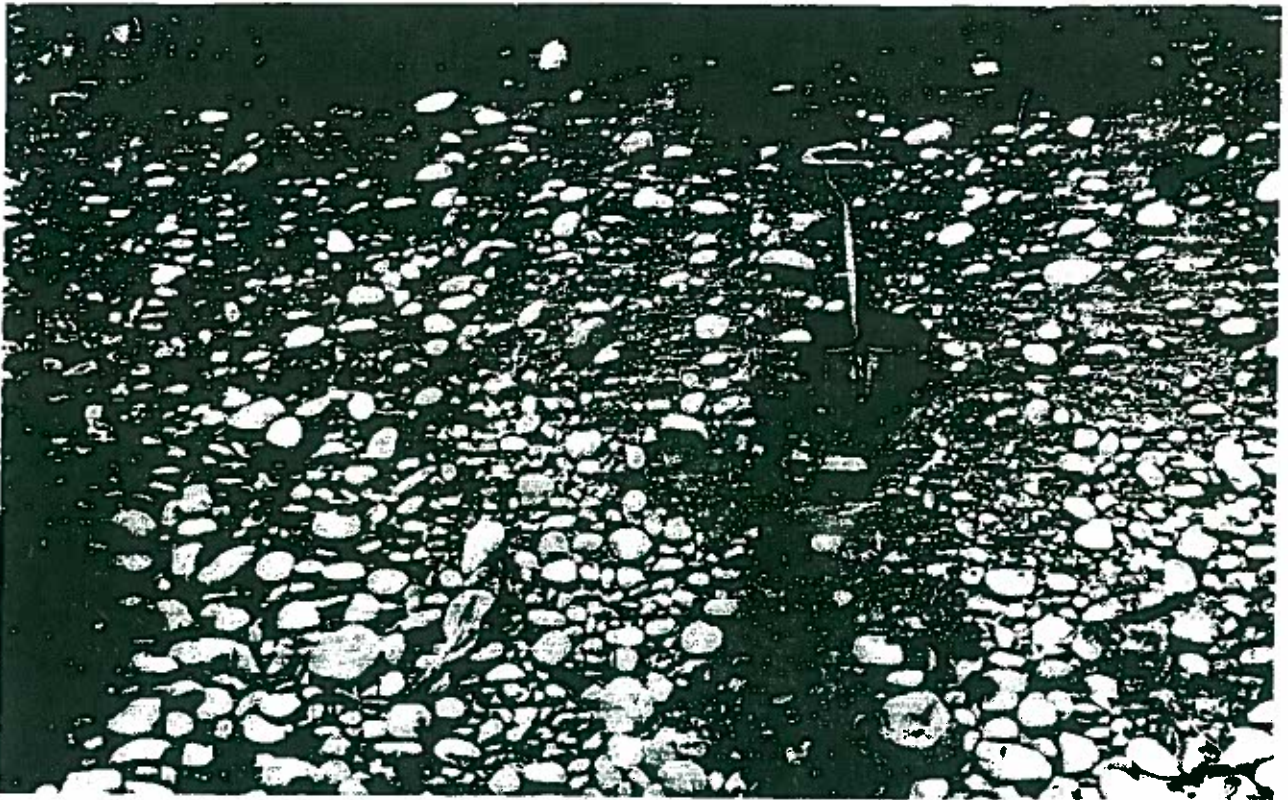


Plate 1 Preglacial gravel and sand below thin overburden exposed in a pit at NW35-75-25-W4 in Deposit 16. The shovel is 1 m long.



Plate 2 Cobble, gravel and sand bar in the Fawcett River at NW20-75-25-W4 in Deposit 15.

5. Deposits Outside the Map Area

There are two Recent and two glaciofluvial deposits bordering the mapped area. Athabasca River terraces adjacent to the south boundary of the mapped area are the most promising. The other three sources are sand along the east shore of Calling Lake, glaciofluvial sand deposits near the southeast corner of the map and a glaciofluvial gravelly sand deposit south of Sandy Lake.

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APPENDIX 1
DEPOSIT AND SITE DESCRIPTION

DEPOSIT NO. 1

LOCATION: Sec 27, 34 Tp72 R21 W4M
Sec 3 Tp73 R21 W4M

No. of associated pits/sites: 1

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

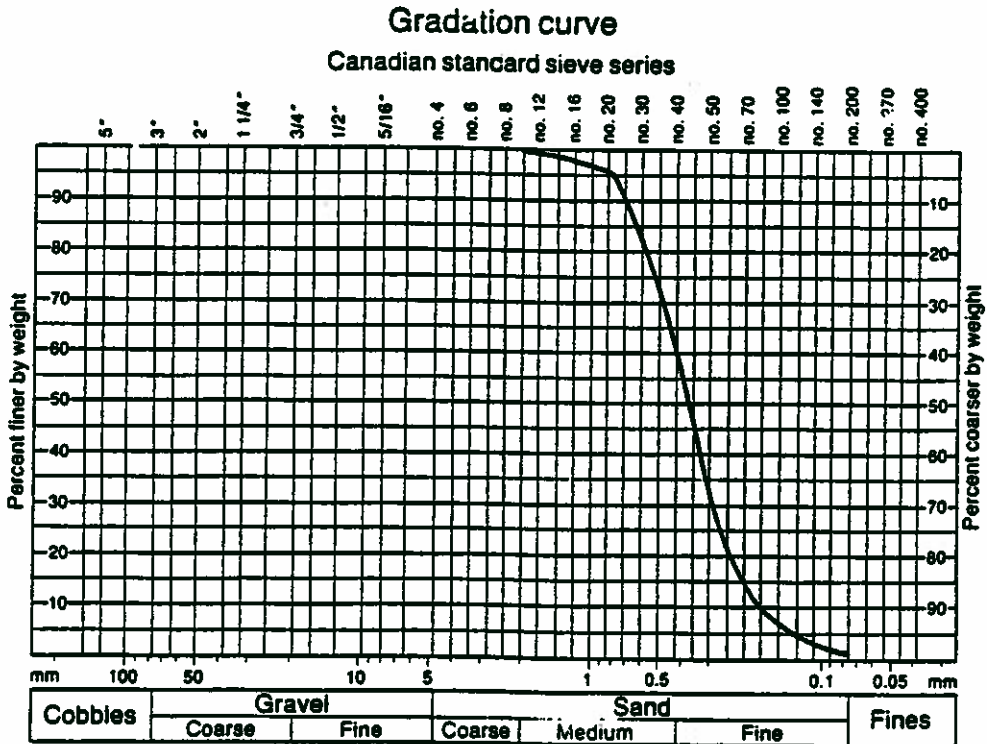
Eolian deposit of dirty, oxidized, fine sand overlain by minor overburden. One pit is present at the south end of the deposit. At the pit locality thickness of the deposit is at least 10 m and the water table is at a depth near 6 m. Large volumes probably still remain. Access by east-west road from secondary road 813.

Pit Location: Sec NE27 Tp72 R21 W4M

Pit Description:

Sampled from near the water table in the deepest part (6 m) of a large pit in eolian sand. This mostly fine sand deposit appears to be fairly dirty and oxidized. Average excavation depth, through minor overburden, is 3 to 4 m. Large volumes of sand still remain. Access is good although very slick when wet.

Gradation: 0% cobbles 0% gravel
98.8% sand 1.2% fines



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DEPOSIT NO. 2

LOCATION: NE corner Tp72 R24 W4M
SE corner Tp73 R24 W4M
Sec 17, 20 Tp72 R23 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Deposit is similar to the southern half of Deposit 6. However, the mounds appear to be less than 1.5 m high. Access by cutline in the winter. Field checked by helicopter flyover.

* * * * *

DEPOSIT NO. 3

LOCATION: Sec 25 Tp72 R26 W4M

No. of associated pits/sites: 1 site

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

Small glaciofluvial, ice contact kame deposit of highly oxidized gravel and sand. Gradation is approximately 60% sand and 40% gravel. Rock types are quartzite and igneous rocks from the Canadian Shield. Overburden is less than 30cm. Exposed interbedded sand and gravel is 3 m thick. Access from road to Fawcett Lake resort.

Site Location: Sec NE25 Tp72 R26 W4M

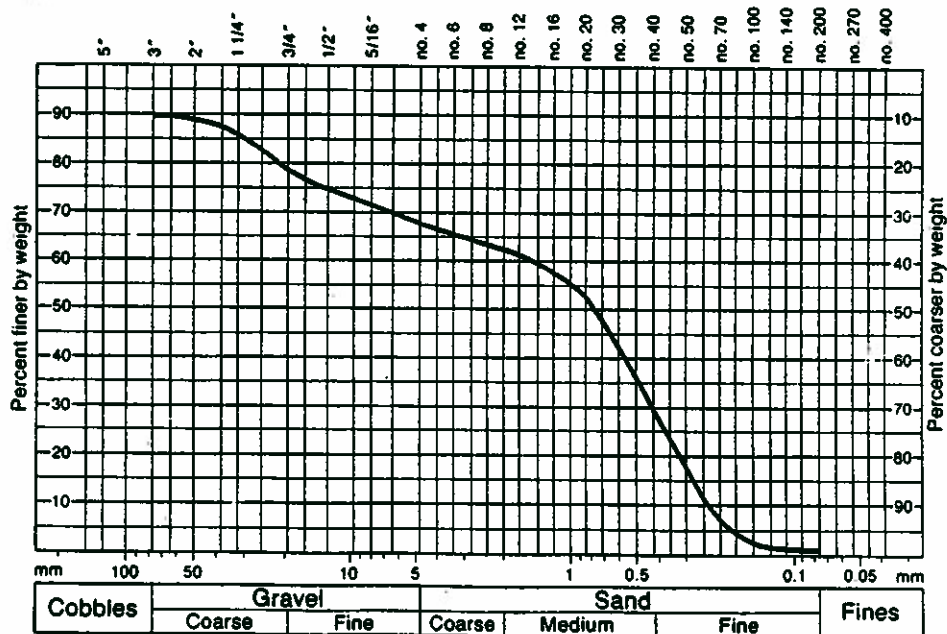
Site Description:

Sample from exposed face of a small kame. Overall gradation of highly oxidized gravel is about 60% sand and 40% gravel contained within a structure of parallel interbedding. Highly oxidized sand is predominately medium grained. Gravels consist of schists and igneous rocks from the Canadian Shield plus quartzites. Overburden is less than 30 cm covering at minimum 3 m of material. Good access.

Gradation: 11% cobbles 22% gravel
65% sand 2% fines

Gradation curve

Canadian standard sieve series



DEPOSIT NO. 4

LOCATION: NW corner Tp73 R26 W4M
SW corner Tp74 R26 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Glaciofluvial outwash fan and meltwater channel outwash consisting of limited volumes of sand. Field checked by helicopter flyover.

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DEPOSIT NO. 5

LOCATION: Central Tp73 R25 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Glaciofluvial outwash. Thin, discontinuous sand. Winter access
by cutline. Field checked by helicopter flyover.

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DEPOSIT NO. 6

LOCATION: SW1/4 Tp73 R23 W4M

No. of associated pits/sites: 1 pit, 2 sites

No. of samples analysed: 2

DEPOSIT DESCRIPTION:

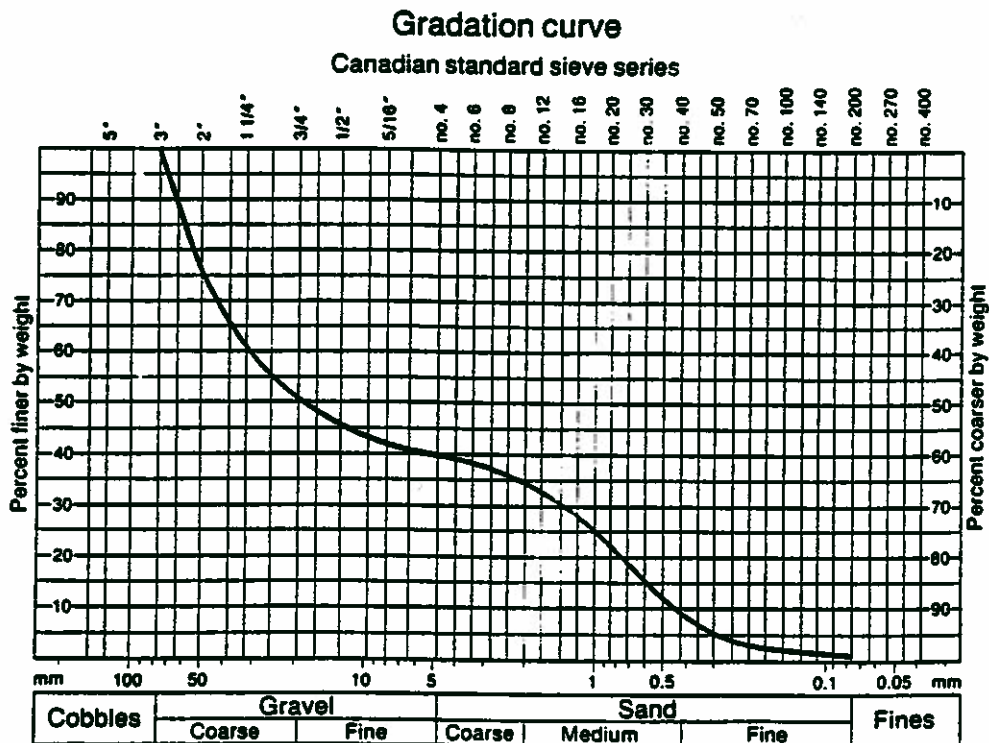
Glaciofluvial kame mounds and ridges surrounded by bog. Overburden thin. Clasts decrease from 60% in the north to 15% in the south end of the deposit. Quartzite is the most common clast with igneous rocks from the Canadian Shield and ironstone less abundant. Maximum clast size is 25 cm. Carbonate coatings and oil stain are present on some clasts. Maximum thickness exceeds 4 m. Access to the north half of the deposit is by a network of narrow roads.

Site Location: Sec NW17 Tp73 R23 W4M

Site Description:

Gravelly coarse sand excavated to the water table at about 4 m. Rounded quartzite and subangular igneous clasts to 25 cm may need crushing. Pit slopes leveled. High water table currently limits use of access road to dry weather.

Gradation: 0% cobbles 60.7% gravel
38.0% sand 1.3% fines

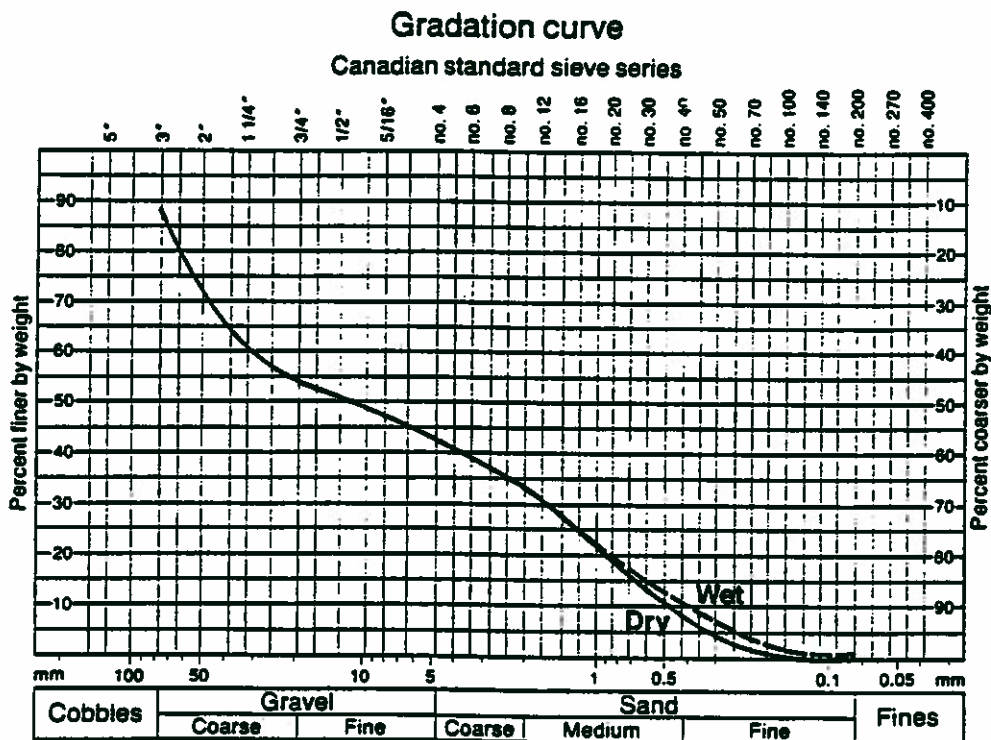


Pit Location: Sec SE17 Tp73 R23 W4M

Pit Description:

Inactive pit in dirty, poorly sorted gravelly kame with beds or lenses of sand. Maximum clast size is 15 cm. Quartzite is most common with less abundant ironstone and igneous rocks from the Canadian Shield. Carbonate coatings and oil stain are present on some clasts. Overburden is minor. This kame deposit is approximately 50% depleted. Access by narrow road from Rock Island tower.

Gradation: 12.3% cobbles 45.2% gravel
42.2% sand 0.3% fines



Site Location: Sec SE18 Tp73 R23 W4M

Site Description:

Test hole detritus indicates similar gravel-sand composition as at Sec SE17 Tp73 R23 W4M. Large clasts also are visible on the surface in surrounding area.

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DEPOSIT NO. 7

LOCATION: Sec 3 to 6, 10, 11 Tp73 R22 W4M
Sec 2 Tp73 R23 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Possible beach deposits consisting of gravelly sand. Water table probably is high and overburden is minor. Unknown quantity.

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DEPOSIT NO. 8

LOCATION: SE1/4 Tp73 R23 W4M
NW1/4 Tp73 R22 W4M
SW1/4 Tp74 R22 W4M

No. of associated pits/sites: 2 sites

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

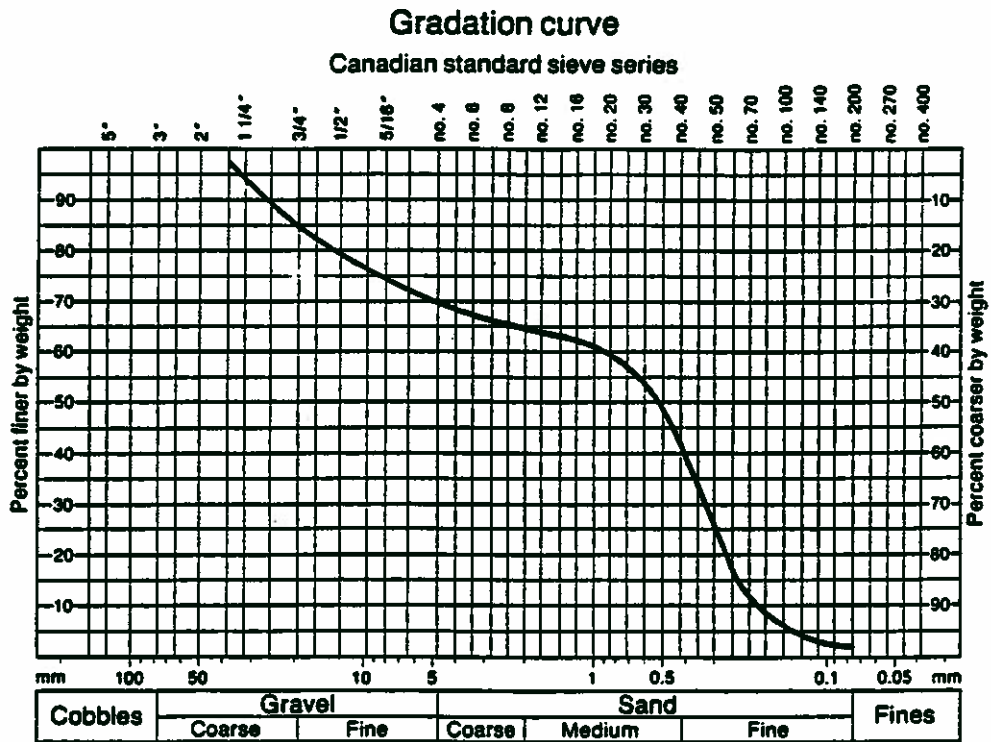
Uneven distribution of clean gravelly sand along the margins of the lower reach of the creek flowing into the north end of Calling Lake. Material is 95% sand. Aggregate component is primarily composed of quartzite and igneous rocks from the Canadian Shield. Lower reaches of the creek is crossed at two locations by "all weather" roads.

Site Location: Sec NW18 Tp73 R22 W4M

Site Description:

Sample from upper part of road cut through 3 m of channel sand/outwash incised by largest creek flowing into Calling Lake. Primarily sand with minor gravel. Clasts primarily igneous rocks from the Canadian Shield with some quartzite. Some oxidation. Excellent access.

Gradation: 0% cobbles 30.2% gravel
67.6% sand 2.2% fines



Site Location: Sec SW4 Tp74 R22 W4M

Site Description:

Glaciofluvial channel/outwash sand exposed by road cut. Greater than 95% oxidized. Dominant aggregate types are quartzite and igneous rocks from the Canadian Shield. Sand exposed on both sides of creek by "all weather" road. No sample.

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DEPOSIT NO. 9

LOCATION: Sec 30, 31, 32 Tp73 R22 W4M

No. of associated pits/sites: 1 site

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

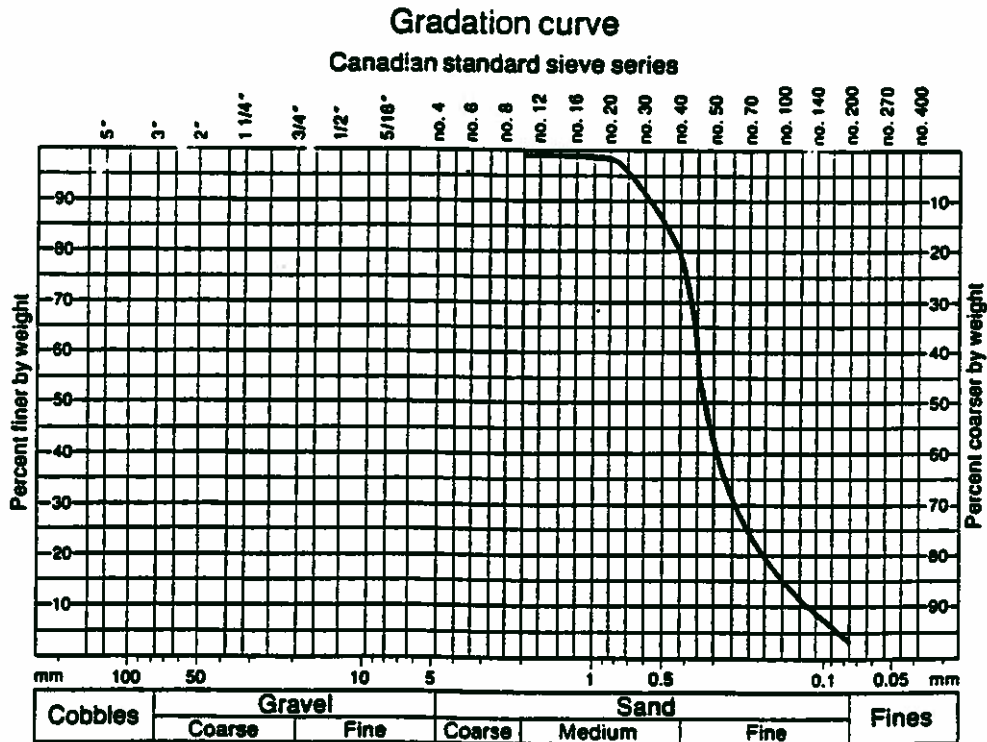
Serpentine dune ridges trending north-south. Sand probably originated from the stream and/or outwash deposit adjacent to and north of the dune deposit. Material is clean, well sorted, fine to medium sand. Very minor soil development on ridges 3 to 4 m high. Access limited to cutline in winter.

Site Location: Sec NE30 Tp73 R22 W4M

Site Description:

Sample from near the toe of a well established sand dune. Clean, well sorted, fine to medium sand. Very minor soil developed as overburden on ridges 3 to 4 m high. Access by cutline in the winter.

Gradation: 0% cobbles 0% gravel
96.4% sand 3.6% fines



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DEPOSIT NO. 10

LOCATION: Centre of Tp74 R24 W4M

No. of associated pits/sites: 1 pit, 1 site

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

Glaciofluvial meltwater channel deposit west of Marten Hills airstrip. The deposit varies from very dirty to clean and clasts vary from 55 to 80% of the deposit. Quartzite is prominent and some chert is present. Some clasts are oxidized and oil stained. Material as thick as 10 m, under minor overburden, is present above the water table. Easily accessible.

Pit Location: Sec SE20 Tp74 R24 W4M

Pit Description:

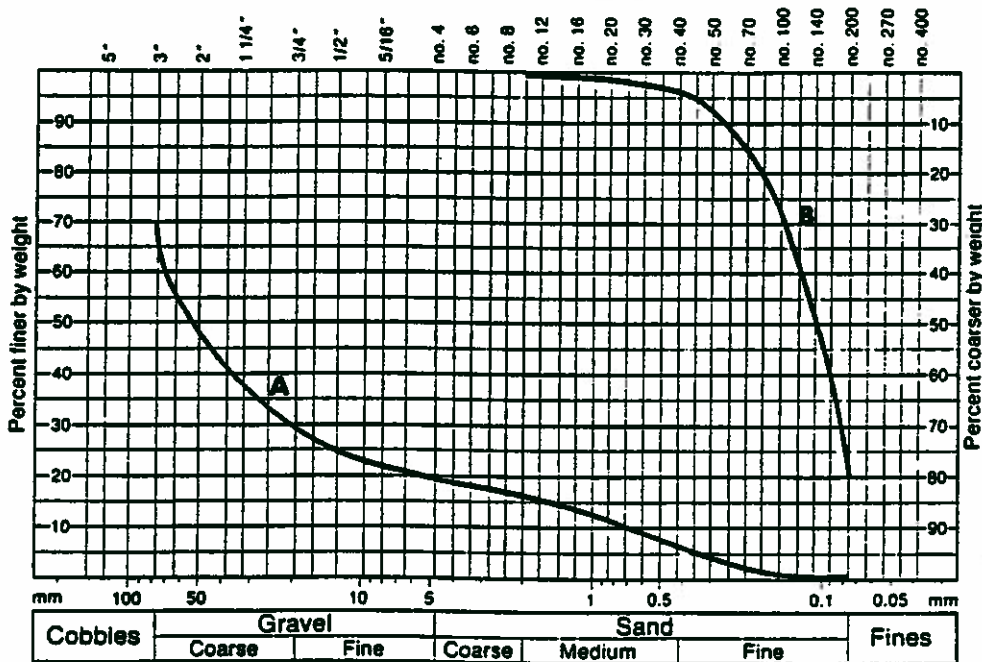
Pit 7 to 10 m deep in meltwater channel deposit. Pit faces show interbedded sand plus gravel with cobbles 80%. Clasts mostly quartzite with some chert. Oil staining and oxidization present. Minor overburden. Maximum depth of excavation is limited by the water table. Adjacent areas to the south and east may be potential sand and gravel sources.

Gradation: 30.1% cobbles 50.2% gravel A - gravel
19.1% sand 0.6% fines

0% cobbles 0% gravel B - sand
79.4% sand 20.3% fines

Gradation curve

Canadian standard sieve series



Site Location: Sec NE21 Tp74 R24 W4M

Site Description:

Road backslope material is very dirty, highly oxidized, gravel (55% gravel). Maximum clast size is 20 cm. High percentage of quartzite and chert.

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DEPOSIT NO: 11

LOCATION: SW corner of Tp75 R25 W4M
NE corner of Tp74 R26 W4M
Middle of Tp74 R25 W4M
SE 1/4 Tp75 R25 W4M
NW 1/4 Tp74 R24 W4M

No. of associated pits/sites: 2 sites

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

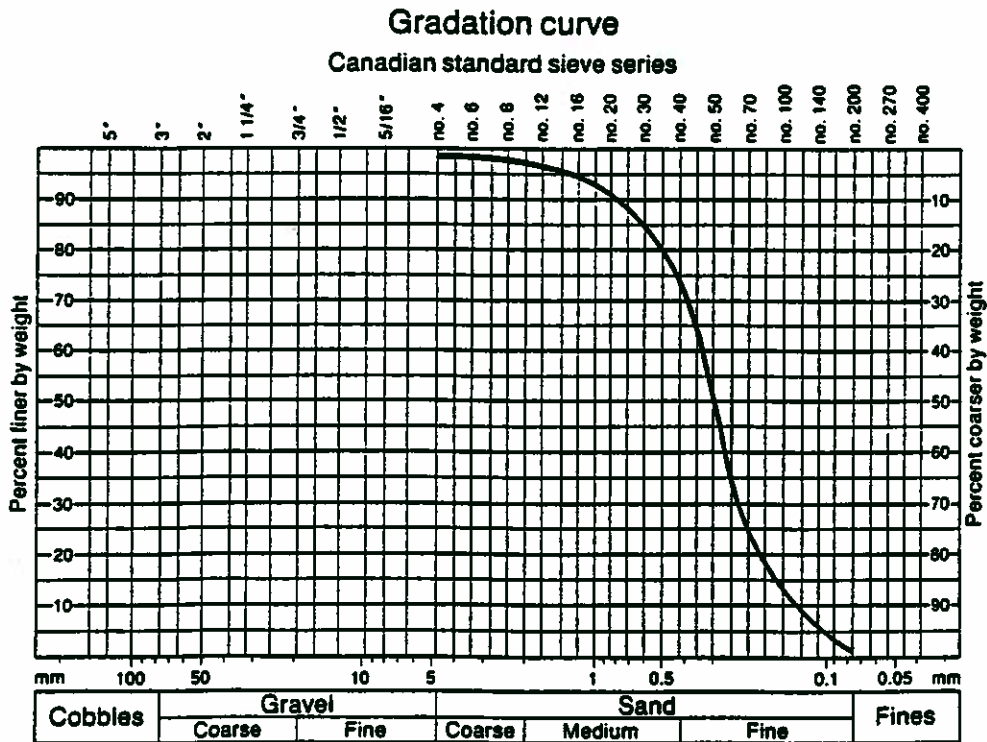
Glaciofluvial sand islands surrounded by bog and till. Primarily dirty sand.

Site Location: Sec SE8 Tp75 R25 W4M

Site Description:

Sampled just beyond disturbed sandy area along road. A 70 cm thick exposure of a few pebbles in sandy matrix. Approximately 15 cm of easily disturbed top soil. High water table. Similar sandy areas in the immediate vicinity.

Gradation: 0% cobbles 1.5% gravel
97.0% sand 1.5% fines



Site Location: Sec SE7 Tp75 R25 W4

Site Description:

Flat to low topography surrounded by bog. Stoney, sandy till to 30 cm.

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DEPOSIT NO. 12

LOCATION: W1/2 Tp74 R26 W4M

No. of associated pits/sites: 1 site

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Primarily a glaciofluvial deposit. Potential for sand/gravel increases from north to south. The northern area boundaries enclose dirty outwash and till outcroppings. The southern body contains at least 3 esker-like ridges and multiple mounds that probably are sand. One of the eskers does contain gravel and may yield as much as 70% gravel. The water table is probably higher in the southern area. Access is poor throughout. The area is crossed with a few cutlines and a pipeline right-of-way.

Site Location: Sec SE8 Tp74 R26 W4M

Site Description:

Esker 3 to 4 m high surrounded by bog. Clasts 10 to 20 cm in size with a few smaller than 10 cm are present at the top of the esker. No evidence of coarse sand. Rounded quartzite and clasts of igneous rocks from the Canadian Shield. May require crushing. No road access to this landform.

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DEPOSIT NO. 13

LOCATION: South 1/2 Tp75 R26 W4M

No. of associated pits/sites: 1 site

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Dirty, sandy, glaciofluvial outwash in a series of ridges.

Site Location: Sec SE4 Tp75 R26 W4M

Site Description:

Sandy clay to clay below thin overburden. Surrounding area is generally till with boulders common.

* * * * *

DEPOSIT NO. 14

LOCATION: Sec 32, 33, 34 Tp75 R26 W4M

No. of associated pits/sites: 1 pit

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

Extensive area of preglacial gravel and sand with gravel concentration as high as 80% in some gravel zones. Quartzite clasts to 20 cm diameter. Some large clasts are fractured but crushing is necessary for most uses. Deposit is at least 15 m thick. Till overburden is 1 to 2 m thick. Clean sand is present below gravel. Very good access. Good gravel potential.

Pit Location: Sec NE33 Tp75 R26 W4M

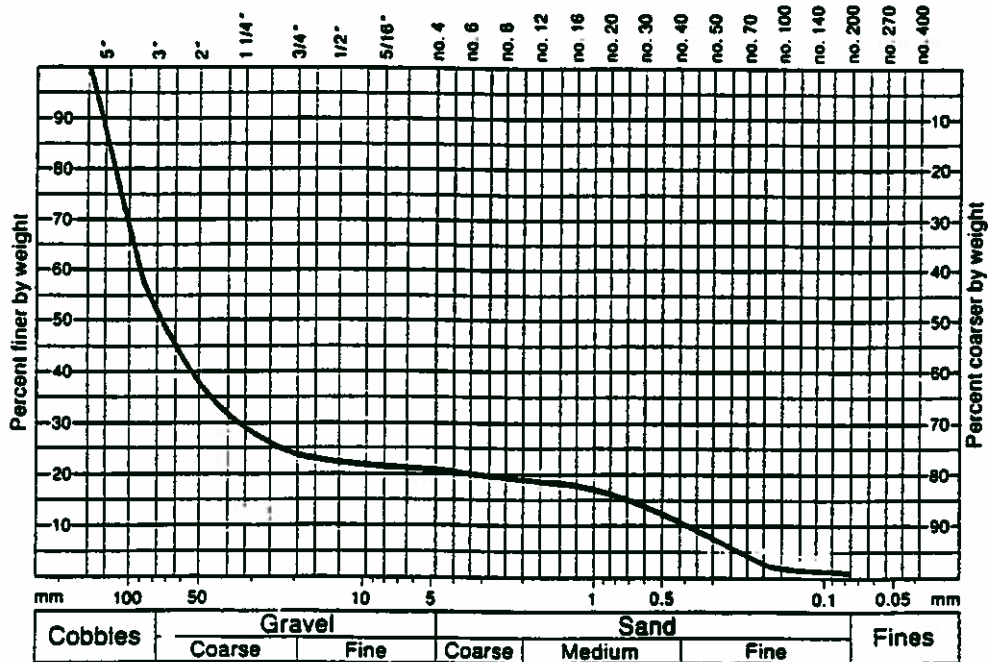
Pit Description:

Approximately 15 m of clean, preglacial gravel and cobbles over sand beds. Maximum clast size is about 20 cm. Fractured quartzite clasts are common but crushing may still be required for most uses. Overburden is from 1 to 2 m thick. Good access.

Gradation: 49% cobbles 30% gravel
20% sand 1% fines

Gradation curve

Canadian standard sieve series



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DEPOSIT NO. 15

LOCATION: Upper reaches of the Fawcett River in Tp75, 76 R25, 26 W4M

No. of associated pits/sites: 2 sites

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

Bars in river with gravel as abundant as 80%. Subrounded igneous clasts from the Canadian Shield are as large as 30 cm. Rounded quartzite clasts average 20 cm and are the most abundant clast. Crushing is necessary for most uses. Sand lenses are present. Water table fluctuates with river level. Access limited along parts of the river.

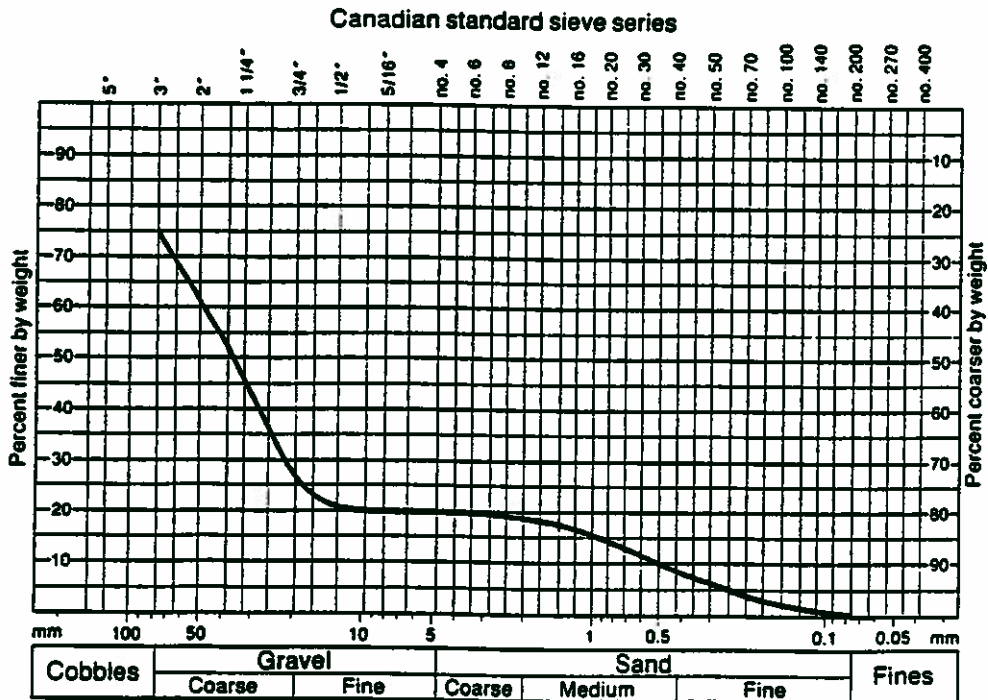
Site Location: Sec NE20 Tp75 R25 W4M

Site Description:

River bar of cobbles, gravel and medium sand (Pl. 2). Crushing will be necessary for the abundant rounded quartzite clasts to 20 cm diameter and the subangular igneous rocks to 30 cm diameter from the Canadian Shield. Water table is river level. Access road nearby. May be a good source of gravel.

Gradation: 23.6% cobbles 56.7% gravel
18.9% sand 0.8% fines

Gradation curve



Site Location: Sec NW7 Tp76 R25 W4M

Site Description:

Coarse preglacial gravel on river bars. Good access.

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DEPOSIT NO. 16

LOCATION: Sec NW35 Tp75 R25 W4M
Sec SW2 Tp76 R25 W4M

No. of associated pits/sites: 1 pit

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

At least 4 m of preglacial gravel composed primarily of well rounded, flat, quartzite clasts to 25 cm in diameter (60%) and clean, fine to medium sand (40%). Many fractured clasts but the material will require crushing for most uses. Thin overburden. Very good access and abundant material. A good gravel source.

Pit Location: Sec NW35 Tp75 R25 W4M

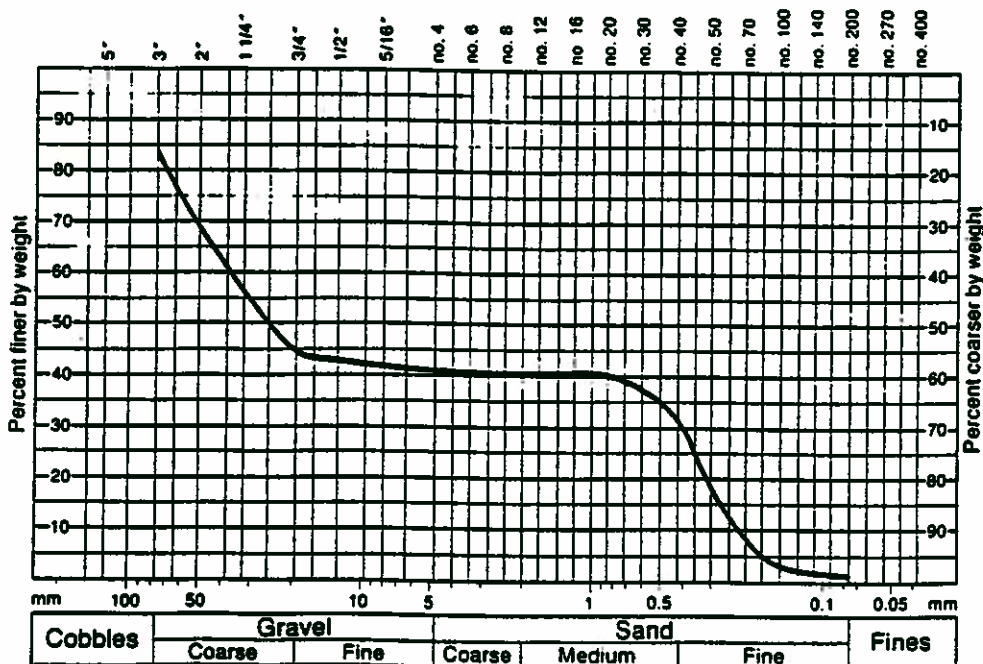
Pit Description:

Pit at least 4 m deep in preglacial gravel (Pl. 1). Rounded, flat, quartzite clasts to 25 cm in diameter but most are less than 15 cm. Gravel constitutes about 60% of the deposit and will need crushing for most uses even though fractured clasts are common. Clean medium to fine sand constitutes about 40% of the deposit. Overburden is minor. Access by all-weather road.

Gradation: 16.8% cobbles 42.0% gravel
39.8% sand 1.4% fines

Gradation curve

Canadian standard sieve series



DEPOSIT NO. 17

LOCATION: Sec 19, 20, Tp75 R22 W4M
Sec 24, 25, Tp75 R23 W4M

No. of associated pits/sites: 2 sites

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

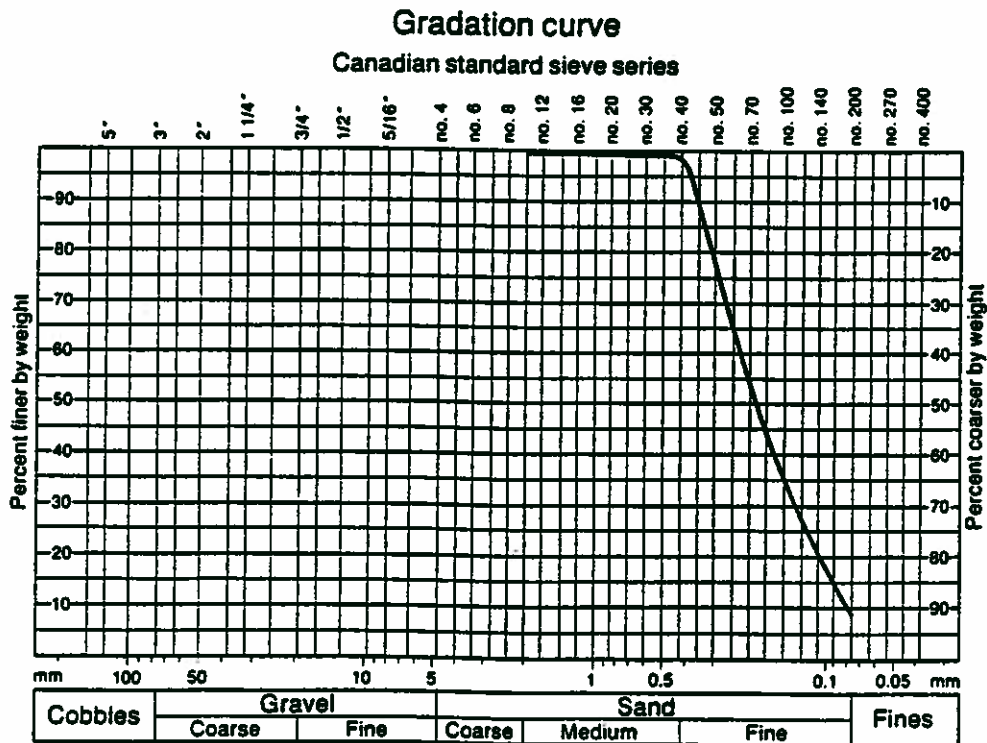
One main ridge and numerous subsidiary ridges and mounds of dirty glaciofluvial sand and/or gravel. Clasts to 30 cm diameter of quartzite and igneous rock from the Canadian Shield. Deposits generally are highly oxidized. Access good.

Site Location: Sec NE24 Tp75 R23 W4M

Site Description:

Roadcut through 3 m high ridge of dirty glaciofluvial sand. Fine gravel is approximately 5%. Highly oxidized. Good access.

Gradation: 0% cobbles 0% gravel
92.3% sand 7.6% fines



Site Location: Sec SW19 Tp75 R22 W4M

Site Description:

Very dirty gravel in 2.5 m high ridge. Gradation 75% gravel, 10% sand and 15% fines (minimum). Clasts to 30 cm diameter. Clasts are quartzite and igneous rock from the Canadian Shield.

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DEPOSIT NO. 18

LOCATION: Broad SE trending arcuate expanses in Tp76 R20 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Oxidized glaciofluvial sand with minor (5 to 10%) clasts to 5 cm diameter. Minor overburden. Boggy area. Winter access.

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DEPOSIT NO: 19

LOCATION: Sec NE22 Tp76 R23 W4M
Sec NE30, E1/2 31 Tp76 R23 W4M
Sec NW33 Tp76 R23 W4M

No. of associated pits/sites: none

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Preglacial gravel approximately 5 m thick determined from drill logs. Overburden 0.5 to 2.0 m. Access probably limited to winter by winter road and cutline.

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DEPOSIT NO. 20

LOCATION: Sec NW18 Tp76 R25 W4M

No. of associated pits/sites: 1 pit

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

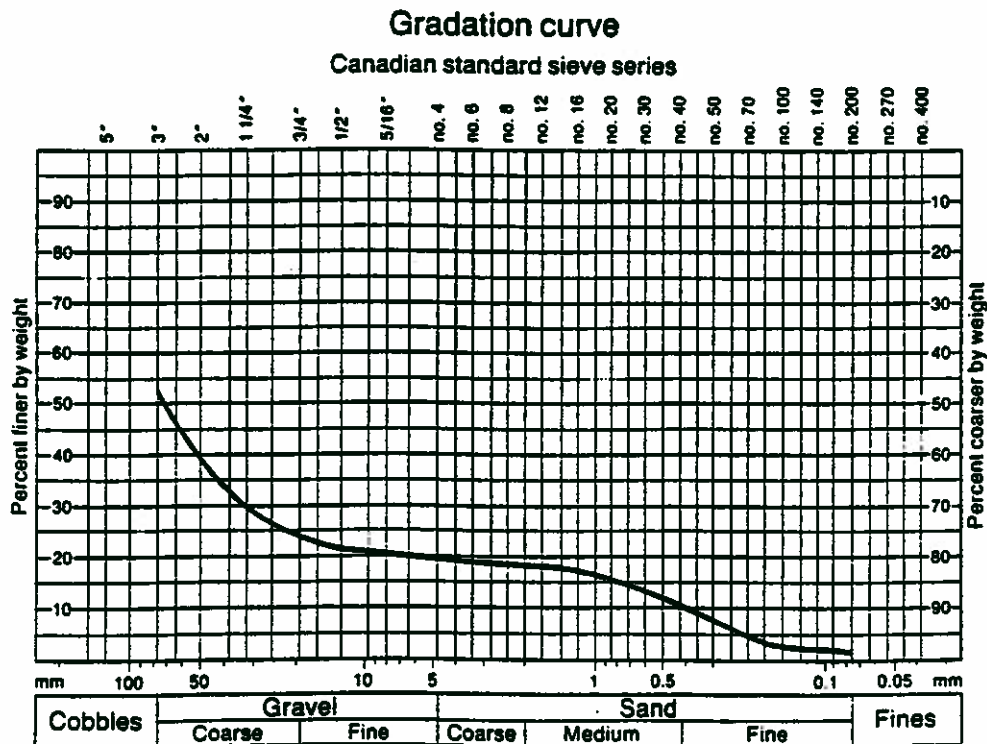
Preglacial, graded, gravel deposit composed of approximately 80% clean, highly oxidized gravel. Maximum clast size is 45 cm. Deposit is 1.5 to 3 m thick below minor overburden. Water table may be near 3 m. Access is excellent. Much of the pit is reclaimed, therefore it is believed the deposit may be nearing depletion.

Pit Location: Sec NW18 Tp76 R25 W4M

Description:

Preglacial gravel exposed to 3 m under minor overburden. Maximum clast size is 45 cm and gravel and cobbles compose about 80% of the material. Oxidation is common. Water table is apparently at 3 m. Access good. Material may be nearly depleted.

Gradation: 47.2% cobbles 33.5% gravel
18.3% sand 1.0% fines



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DEPOSIT NO. 21

LOCATION: East half of Sec 22 Tp77 R26 W4M

No. of associated pits/sites: 2 sites

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

Unknown thickness of glaciofluvial dirty sand and gravel. Rock types mostly rounded quartzite and subangular igneous rocks from the Canadian Shield under 10 to 20 cm of overburden. This may be an extensive deposit. Access is good.

Site Location: Sec NE22 Tp77 R26 W4M

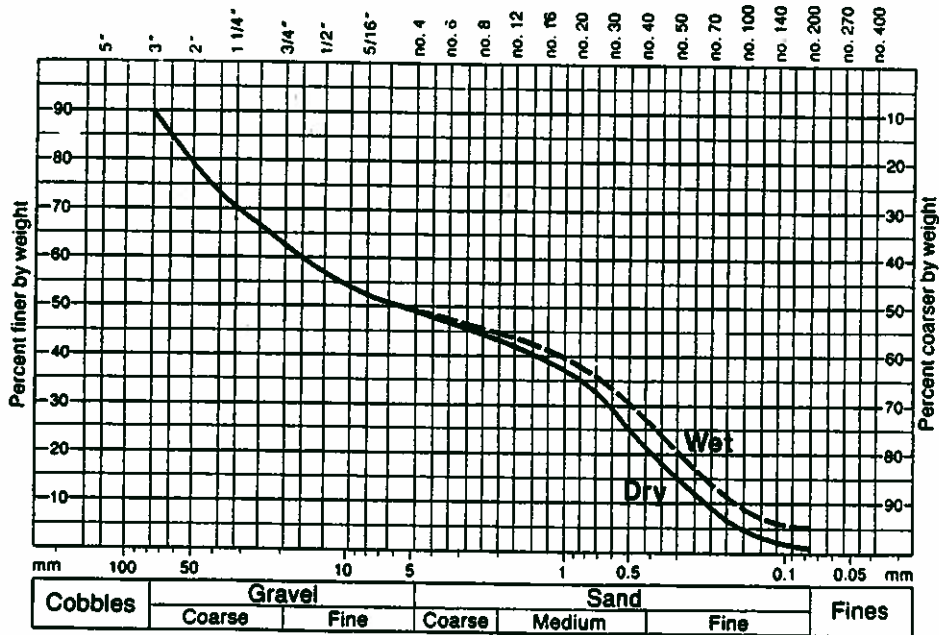
Site Description:

Very dirty sand and gravel exposed in a roadcut. Most common clasts are rounded quartzite followed by subangular, igneous rocks from the Canadian Shield. Overburden is 15 cm.

Gradation:	10.1% cobbles	40.2% gravel	-Wet sieve
	43.7% sand	6.0% fines	
	10.1% cobbles	40.2% gravel	-Dry sieve
	48.0% sand	2.0% fines	

Gradation curve

Canadian standard sieve series



Site Location: Sec SE22 Tp77 R26 W4M

Site Description:

Quartzite gravel in a small stream.

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DEPOSIT NO. 22

LOCATION: Sec NW2, NE3 Tp78 R26 W4M

No. of associated pits/sites: 1 pit

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

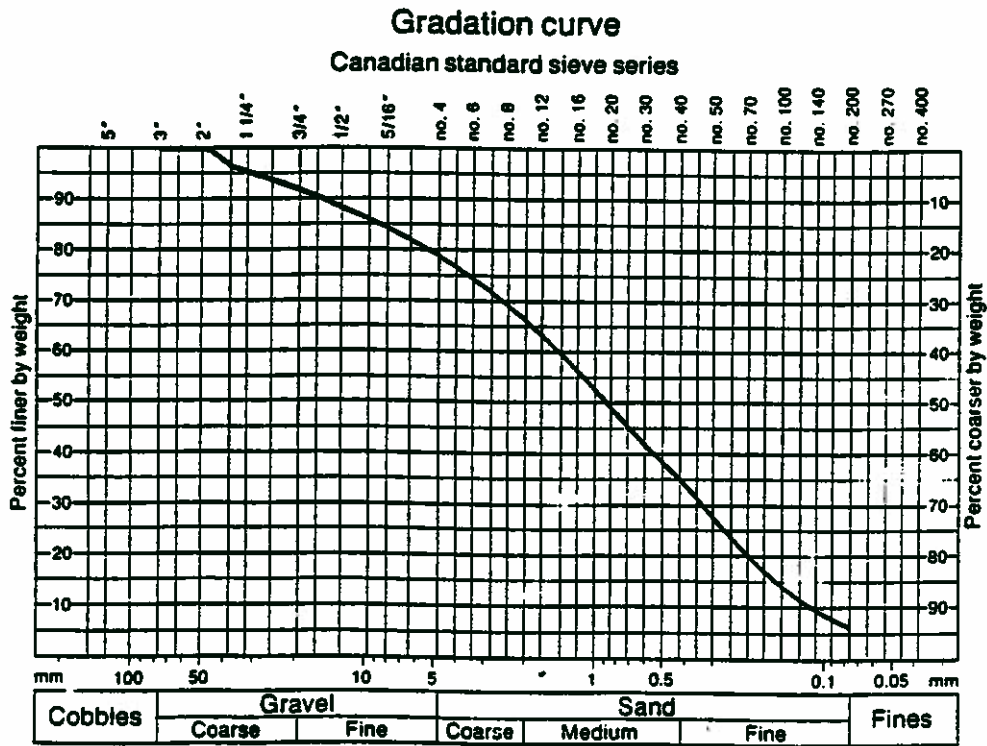
Dirty glaciofluvial deposit of 25% gravel clasts to 20 cm diameter and the remaining material medium to coarse sand. Minor overburden over an unknown thickness of material. Access by winter cutline.

Pit Location: Sec NE3 Tp78 R26 W4M

Pit Description:

Small, shallow pit in dirty, gravelly, coarse to medium glaciofluvial sand covered by minor overburden. Clasts comprise approximately 25% of these sands. Maximum clast size is 20 cm. Depth of sand is unknown. Similar sand may form the ridge immediately to the east. Access is by cutline only.

Gradation: 0% cobbles 22.9% gravel
 70.6% sand 6.5% fines



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DEPOSIT NO. 23

LOCATION: Tp77, 78 R23 W4M
E 1/2 Tp 77, 78 R24 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Possibly up to 3 m of glaciofluvial outwash gravel under 2 m of
overburden in the banks of three creeks.

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DEPOSIT NO. 24

LOCATION: Sec E1/2 7 Tp78 R22 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Glaciofluvial sand and gravel greater than 1 m thick. Clasts greater than 2.5 cm compose approximately 30% of the material. Overburden is 15 cm. Winter access along a cutline.

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DEPOSIT NO. 25

LOCATION: Tp77 R20 W4M
SW1/4 of Tp78 R20 W4M
SE 1/4 of Tp78 R21 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION: '

Extensive eolian fine to medium sand deposit under minor
overburden. High water table in surrounding boggy area. Winter
access.

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DEPOSIT NO. 26

LOCATION: Sec 26 Tp76 R23 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

Inactive pit in preglacial gravel; checked by helicopter. Summer access is poor. Limited geophysical survey indicates approximately 6 m of material below till overburden 0.5 to 1.5 m thick. Rounded quartzite clasts to 15 cm diameter dominate. Crushing is necessary for most uses. This is high quality material and additional exploration, especially above the 3000 ft contour, is recommended.

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APPENDIX 2

Deposits of Limited Size and Perceived Limited Value

Site Location: Sec 14 Tp73 R22 W4M

Site Description:

Road cut through a sand ridge. Greater than 95% oxidized sand. Clasts are mostly quartzite and igneous rock from the Canadian Shield. Maximum height of the ridge is approximately 3 m. Overburden is 15 cm. Limited extent. Good access.

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Site Location: Sec SE36 Tp75 R23 W4M

Site Description:

Fine, dirty sand in two ridges about 3 m high. Very common in this area.

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Site Location: Sec 22 Tp74 R24 W4M

Site Description:

Very stoney till that may have been derived from a meltwater channel deposits nearby. May be good for road base material.

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Appendix 3
Deposits and Sites Outside Mapped Area

DEPOSIT NO. 27

LOCATION: Sec 19, 20 Tp78 R22 W4M

No. of associated pits/sites: 1 pit

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

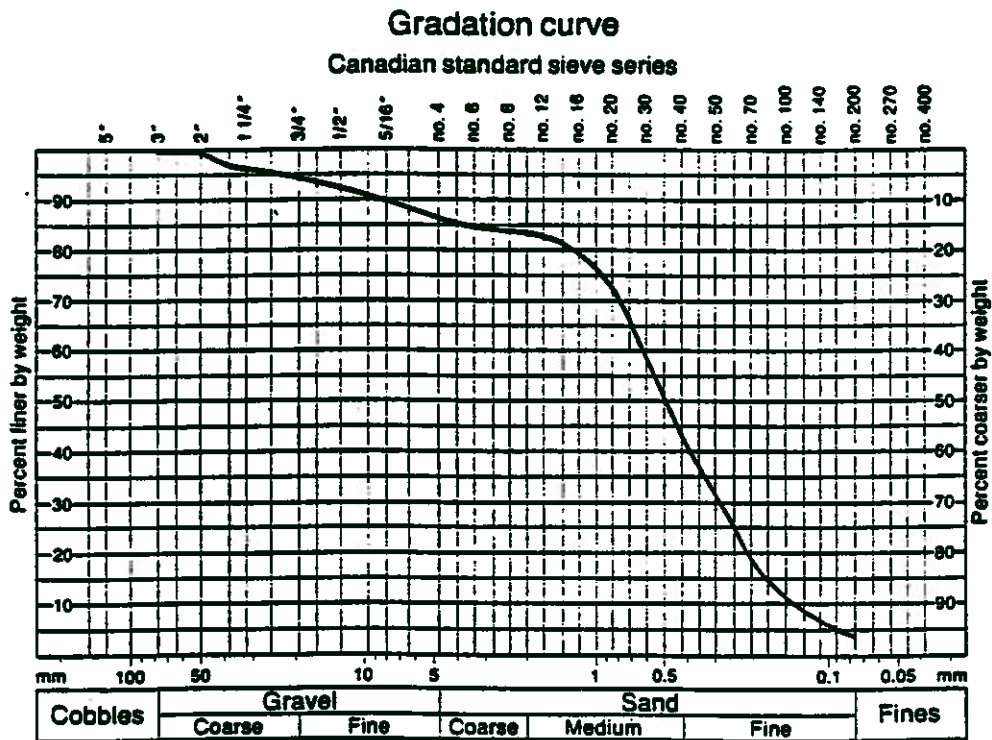
Dirty, glaciofluvial deposit of sand and gravelly sand. Access by "all weather road".

Pit Location: Sec SE19 Tp78 R22 W4M

Pit Description:

Approximately 1 m dirty, gravelly, fine to medium, glaciofluvial sand overlying fine to medium sand. Gravel constitutes about 15 to 20% of the top layer. Angular clasts to 15 cm diameter. Access by "all weather road".

Gradation: 0% cobbles 14% gravel
82% sand 4% fines



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DEPOSIT NO. 28

LOCATION: Sec 34, 35 Tp72 R20 W4M
Sec 3 Tp73 R20 W4M

No. of associated pits/sites: None

No. of samples analysed: None

DEPOSIT DESCRIPTION:

No clasts are apparent on the sandy surface of these glaciofluvial deposits during helicopter flyover. Sand probably is fine to medium grained. Overburden is minor. Access by narrow trails.

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DEPOSIT NO: 29

LOCATION: Sec 4, 5, 8, 9, 17, 18, 19, 20 Tp72 R24 W4M
Sec 23, 24 Tp72 R25 W4M

No. of associated pits/sites: 1 pit

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

Two fluvial terraces on the east and west banks of the Athabasca River. The east bank deposit contains 75% quartzite and igneous clasts up to 25 cm diameter but the majority are around 15 cm. May need crushing for most uses. Access is by winter road.

Pit Location: Sec SE8 Tp72 R24 W4M

Pit Description:

Gravel pit approximately 5 m. deep in a fluvial terrace. Coarse gravel (75%) is mixed with poorly sorted sand. Separate beds of coarse sand also are present. Maximum clast size is 25 cm but most clasts are near 15 cm. Most common clasts are well-rounded quartzite followed by less abundant, subangular igneous rocks from the Canadian Shield. Overburden is minor. This probably would produce good road material when crushed. Access by winter road only.

Gradation: 0% cobbles 73.5% gravel
25.4% sand 1.1% fines

