

SAND AND GRAVEL RESOURCES  
OF THE WANDERING RIVER AREA

1991 - 01

MAP SHEETS  
PELICAN (EAST HALF 83P)  
WINEFRED LAKE (WEST HALF 73M AND 73M/7 AND /8  
BETWEEN THE NORTHERN BOUNDARY OF THE  
COLD LAKE AIR WEAPONS RANGE AND THE  
NORTHERN BOUNDARY OF THE MAP SHEETS)

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## ABSTRACT

The east half of Pelican (83P) and the west half of Winefred Lake (73M) map sheets were studied in 1988 to determine the distribution and characteristics of the sand and gravel resource. The study area is approximately 14025 km<sup>2</sup> in size and was investigated at an enhanced reconnaissance level. The program consisted of compiling existing information, air photo interpretation, field evaluation of key sites, laboratory analyses, reevaluation of air photos and final assessment. Sand and gravel is limited in the area. Most deposits are predominantly sand. Major sand and gravel deposits currently exploited are glaciofluvial in origin. These deposits are in the vicinity of the towns of Amesbury and Wandering River and at the intersection of Highway 63 and the House River. A reconnaissance level study, with no field checks, was performed in the southeastern quarter of map area 73M north of the Cold Lake Air Weapons Range. Sand and gravel deposits appear to be limited in this area as well and are assumed to be composed mostly of sand.

## INTRODUCTION

This study is part of a program initiated in 1976 by the Alberta Research Council and Alberta Energy and Natural Resources to provide information on the aggregate resources of the Province of Alberta. The program continues with the support of Alberta Transportation and Utilities and Alberta Forestry, Lands and Wildlife. The area of study (Figure 1), level of detail and emphasis of the project were determined by representatives of Alberta Transportation and Utilities (ATU) and the Land Information Division of Alberta Forest Lands and Wildlife (AFLW). The actual investigations were conducted by the Alberta Geological Survey, a department of the Alberta Research Council.

The study area is the eastern half of the Pelican (83P) National Topographic System map sheet, the western half of Winefred Lake (73M) map sheet and map sheets 73M/7 and /8 north of Cold Lake Air Weapons Range. Total area is approximately 14025 km<sup>2</sup>. There are no major population centres in the study area, however, several small communities such as Wandering River, Amesbury and Conklin are present. Highway 63 and the Canadian National Railways right-of-way are the two main transportation arteries through the study area.

Most of the study was completed at the enhanced reconnaissance level (Category 4, Table 1). This level 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. That part of the study area in the southeast quarter of map sheet 73M north of the Cold Lake Air Weapons Range was completed at the reconnaissance level (Category 5, Table 1). This level of mapping is designed to provide an initial estimate of the aggregate potential in a region.

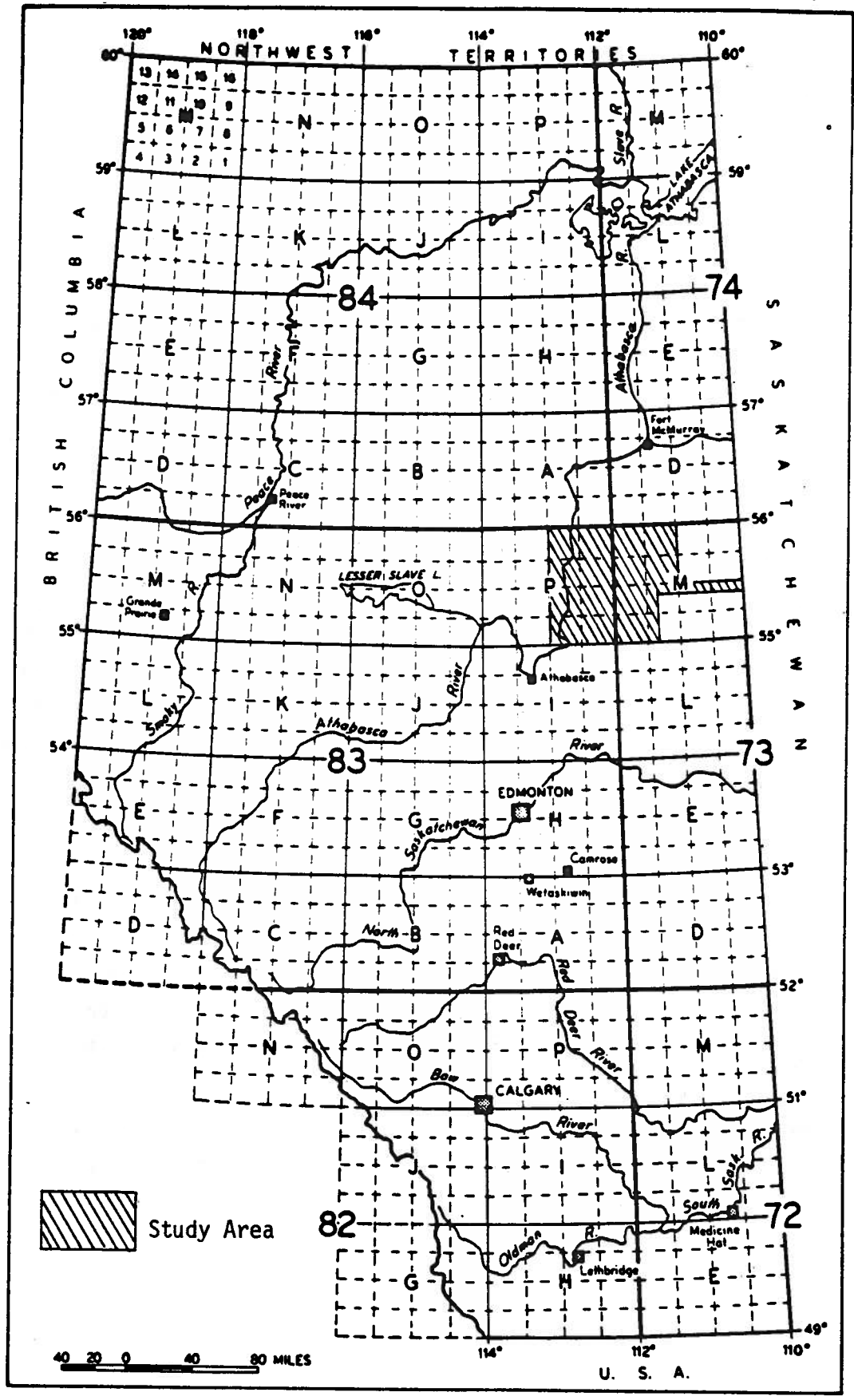


Figure 1. Location Map

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.

## ACKNOWLEDGMENTS

Dianne Goulet performed the laboratory analyses. Summer student Slavko Stuhec gave very competent assistance in the field and the office. Funds for the project were provided by Alberta Transportation and Utilities and Land Information Services Division of Alberta Forestry and Wildlife. Lac La Biche Forest Land Use Officer Dan Slight kindly arranged for the helicopter assistance needed during the project.

## METHODS

The study was initiated with the review and compilation of data from the files of Alberta Transportation and Utilities and from water well logs filed at Alberta Environment.

This information was incorporated into the air photo interpretation of the eastern half of map sheet 83P and the western half of map sheet 73M by Terrain Evaluation Services following criteria set out by the Alberta Geological Survey. Air photo interpretation of map sheets 73M/7 and /8, north of the Cold Lake Air Weapons Range, was performed by the principal investigators later, after the field season, when maximum understanding of the adjacent area was available.

The initial air photo interpretation of the study area delineated 229 prospects that could contain sand or gravel. These prospects were categorized by genesis and rated as high, medium or low potential as a possible source of granular material, particularly gravel. Of the initial 229 prospects, 74 were projected to have high potential, 30 to have medium potential and 125 to have low potential for sand or gravel.

The air photo information was reviewed and a field plan developed. Prospects of highest potential were the first priority with sites of ready access the second priority. Consideration also was given to visiting examples from each type of deposit. This provided new geological

information for the evaluation of areas that could not be field checked.

In total, 91 prospects were field checked (40% of all potential prospects). Prospects confirmed to have sand with gravel less than 15% (Table 2) are shown on the maps of potential deposits (in pocket) as category 'A' and those assumed to have sand with gravel less than 15% but that have not been field checked are shown as category 'B'. Prospects confirmed to have sand with negligible gravel (less than 1%) are shown on the map of potential deposits as category 'C' and those assumed to have sand but that have not been field checked are shown as category 'D'.

Table 2. Potential prospect grouping after field checks.

Genesis	Category A	Category B	Category C	Category D	Prospects
	Confirmed Sand with Gravel <15%	Assumed Sand with Gravel <15%	Confirmed Sand with Gravel <1%	Assumed Sand with Gravel <1%	
Glaciofluvial	9	10	17	13	49
Fluvial	1	1	0	0	2
Eolian	0	0	6	0	6
Esker	1	6	7	2	16
Meltwater Channel	3	7	3	6	19
Ice Contact	2	0	2	1	5
Other	1	1	0	1	3
Total	17	25	35	23	100

Field work was conducted in July and August, 1988. Access to some sites was possible by foot, three-wheeled all terrain vehicles or truck. Travel in this area for normal vehicular traffic is very limited, however, and helicopter access was required for many sites. Samples were returned to the laboratory for grain size and petrographic analyses. A limited number of geophysical traverses using a Geonics EM31 were made in an attempt to detect buried granular material.

The report for 83P (east) and 73M (west) is based on air photo interpretation, surface geological observation, limited field checking and limited laboratory data. Application of the results should take account of the reconnaissance nature of the study.

## GEOLOGY

The bedrock in the region is relatively soft marine sandstone and shale of Late Cretaceous age. These bedrock materials are not good sources for clasts of gravel size in the surficial deposits and this shows in the minor amounts of gravel present in the study area.

Evidence of preglacial (Tertiary or early Quaternary) deposition may be present in the study area as a single deposit. This sand deposit marks part of the drainage system which flowed from the Rocky Mountains eastwards before continental glaciation.

No detailed studies are published on the Quaternary or surficial geology within the study area. Pettapiece (1986), however, indicates that in the three physiographic regions present in the study area undulating ground moraine till is the most common surficial geological deposit. The till may be overlain by a veneer of glaciofluvial or glaciolacustrine materials. Till over exposed bedrock of Cretaceous age is present in the Athabasca River valley and the Amadou Hills and May Hills areas.

The air photo interpretation that was performed in the course of this study adds some information to the surficial geology. The surficial land form and genesis is often a clue to the presence of sand or gravel so that certain features were delineated which represent part of the surficial geology. The material composition of many of these features was described during the fieldwork and gives some insight into the composition of these particular surficial units.

The genesis of each prospect shown in figures 2 and 3 (in pocket) is listed in table 3. In total, 91 prospects were investigated in the study area. Of this total 39 contain silt and clay, 35 are sand and 17 contain gravel (in all cases less than 15% gravel). Thus, even the glaciofluvial units that commonly contain gravel in other areas in the province are relatively fine grained in this region.

Ice movement in the area, as determined from linear landforms, was

generally NE-SW. Meltwater drainage from the melting ice sheet was roughly parallel to this trend (esker and ice-contact systems) or across it (meltwater channels). Prospects aligned in these directions mark the greatest concentrations of sand and the most likely locations for successful gravel prospecting.

Table 3. Deposits and their genesis.

Genesis	Deposit numbers
Glaciofluvial	1, 2, 4, 5, 6, 8, 11, 12, 15, 22, 23, 24, 25, 26, 30, 31, 32, 33, 34, 40, 42, 43, 44, 45, 46, 47, 48, 49, 51, 52, 53, 63, 65, 66, 72, 74, 75, 88, 89, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
Fluvial	3, 90
Eolian	27, 28, 29, 39, 78, 84
Esker	14, 16, 17, 18, 19, 35, 36, 41, 50, 54, 68, 69, 70, 71, 76, 83
Meltwater Channel	10, 13, 20, 21, 37, 38, 55, 56, 57, 58, 59, 60, 64, 73, 80, 81, 82, 86, 87
Ice Contact	61, 62, 67, 77, 85
Other	7, 9, 79

Glaciation, the latest major geological event in the study area, was followed by a period of erosion and deposition which determined the general physiography of much of the present surface.

#### SAND AND GRAVEL RESOURCES

The dominant geological factors that determined the distribution and character of the sand and gravel resources in the study area are the shallow and fine grained bedrock, possible preglacial deposition, movement, melting and drainage of the Late Wisconsinan ice sheet and Recent river drainage.



The friable, fine grained nature of the underlying Labiche Formation made it unsuitable as a possible source of coarse aggregate to the advancing continental ice sheet. This conclusion is based on the data from field checks of glacially derived prospects. Sixty-three glaciofluvial, ice-contact, esker and meltwater channel prospects were examined. Of the 63 sites, 19 are silt and clay, 29 are sand (primarily fine to medium grained) and 15 are sand with less than 15% gravel. The gravel that is present consists of igneous rocks from the Canadian Shield, Athabasca Formation quartzite and Devonian limestones. This material was carried into the region by ice flowing from the northeast.

Fluvial deposits originally were considered a good prospect for locating gravel. Of sixteen fluvial prospects (most in the Athabasca River valley) field checked, 15 contain fine silt and clay and one contains sand with less than 15% pebbles. The reason for the lack of coarse material is that the Athabasca River currently is cutting into the same fine grained bedrock. Only where a source of gravel (glaciofluvial or preglacial deposit) is exhumed can the river mechanically concentrate the sediment as a granular bar or terrace deposit. Thus, the Athabasca River valley, in this area, is a poor source of gravel.

One prospect (34) in the study region may be of preglacial origin (Plate 1). If this is the case, then the gravel was derived from the mountains to the west as part of a preglacial river system which crossed the region. Preglacial deposits occur in many other parts of Alberta and can be excellent sources of high quality gravel. These deposits commonly are buried beneath till or glaciolacustrine clay and may be difficult to detect. Confirmation of this site as preglacial, through more detailed investigation, could justify a geophysical or test-hole drilling program to locate additional deposits of similar origin.

The most prospective sources of coarse aggregate in this region will have been formed by processes which carried the gravel into the area by preglacial rivers or by ice. The ice-borne gravel would be concentrated by glaciofluvial action. The greatest number sites of sand with gravel less than 15% are prospects of glaciofluvial origin. However, they are also the

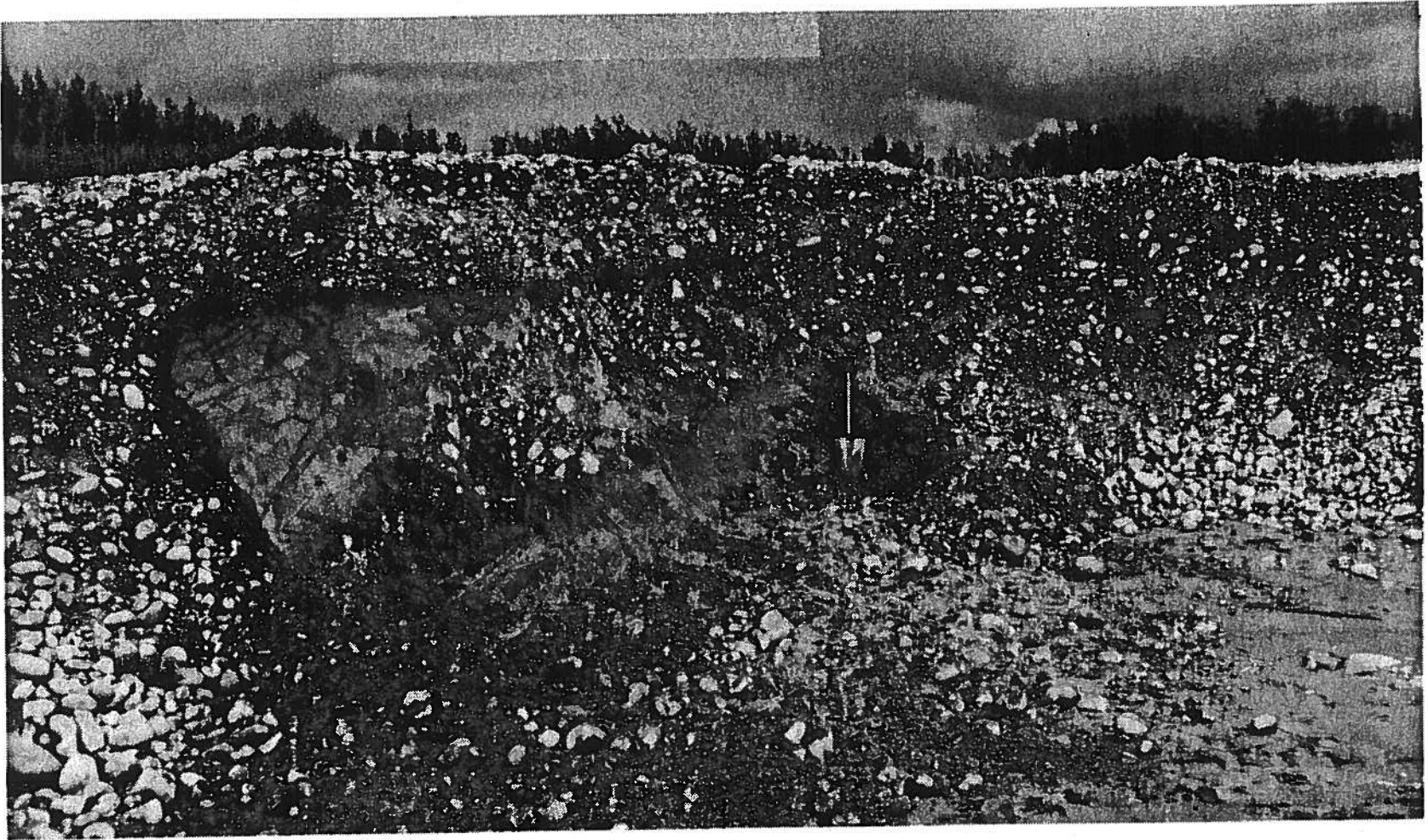


Plate 1. Glaciofluvial, dirty, poorly sorted, sandy gravel with abundant clasts from the Canadian Shield overlies, with sharp contact, preglacial, clean, fine to medium grained sand with scattered lenses of gravel and no clasts from the Canadian Shield in Deposit 34.

most numerous so that the nine sites confirmed represent only 7% of the glaciofluvial sites field checked. The highest probability of finding sand with some gravel is in the less common meltwater channel areas (11% success) and ice-contact areas (25% success). Sand is abundant. Fifty percent of ice-contact sites visited have sand, 47% of the esker sites and 21% of both glaciofluvial and meltwater channel sites have sand.

Three large features of meltwater/ice-contact/esker origin contain 11 of the 35 known sand prospects (31%) and three of the 17 prospects known to contain gravel (18%). These three are referred to as the Logan River/House River valley meltwater channel and House River esker systems, the Goodwin Lake esker system and the Christina River valley esker system.

#### 1. Logan River/House River valley meltwater channel and House River esker system

The Logan River is a misfit river occupying what was probably an ice-marginal meltwater channel. The channel trends generally NNW-SSE (Plate 2). Granular materials are present along the valley as low level bars or terraces above the present stream (prospects 10, 20, 21, 73 and 81 on Figures 2 and 3) and as high level abandoned channels or cut-offs (prospects 80, 82, 86, and 87 on Figure 3). The cut-offs are believed to be early channels of the meltwater drainage system that were abandoned and left hanging as the main channel migrated and entrenched. Sand (20 on Figure 2), and sand with gravel prospects (10, 80, and 81 on Figures 2 and 3), were confirmed by field checks in both the low terraces and high cut-offs. It is assumed that other areas identified on air photos within the Logan River and House River valleys also contain granular material (prospects 21, 82, 86 and 87 on Figures 2 and 3). The House River valley intersects a NE-SW trending meltwater channel/esker system near the northern end of the meltwater channel (Plate 3). Prospects 10 and 20 on Figure 2 contain sand with pebbles. Esker prospects 18 and 19 have a high probability of containing sand with pebbles. Granular material carried by this ice-contact/esker system may have been one source of sediment for the Logan River and House River valley meltwater system. Time relationships



Plate 2. Meltwater channel prospects in the Logan River valley. Air photo AS 2790 204 shows the meltwater channel, abandoned channel and cutoff prospect (80), low terrace (81) and the glaciofluvial system (65) which joins the meltwater channel at a right angle.



Plate 3. Gravel prospects near the crossing of the House River by Hwy 63. Air photo AS 2791 209 shows prospects 10 and 20 (meltwater channel terraces) and prospects 11, 12 and 13 of the intersecting glaciofluvial system.

have not been established for this hypothesis. Of the 17 prospects in the entire study area which contain some gravel, three (17%) are present in this system.

## 2. Goodwin Lake esker system

The Goodwin Lake esker and ice-contact system (Plate 4) also trends NE-SW to E-W. It is represented by prospects adjacent to the lower half of the May River and from the Logan River along Goodwin Lake, Glover Lake and Edwards Lake. Four prospects along this system were confirmed to contain sand (68, 69, 71 and 77 on Figure 3). One prospect (61) contains some gravel. Three other areas on this trend have a high probability of also containing sand (62, 70 and 76 on Figure 3).

## 3. Christina River valley esker system

An E-W trending esker system adjoins the upper Christina River. Two sand prospects were confirmed (50 and 54 on Figure 3). A series of prospects extend to the NE (trending NE-SW) from the more clearly defined esker segment. These may represent an upstream ice-contact or meltwater channel extension of the esker drainage system. This NE-SW segment contains five possible deposits (47, 55, 56, 57 and 59 on Figure 3), one of which is known to contain sand.

## CONCLUSIONS

The most common aggregate material in the study area is fine to medium grained, clean sand. A large number of prospective sand areas are delineated on figures 2 and 3 (in pocket). Clasts of gravel size and oversize that can be crushed to gravel size seldom exceed 5% of the material in any deposit in the study area. No prospective gravel areas were found.

Deposit, pit, site and/or sample locations and description of the aggregate resources in the study area are given in figures 2 and 3.



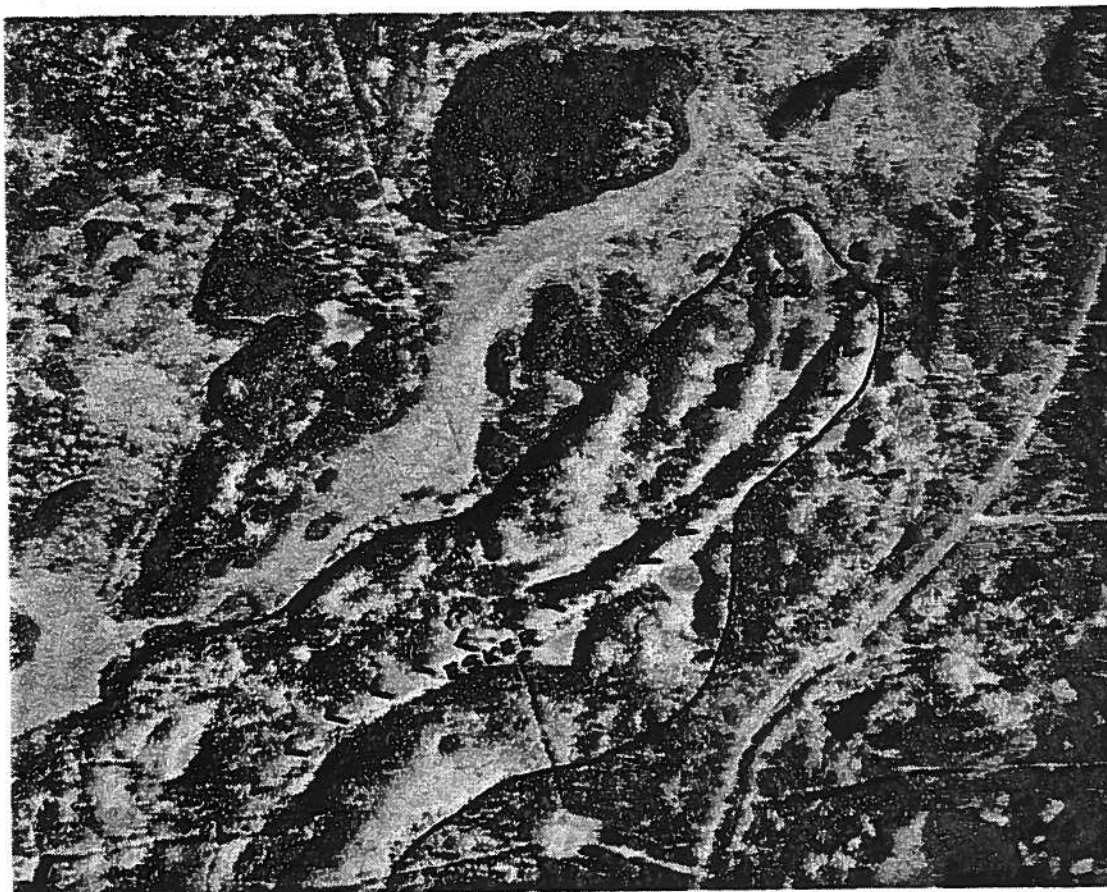


Plate 4. Esker ridge southwest of Goodwin Lake. Air photo AS 1762 092 shows an esker ridge that forms part of prospect 76.

Deposit, pit and site descriptions and laboratory data are in Appendices 1 and 2.

Further exploration for gravel in the region should focus on preglacial deposits, meltwater channel and ice-contact deposits. Extensive, flat-lying glaciofluvial deposits occasionally contain sand with less than 15% gravel and are a prospective source for gravel but are more difficult to find. Deposits recycled by a second fluvial process may be prospective. For example, where an ice-contact deposit is reworked by a meltwater channel or a glaciofluvial or preglacial deposit is reworked by the Athabasca River or other stream.

#### RECOMMENDATIONS

The preglacial origin for prospect 34 should be confirmed and a program developed to find other preglacial deposits.

A program focusing on meltwater channel and ice-contact deposition and trends could be started with an air photo study followed by site checks.

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Research Council Open File Report 1987-02.

APPENDIX 1  
PITS/SITES WITHIN DEPOSIT BOUNDARIES

## DEPOSIT 1

LOCATION: Sec 19,30,31 Tp80 R17 W4M  
Sec 12,13 Tp80 R18 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with gravel content less than 15%. Not field checked.

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## DEPOSIT 2

LOCATION: Sec 1 Tp80 R18 W4M  
Sec 36 Tp79 R18 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Pocket of dirty gravelly sand at the north end of a bedrock outcrop.

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## DEPOSIT 3

LOCATION: Sec 1 Tp80 R18 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Pocket of dirty gravelly sand at edge of bedrock outcrop.

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## DEPOSIT 4

LOCATION: Sec 6 Tp79 R17 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

**DEPOSIT DESCRIPTION:**

Probably sand with gravel content less than 15%. Not field checked.

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**DEPOSIT 5**

LOCATION: Sec 13 Tp79 R 17 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

**DEPOSIT DESCRIPTION:**

Probably sand with gravel content less than 15%. Not field checked.

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**DEPOSIT 6**

LOCATION: Sec 6 Tp79 R17 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

**DEPOSIT DESCRIPTION:**

Probably sand with gravel content less than 15%. Not field checked.

---

**DEPOSIT 7**

LOCATION: Sec 6,7 Tp79 R14 W4M

No. of associated pits/sites: 2

No. of samples analysed: 2

**DEPOSIT DESCRIPTION:**

Dirty, iron stained, fine to coarse grained sand with clasts less than 15%. Abundant oversize clasts of igneous rocks from the Canadian Shield. Some hard sandstone, quartzite, ironstone and chert. Till overburden thickness is variable from 15cm to 7m.

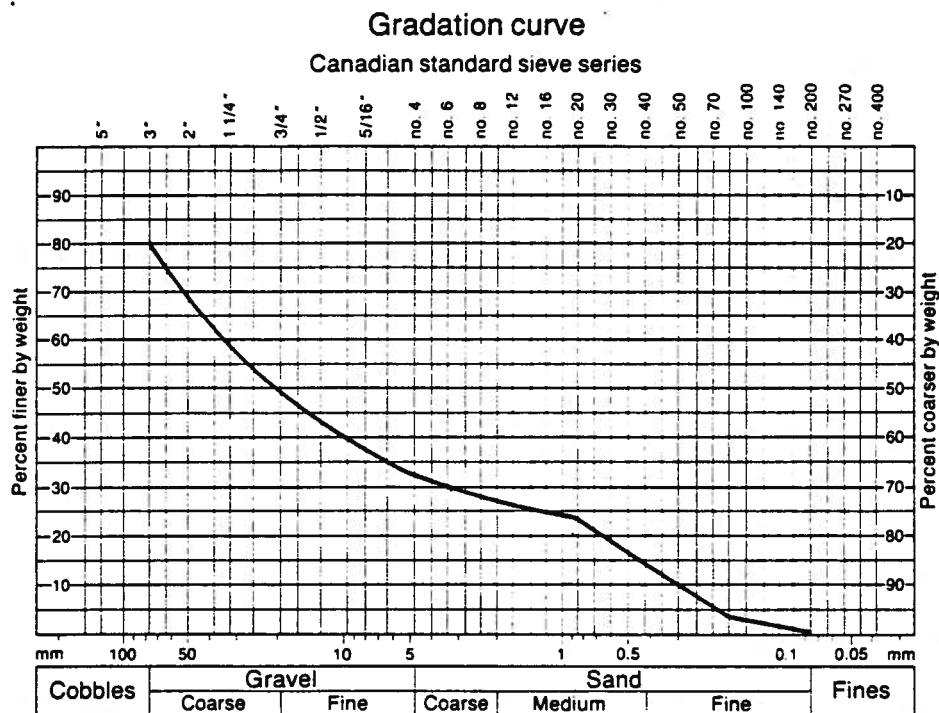
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Pit Location: LSD10 Sec7 Tp79 R14 W4M

Pit Description:

Dirty, fine to medium grained sand with clasts less than 15%. Coarse clasts are abundant and consist primarily of igneous rocks from the Canadian Shield, some hard sandstone, quartzite, ironstone and chert. Till overburden is 7m thick. It is unknown how far the material extends to the west.

Gradation:           20% cobbles           48% gravel  
                          31% sand                1% fines

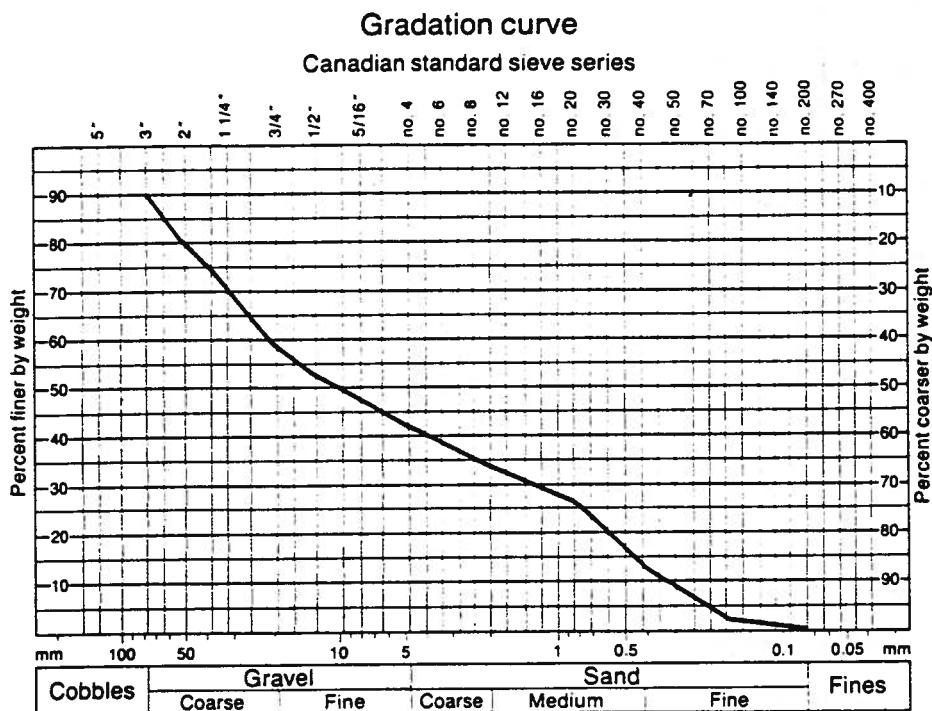


Site Location: LSD7 Sec7 Tp79 R14 W4M

Site Description:

New roadcut in dirty, iron stained, fine to coarse grained sand with approximately 8% clasts. Clasts are primarily angular to subangular igneous rocks from the Canadian Shield with hard sandstone, quartzite, ironstone and minor limestone. Till overburden varies from 15cm to 1m. This site is approximately 300m south of the pit described above and two new roadcuts between the two locations exhibit till in excess of 2m with no clasts in the ditch. The high ground to the west of this site could be drilled on speculation for aggregate.

Gradation:            10% cobbles            48% gravel  
                              41% sand                1% fines



### DEPOSIT 8

LOCATION: Sec 8 Tp78 R17 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

See pit description below.

Pit Location: LSD15 Sec8 Tp78 R17 W4M

Pit Description:

A disused pit of dirty, gravelly sand. Maximum pit depth is 6.5m. Coarse sand is the most abundant material and clasts compose less than 40% of the deposit. Nearly 15% of the clasts are larger than 75mm. Near the base of the pit the material tends to medium grained, clean sand with fewer than 5% clasts. The sand matrix is iron stained, ironstone clasts are common and weathered gneiss clasts are present. Crushing of the oversize clasts would greatly improve the yield of useable aggregate from this deposit.

## DEPOSIT 9

LOCATION: Sec 21,22,28 Tp78 R14 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Linear ridge probably composed of sand with gravel content less than 15%. Not field checked.

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## DEPOSIT 10

LOCATION: Sec 2-5 Tp77 R14 W4M  
Sec 33,34 Tp76 R14 W4M

No. of associated pits/sites: 5

No. of samples analysed: 8

## DEPOSIT DESCRIPTION:

Clean, fine to medium grained sand with local lenses of clasts to 25%. Maximum clast size is 50cm. Clasts are primarily igneous rocks from the Canadian Shield with sandstone, quartzite and ironstone.

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Pit Location: LSD12 Sec5 Tp77 R 14 W4M  
LSD9 Sec9 Tp77 R14 W4M

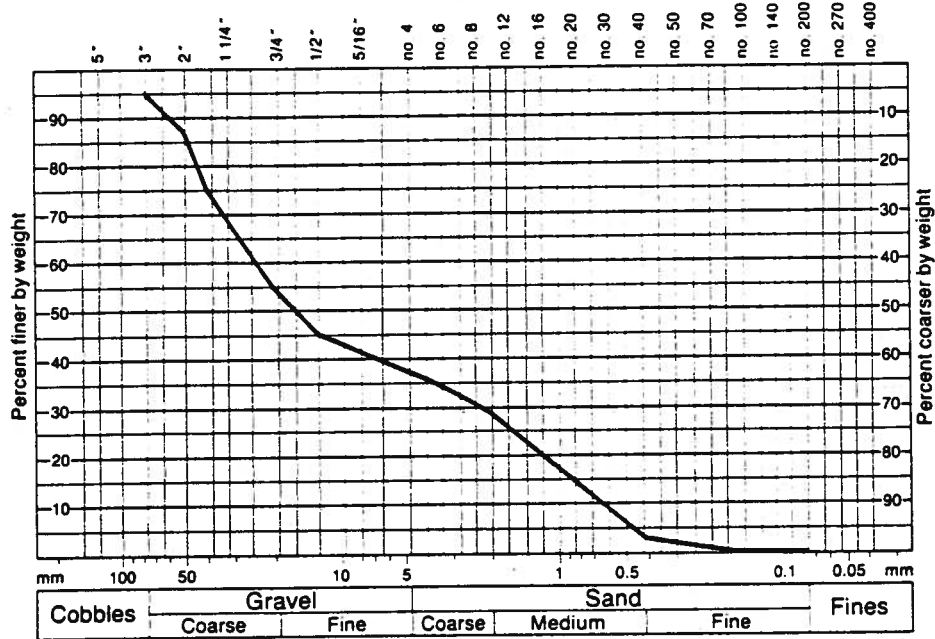
## Pit Description:

Pit of fine to medium grained, clean sand with clasts that average approximately 15% but which can be as high as 25% in lenses. Areas that have clasts tend to have more medium and coarse sand. The NE corner of the pit has an area of cobbles and boulders in abundance. Clasts are primarily igneous rocks from the Canadian Shield, with sandstone, quartzite, ironstone and abundant clay clasts. Coaly fragments also are common. The stratigraphy of the pit tends to be fine grained sand with a few clasts in the top 3.5m and sand to the base of the pit with lenses of more clast rich material. The current pit base has the highest concentration of clasts.

Gradation: 5% cobbles 58% gravel  
37% sand 0% fines

Gradation curve

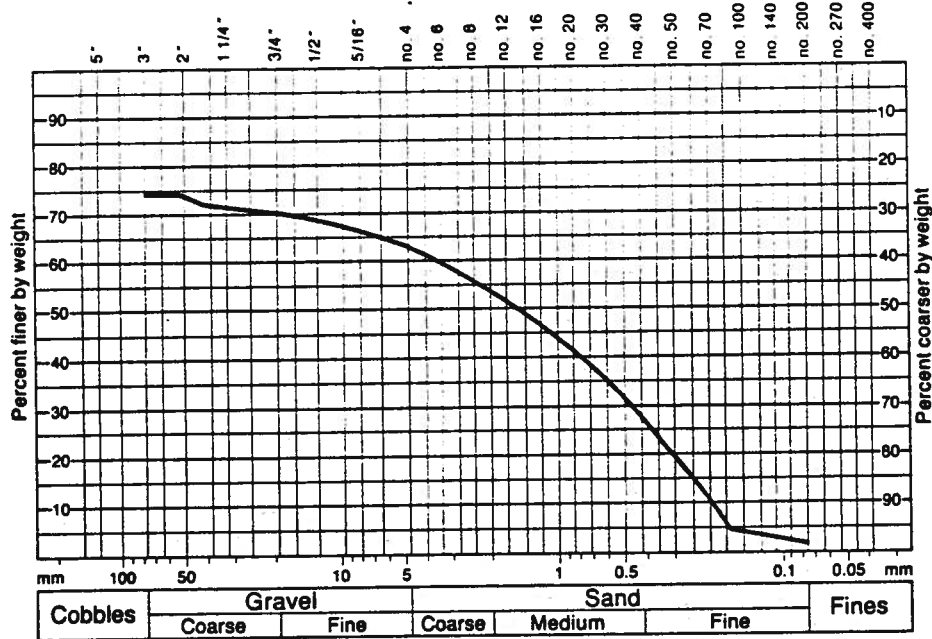
Canadian standard sieve series



Gradation: % cobbles 11% gravel  
61% sand 2% fines

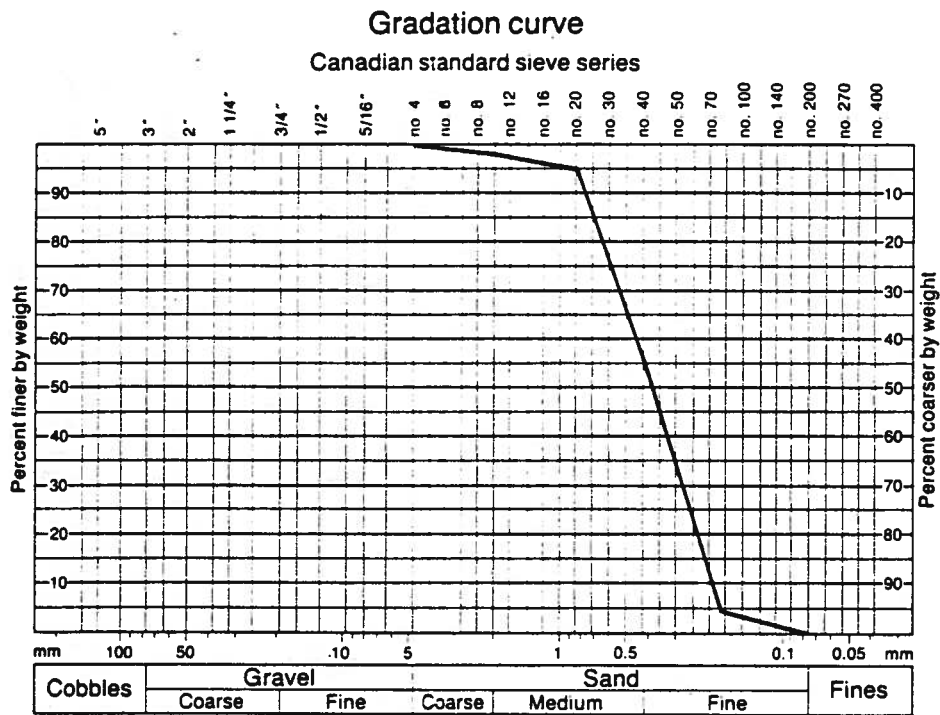
Gradation curve

Canadian standard sieve series

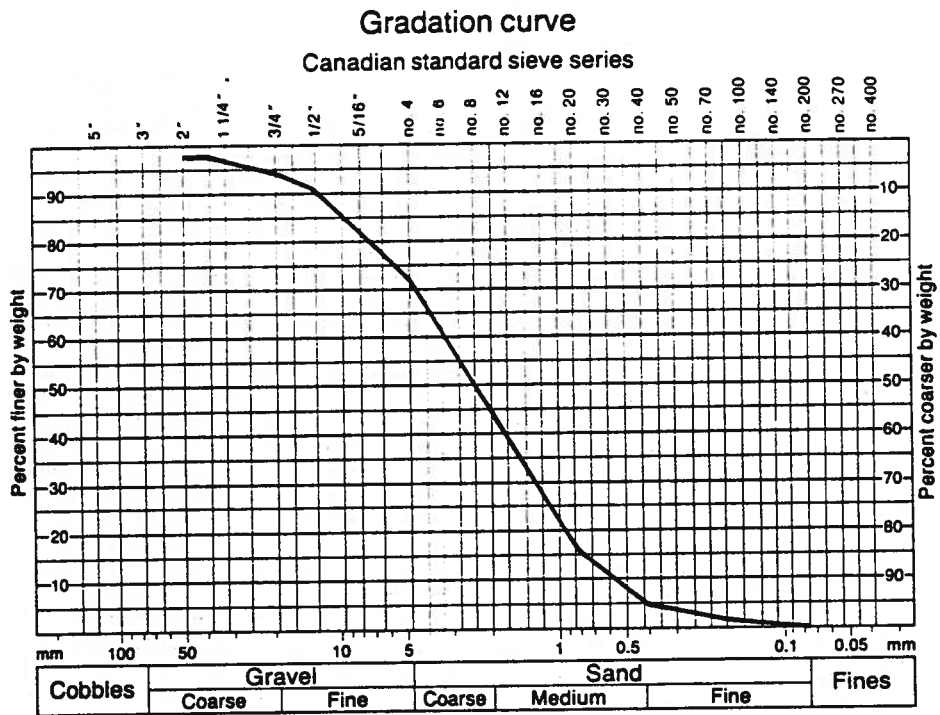




Gradation:                    % cobbles                    % gravel  
    100% sand                    % fines



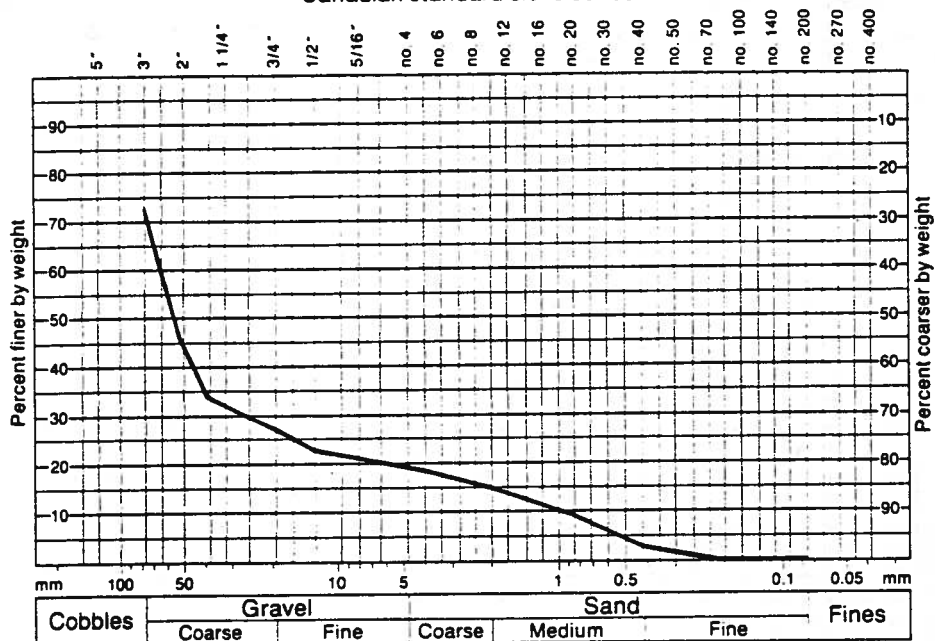
Gradation:                    % cobbles                    26% gravel  
    72% sand                    % fines



Gradation:            27% cobbles            54% gravel  
                              19% sand                        % fines

Gradation curve

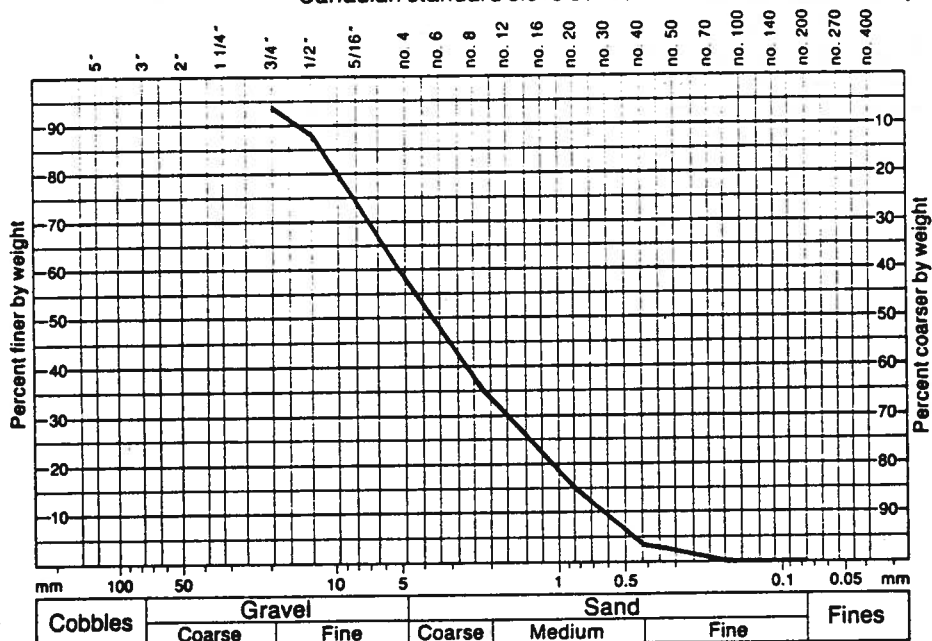
Canadian standard sieve series



Gradation:            % cobbles            35% gravel  
                              58% sand                        % fines

Gradation curve

Canadian standard sieve series



Site Location: LSD16 Sec34 Tp76 R14 W4M

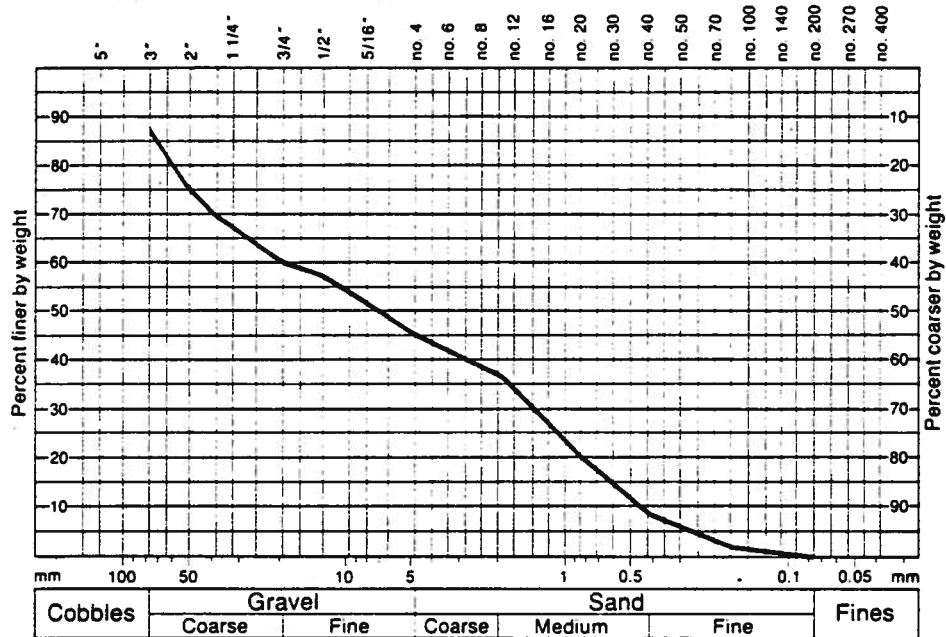
Site Description:

Terrace, 3.5m high measured from creek level that in the upper 40cm consists of fine to medium grained sand with clasts to 15cm fewer than 2%. Below is clean fine to medium grained sand with no or scattered clasts.

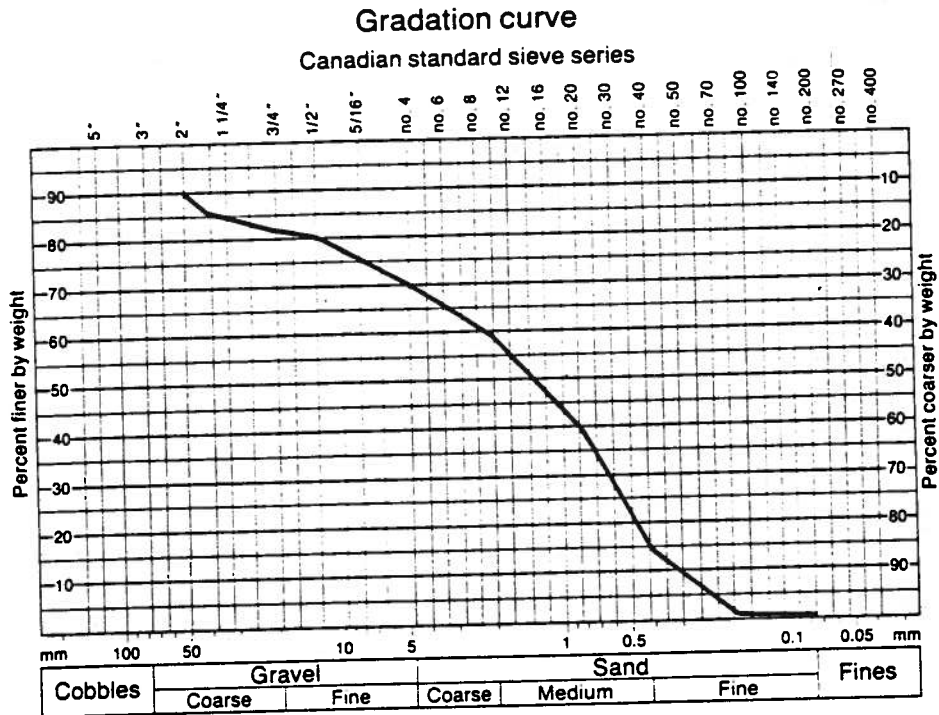
Gradation:                    % cobbles                    42% gravel  
                                   45% sand                    % fines

Gradation curve

Canadian standard sieve series



Gradation:                    % cobbles                    20% gravel  
    70% sand                    % fines



Site Location: LSD10 Sec34 Tp76 R14 W4M

Site Description:

Clean, fine to medium grained sand at the upper edge of the valley wall that is overlain with slightly clayey silt and till.

**DEPOSIT 11**

LOCATION: Sec 3-5,7-10 Tp77 R14 W4M

No. of associated pits/sites: 2

No. of samples analysed: 1

DEPOSIT DESCRIPTION:

Fine to medium grained, cross bedded sand with clasts fewer than 1%.

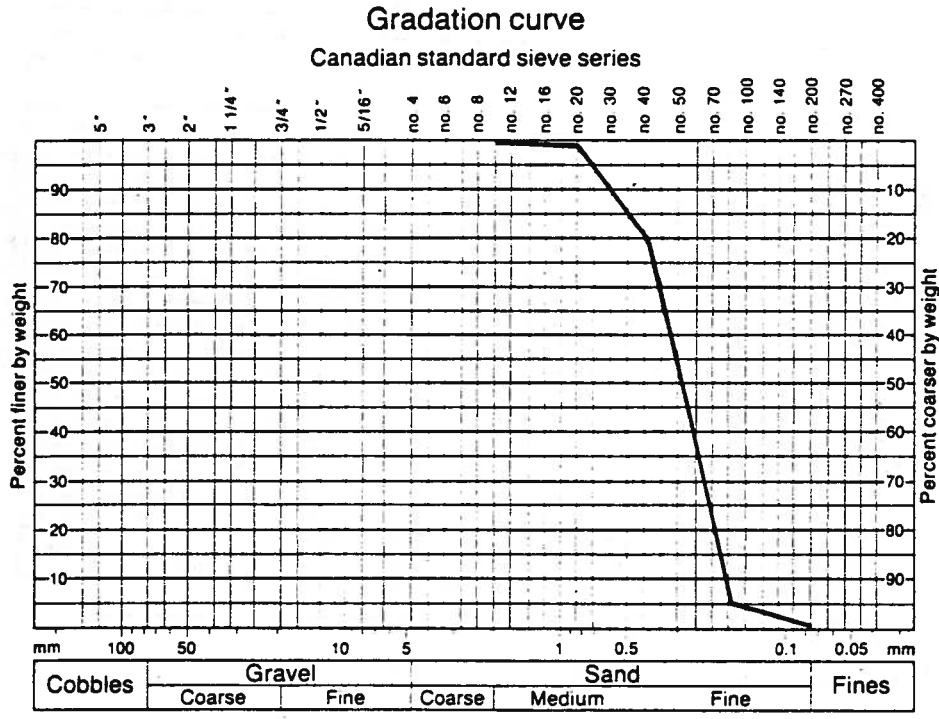
Pit Location: LSD3 Sec8 Tp77 R14 W4M

Pit Description:

Pit exposing 12.5m of clean, fine to medium grained sand. No clasts

except for a few tabular clay clays to 3cm diameter. Cross bedding is common and the beds are marked by fine clay, organic or iron fragments.

Gradation:                   % cobbles                   % gravel  
                                   100% sand                   % fines



Site Location: LSD7 Sec10 Tp77 R 14 W4M

Site Description:

Well site with fine to medium grained sand. Clasts to 5cm fewer than 1%.

**DEPOSIT 12**

LOCATION: Sec 3,9,10,11,15,16,21,22 Tp77 R14 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Flyover. Open pine forest with sand visible at surface on roads and approximately 5m of bedded, fine to medium grained looking sand is present in a stream bank.

## DEPOSIT 13

LOCATION: Sec 1-3,11-14,24 Tp77 R14 W4M  
 Sec 18,19 Tp77 R13 W4M

No. of associated pits/sites: 2

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Fine to medium grained, clean sand with clasts less than 0.5% is exposed in the many backhoe test pits left by previous prospectors.

---

Site Location: LSD15 Sec12 Tp77 R14 W4M

## Site Description:

Fine to medium grained, clean sand with clasts less than 0.5%.

---

Site Location: LSD4 Sec2 Tp77 R14 W4M

## Site Description:

Road surface ascending a hill approximately 15m high exposes fine to medium grained sand. A lens approximately 30cm thick contains less than 0.5% clasts to 7.5cm.

---

## DEPOSIT 14

LOCATION: Sec 2-5,8,9,17,18 Tp76 R19 W4M  
 Sec 13,14,23 Tp76 R20 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Linear body composed of fine to medium grained sand with no clasts exposed along a winter road under open pine forest.

---

## DEPOSIT 15

LOCATION: Sec 29-32 Tp75 R18 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Sand with clasts fewer than 15%. Not field checked.

---

DEPOSIT 16

LOCATION: Sec 28,29,32,33 Tp75 R16 W4M  
Sec 4 Tp76 R16 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Sand with clasts fewer than 15%. Not field checked.

---

DEPOSIT 17

LOCATION: Sec 19 Tp76 R15 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Flyover. Open pine forest, moss covered ground, no place to land.  
Likely fine to medium grained sand with clasts fewer than 1%.

---

DEPOSIT 18

LOCATION: Sec 20 Tp76 R14 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Small linear feature. Likely sand with clasts fewer than 15%. Not  
field checked.

---

## DEPOSIT 19

LOCATION: Sec 9,10,14,15 Tp76 R14 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Linear feature. Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 20

LOCATION: Sec 26,27,34,35 Tp76 R14 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Fine to medium grained, clean sand with scattered concentrations of clasts to 7.5cm diameter but fewer than 0.5%. The sand is 3.5m thick at one location.

---

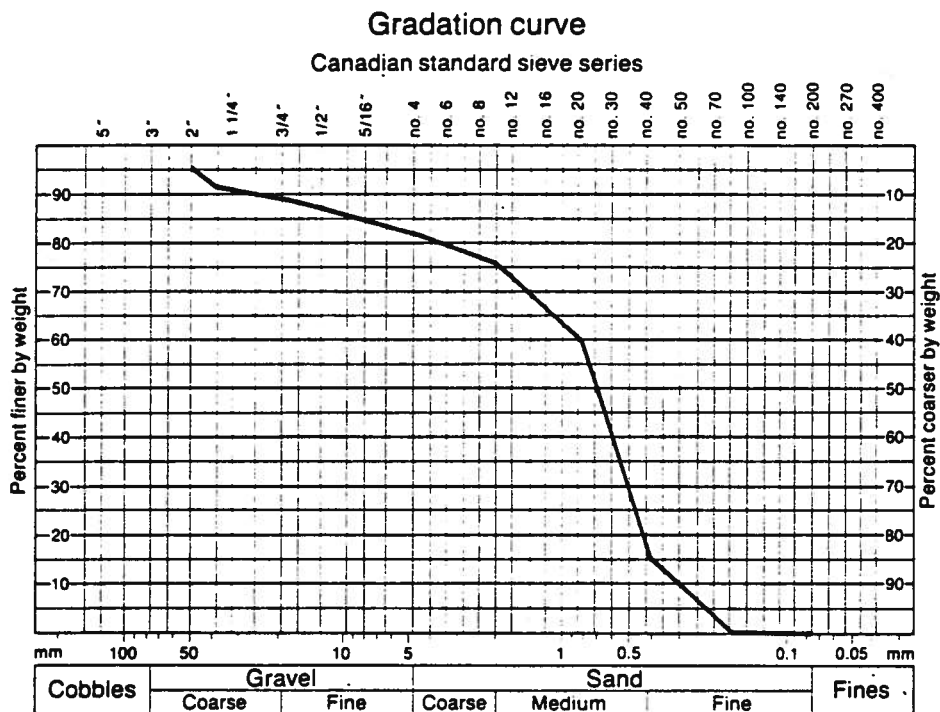
Site Location: LSD11 Sec26 Tp76 R14 W4M

## Site Description:

Pit 0.9m deep dug in the surface of the winter road at the spot where the most clasts are present relative to any other location observed to the north. Fine to medium grained, clean sand with clasts to 7.5cm fewer than 0.5% in a thin, discontinuous, surface layer.



Gradation:                    % cobbles                    13% gravel  
    82% sand                    % fines



#### DEPOSIT 21

LOCATION: Sec 13,24,25 Tp76 R14 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

#### DEPOSIT 22

LOCATION: Sec 10-16 Tp73 R16 W4M

Sec 1-3,7,8,13-18,20-29,33-36 Tp73 R15 W4M

Sec 1,2 Tp74 R15 W4M

Sec 1-27,35,36 Tp73 R14 W4M

Sec 34-36 Tp72 R15 W4M

Sec 11-15,20-36 Tp72 R14 W4M

Sec 7-36 Tp72 R13 W4M

Sec 18,19,30,31 Tp72 R12 W4M

Sec 5-8,17-19 Tp73 R12 W4M

Sec 1-6,8-28,30,31,33,34 Tp73 R13 W4M

## Sec 3,4 Tp74 R13 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 23

LOCATION: Sec 13,24,25,35,36 Tp72 R17 W4M  
Sec 7,18,19,30 Tp72 R16 W4M  
Sec 1,2,11,12 Tp73 R17 W4M

No. of associated pits/sites: 2

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Fine to medium grained sand with clasts fewer than 1%.

---

Pit Location: LSD6 Sec36 Tp72 R17 W4M

## Pit Description:

Fine to medium grained sand with clasts, to 10cm fewer than 1%, in the upper 30cm.

---

Pit Location: LSD13 Sec36 Tp72 R17 W4M

## Pit Description:

Pit 6m deep of fine to medium grained sand with a few clasts scattered at the surface.

---

## DEPOSIT 24

LOCATION: Sec 8,9,16-18,20,21,29,30 Tp72 R16 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

See site description.

---

Site Location: LSD3 Sec18 Tp72 R16 W4M

Site Description:

Pad, for sawmill, built from scraping approximately 20-30cm veneer of dirty, fine to coarse sand with fewer than 15% clasts to 20cm off the top of the rise on which the mill is to be built. Material below is till.

---

#### DEPOSIT 25

LOCATION: Sec 13,24 Tp71 R17 W4M  
Sec 18,19,29-31 Tp71 R16 W4M

No. of associated pits/sites: 2

No. of samples analysed: 2

DEPOSIT DESCRIPTION:

Primarily fine to coarse grained sand with clasts fewer than 5% exposed on the flood plain or in the banks of the Wandering River valley. Mosts clasts are igneous rocks from the Canadian Shield with additional clasts of limestone, hard sandstone, quartzite and ironstone. Overburden varies from 1-10m.

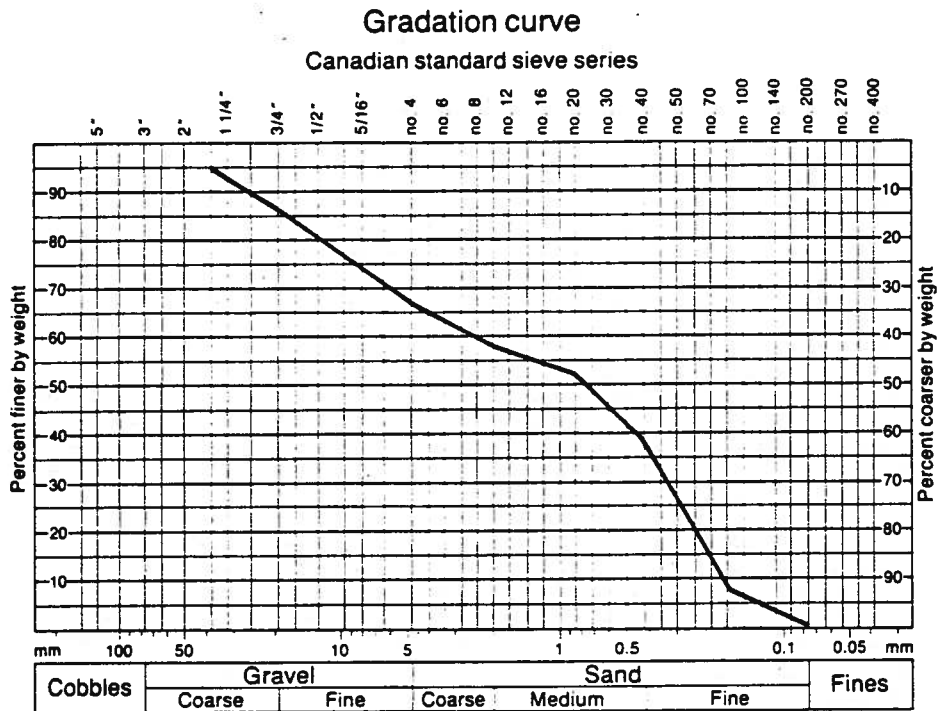
---

Pit Location: LSD6 Sec30 Tp71 R16 W4M

Pit Description:

Approximately 6m of primarily cross bedded to horizontally bedded sand with thin beds or lenses of clasts fewer than 5% exposed in a pit along a tributary to Wandering River. Most clasts are igneous rocks from the Canadian Shield with limestone, hard sandstone, abundant ironstone and minor oil sand. Overburden is 1-1.5m of dirty sand, silt or varved clay.

Gradation:                    % cobbles                    28% gravel  
    67% sand                    % fines

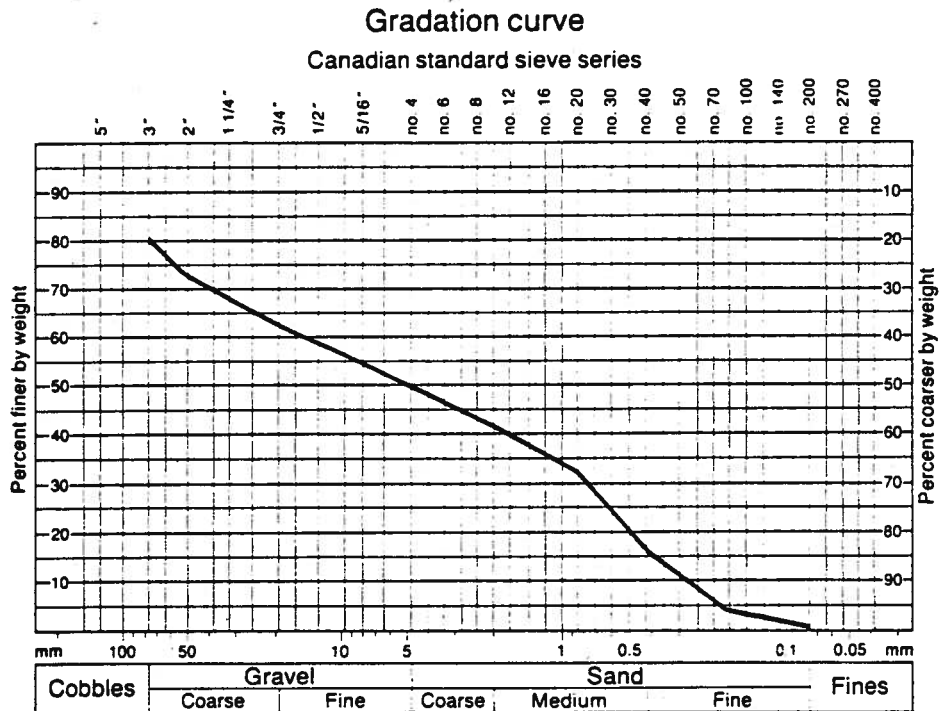


Pit Location: LSD6 Sec24 Tp71 R17 W4M

**Pit Description:**

Pit on Wandering River lowland exposes 1.5m of clean, fine to coarse grained sand with fewer than 5% clasts to 25cm below 1-10m of clayey silt overburden. Backhoe test pits, in the area of thin overburden, exhibit 0.5-1m of clayey silt over 1.5-2m of bedded, clean sand over approximately 1.5m of sand with clasts fewer than 5%. Clasts are primarily igneous rocks from the Canadian Shield with hard sandstone, quartzite and ironstone.

Gradation

% cobbles  
29% sand30% gravel  
1% fines**DEPOSIT 26**

LOCATION: Sec 32-34 Tp70 R17 W4M  
Sec 2,3,11,14 Tp71 R17 W4M

No. of associated pits/sites: 2

No. of samples analysed: 0

**DEPOSIT DESCRIPTION:**

Fine to medium grained sand with clasts fewer than 0.5%.

Site Location: LSD8 Sec32 Tp70 R17 W4M

**Site Description:**

Pocket, at least 50cm deep, of clean, fine to medium grained sand with fewer than 0.5% clasts below 30cm of silty clay. Most of the clasts are at the contact with the overburden. Digging a hole across the road did not expose sand at a similar depth.

Site Location: LSD1 Sec3 Tp71 R17 W4M

## Site Description:

Borrow pit in the ditch exposes fine to medium grained sand below silty clay overburden. No clasts.

---

## DEPOSIT 27

LOCATION: Sec 25,35,36 Tp71 R14 W4M  
 Sec 1,12 Tp72 R14 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

See site description below.

---

Site Location: LSD16 Sec1 Tp72 R14 W4M

## Pit Description:

Clean, fine to medium grained sand with a veneer of clasts to 5cm, fewer than 0.1%, present at the surface in scattered spots.

---

## DEPOSIT 28

LOCATION: Sec 26 Tp72 R14 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 29

LOCATION: Sec 25-29,33-36 Tp69 R14 W4M  
 Sec 1-4,10,11,13-15,21-27,34-36 Tp70 R 14 W4M  
 Sec 1 Tp71 R14 W4M  
 Sec 28-32 Tp69 R13 W4M  
 Sec 7,18-20,30-36 Tp70 R13 W4M  
 Sec 1-4,6,7,10-14,18,23 Tp71 R13 W4M  
 Sec 7,17-20 Tp71 R12 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Clean, fine to medium grained sand with no clasts is present along the Conklin road from the south to the site described below. Open pine to pine with poplar forest cover. Isolated pockets of silt and clay with no clasts.

---

Site Location: LSD9 Sec7 Tp71 R13 W4M

Site Description:

Roadcut of clean, fine to medium grained sand with no clasts.

---

DEPOSIT 30

LOCATION: Sec 20,29 Tp70 R19 W4M

No. of associated pits/sites: 1

No. of samples analysed: 2

DEPOSIT DESCRIPTION:

See pit description below.

---

Pit Location: LSD4 Sec20 Tp70 R19 W4M

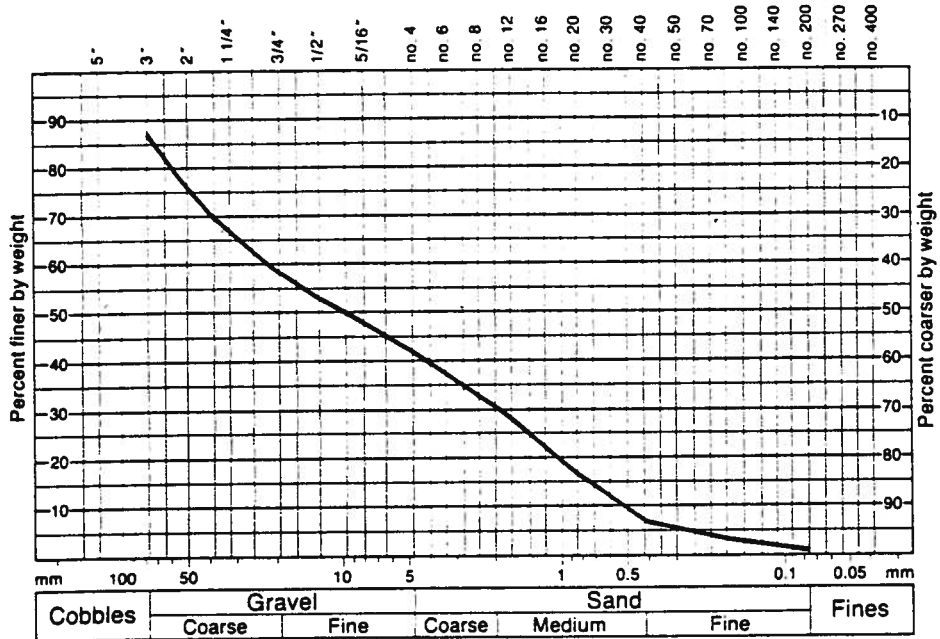
Pit Description:

On a terrace above the Athabasca River, is clean, fine to medium grained sand with fewer than 3% clasts overlain by iron stained coarse to medium grained sand with fewer than 8% clasts. A few small lenses of the higher clast content material are present lower in the section but most of the higher clast content material is in the upper 0.5m. Clasts are primarily igneous rocks from the Canadian Shield with some limestone, hard sandstone, quartzite, ironstone and a few coaly fragments and oil sand clasts.

Gradation:                    % cobbles                    45% gravel  
    41% sand                    1% fines

Gradation curve

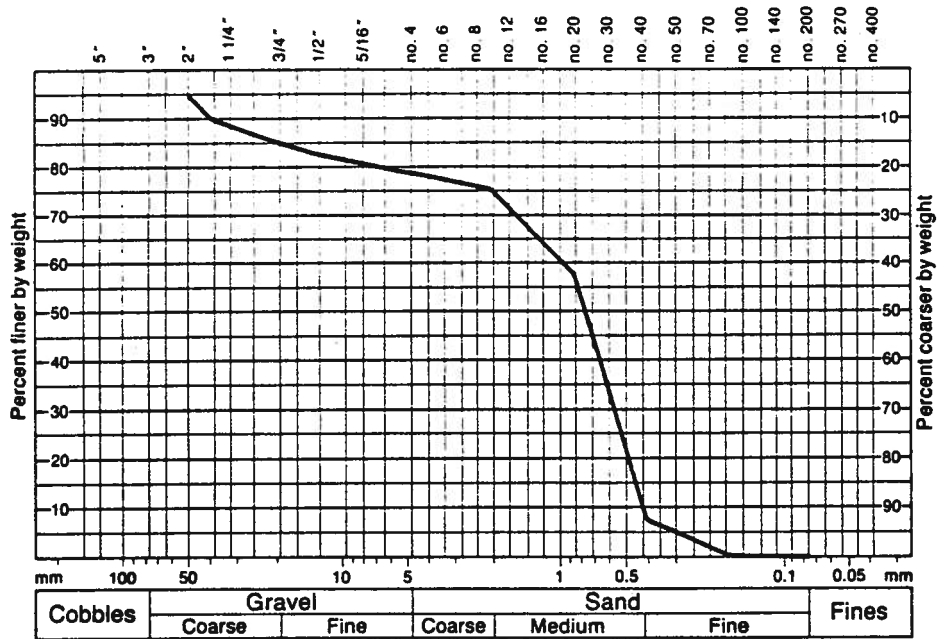
Canadian standard sieve series



Gradation:                    % cobbles                    17% gravel  
    78% sand                    % fines

Gradation curve

Canadian standard sieve series





## DEPOSIT 31

LOCATION: Sec 10,14,15,23 Tp70 R17 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 32

LOCATION: Sec 25 Tp70 R17 W4M  
Sec 30,31 Tp70 R16 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 33

LOCATION: Sec 2,11-14 Tp70 R17 W4M

No. of associated pits/sites: 1

No. of samples analysed: 2

## DEPOSIT DESCRIPTION:

See pit description below.

---

Pit Location: LSD2 Sec13 Tp70 R17 W4M

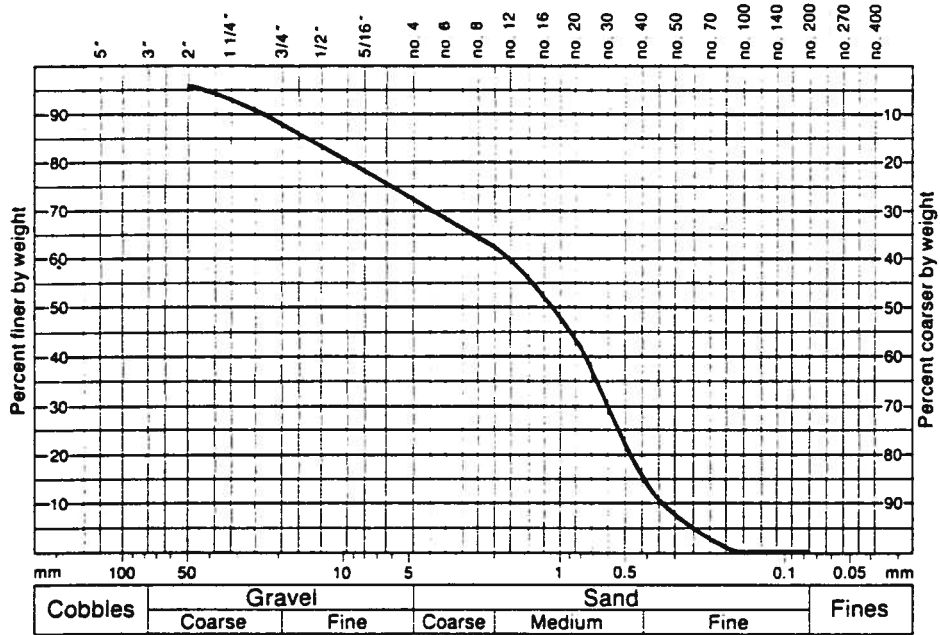
## Pit Description:

Fine to medium grained, horizontally to cross bedded, clean sand with scattered lenses of sand with clasts fewer than 5%. Clasts are primarily igneous rocks from the Canadian Shield with hard sandstone, quartzite, abundant ironstone and minor oil sand.

Gradation:                    % cobbles                    24% gravel  
    72% sand                    % fines

Gradation curve

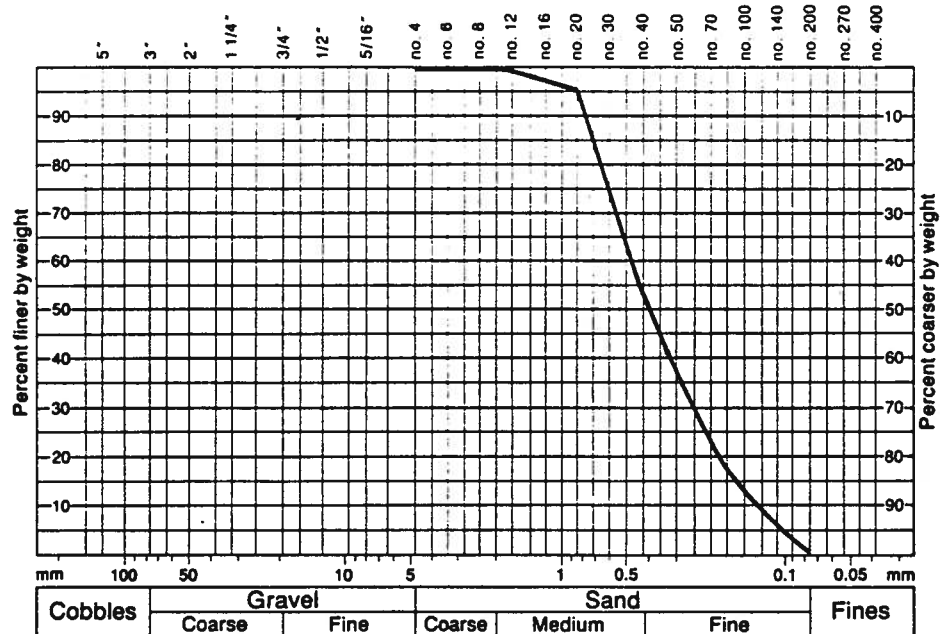
Canadian standard sieve series



Gradation:                    % cobbles                    % gravel  
    100% sand                    % fines

Gradation curve

Canadian standard sieve series



## DEPOSIT 34

LOCATION: Sec 1,12,13,23,24 Tp70 R16 W4M  
 Sec 5-8,17,18 Tp70 R15 W4M  
 Sec 28,29,31,32 Tp69 R15 W4M

No. of associated pits/sites: 1

No. of samples analysed: 2

## DEPOSIT DESCRIPTION:

See pit description below.

Pit Location: LSD16 Sec32 Tp69 R15 W4M

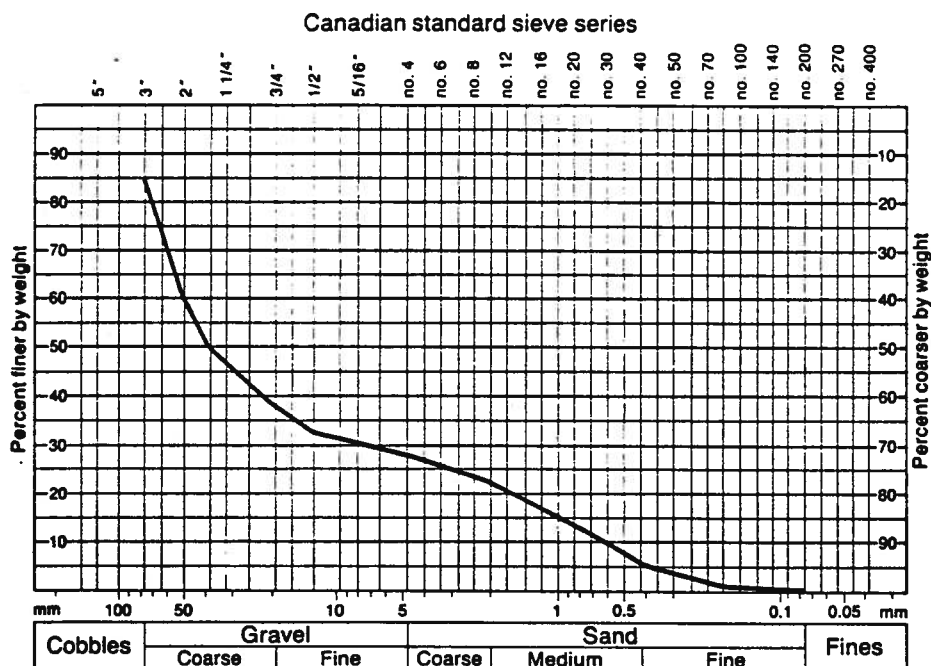
## Pit Description:

Reddish gray-brown, dirty, sandy gravel, 0.75m thick overlying, with sharp contact, 7m of yellow brown, fine grained, clean, crossbedded sand with lenses of yellowish red-orange gravel. Overburden is slightly clayey, bedded silt as much as 4m thick. The upper sandy gravel contains approximately 55% clasts that are primarily igneous rocks from the Canadian Shield with hard and soft sandstone, quartzite, ironstone and chert. This is glacial material of Pleistocene age. The lower sand, with scattered gravel lenses, contains fewer than 1% clasts that are primarily tabular quartzite and chert. This is fluvial material of Tertiary age.

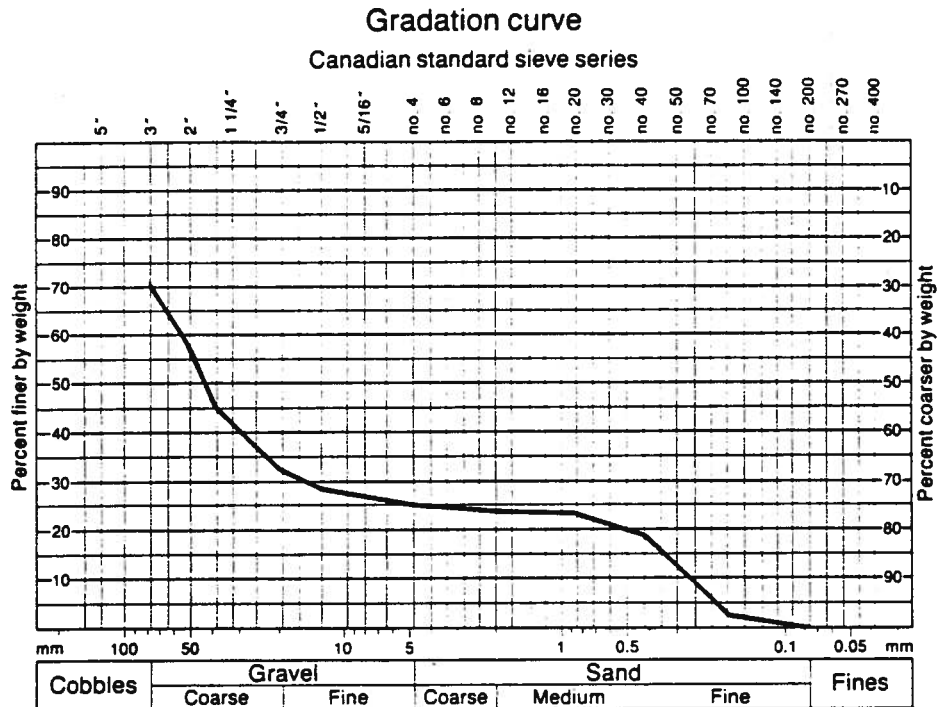
Overlying Pleistocene age material:

Gradation:	15% cobbles	57% gravel
	27% sand	1% fines

## Gradation curve



Underlying Tertiary age material from a gravelly lens:  
 Gradation:                   % cobbles                   45% gravel  
                                   45% sand                    % fines



#### DEPOSIT 35

LOCATION: Sec 19 Tp80 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

#### DEPOSIT DESCRIPTION:

Flyover. Pine and spruce forest. Looks like dirty sand with scattered clasts to 30cm fewer than 0.5%.

#### DEPOSIT 36

LOCATION: Sec 18 Tp80 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

#### DEPOSIT DESCRIPTION:

Probably sand with fewer than 15% clasts. Not field checked.

---

## DEPOSIT 37

LOCATION: Sec 6 Tp80 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 38

LOCATION: Sec 6 Tp80 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 39

LOCATION: Sec 4,5,8,9 Tp80 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. High ground, covered with open, pine forest, surrounded by swamp. Probably sand with clasts fewer than 1%.

---

## DEPOSIT 40

LOCATION: Sec 14-16,21-23,26,27 Tp80 R8 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

See site description below

---

Site Location: LSD4 Sec14 Tp80 R8 W4M

## Site Description:

Veneer of clean, fine to medium grained sand over till. Clasts to 15cm fewer than 5%.

---

## DEPOSIT 41

LOCATION: Sec 18 Tp80 R7 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 42

LOCATION: Sec 18 Tp79 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open pine forest, sand, no clasts seen in scars left by fallen trees.

---

## DEPOSIT 43

LOCATION: Sec 25,26,36 Tp79 R9 W4M  
Sec 1 Tp80 R9 W4M  
Sec 6 Tp6 R8 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. High ground covered with open, pine forest surrounded by swamp. Probably sand with clasts fewer than 1%.

---

## DEPOSIT 44

LOCATION: Sec 23 Tp78 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, sand, no clasts seen in scars left by fallen trees.

---

## DEPOSIT 45

LOCATION: Sec 14 Tp78 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 46

LOCATION: Sec 11 Tp78 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 47

LOCATION: Sec 1,12 Tp78 R11 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, sand in river outcrops, one outcrop approximately 10m high, no clasts.

---

DEPOSIT 48

LOCATION: Sec 30 Tp77 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

DEPOSIT 49

LOCATION: Sec 1-36 Tp77 R8 W4M  
Sec 1-5,10,11 Tp78 R8 W4M  
Sec 6 Tp78 R7 W4M  
Sec 5-7,31 Tp77 R7 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

See pit description below.

---

Pit Location: Sec13, tp77 R8 W4M

Pit Description:

CNR pit in clean sand with pockets of clasts fewer than 1%.

---

DEPOSIT 50

LOCATION: Sec 17,19,20 Tp77 R13 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0



## DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, sand on surface of trail, no clasts.

---

## DEPOSIT 51

LOCATION: Sec 17 Tp77 R13 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open pine forest, sand on surface of trail, no clasts.

---

## DEPOSIT 52

LOCATION: Sec 16 Tp77 R13 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open pine forest, sand on surface of trail, no clasts.

---

## DEPOSIT 53

LOCATION: Sec 15 Tp77 R13 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open pine forest, sand on surface of trail, no clasts.

---

## DEPOSIT 54

LOCATION: Sec 1,12 Tp77 R13 W4M  
Sec 4-9 Tp77 R12 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Fine grained, clean sand, no clasts. Blueberries, spruce and poplar,  
no pine forest.

---

DEPOSIT 55

LOCATION: Sec 14,23 Tp77 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

DEPOSIT 56

LOCATION: Sec 23,24 Tp77 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

DEPOSIT 57

LOCATION: Sec 24 Tp77 R12 W4M  
Sec 19 Tp77 R11 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 58

LOCATION: Sec 28,29 Tp77 R11 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 59

LOCATION: Sec 33,34 Tp77 R11 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 60

LOCATION: Sec 30 Tp77 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open pine forest, trail surface has sand, no clasts.

---

## DEPOSIT 61

LOCATION: Sec 11-14,24,25 Tp75 R11 W4M  
Sec 19,20,29,30,32-34 Tp75 R10 W4M  
Sec 2-4,10-14,24,25 Tp76 R10 W4M  
Sec 30 Tp76 R9 W4M

No. of associated pits/sites: 4

No. of samples analysed: 0

**DEPOSIT DESCRIPTION:**

Clean, fine to medium grained sand with lenses of interbedded silt and clay or sand and clay at scattered locations. Few clasts.

---

Site Location: LSD3 Sec13 Tp75 R11 W4M

Site Description:

Clean, fine sand with lenses of clasts to 10cm fewer than 1%. Hummocky terrain. Pine and poplar forest.

---

Site Location: LSD3 Sec24 Tp75 R11 W4M

Site Description:

Knob of fine sand with clasts to 35cm fewer than 3%. Dominant clasts larger than 7.5cm.

---

Site Location: LSD12 Sec29 Tp75 R10 W4M

Site Description:

Approximately 1m of bedded silt and clay over sand and clay. Lenses of these materials are present in this area but the dominant material is fine to medium grained, clean sand with few clasts.

---

Site Location: LSD14 Sec3 Tp76 R10 W4M

Site Description:

Interbedded silt, clay and sand with clasts to 35cm near the surface fewer than 0.5%. The silt and clay interbeds generally are near the surface and the sand and clay interbeds generally are in lenses at deeper depths. However, clean, fine to medium grained sand dominates in the area.

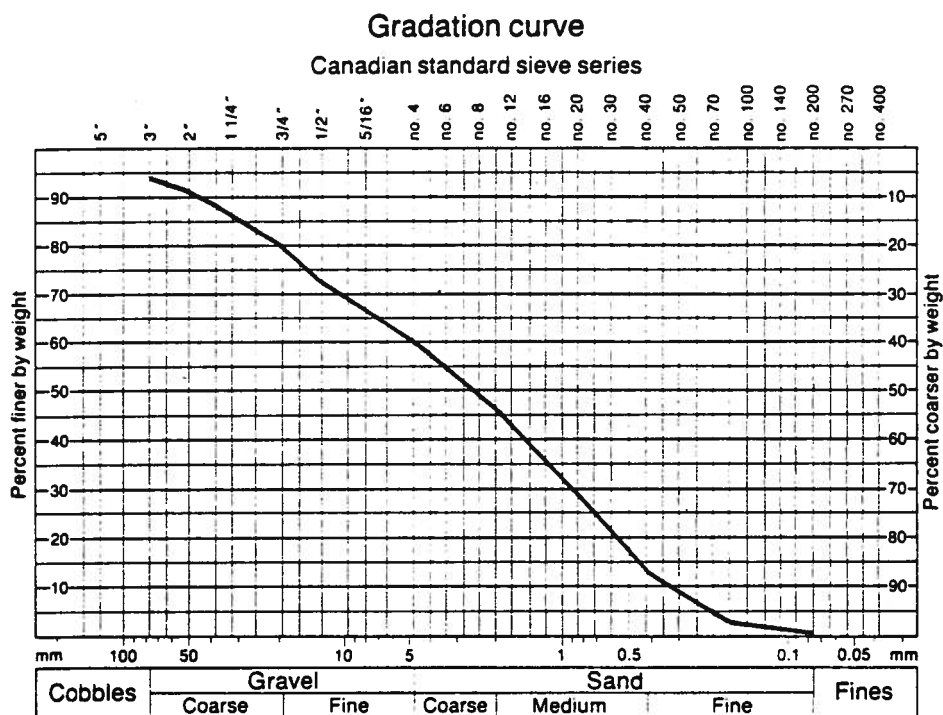
---

Pit Location: LSD13 Sec13 Tp76 R10 W4M

Pit Description:

Pit approximately 9m deep containing primarily medium to coarse grained, clean sand with clasts fewer than 2.5%. Horizontal bedding, a few lenses of clean silt and trace beds of clayey silt or clayey sand. A pile of clasts to 2m diameter, that probably came from the deposit, is nearby and could be crushed for gravel size material.

Gradation:                    % cobbles                    34% gravel  
    59% sand                    1% fines



### DEPOSIT 62

LOCATION: Sec 1,2,10-17,20-29,33-36 Tp76 R9 W4M  
 Sec 7,17-21,30,31 Tp76 R8 W4M  
 Sec 1,2 Tp77 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

#### DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

### DEPOSIT 63

LOCATION: Sec 30-33 Tp75 R10 W4M  
 Sec 3,4,9-11,13-15,23-26,36 Tp76 R10 W4M  
 Sec 1 Tp77 R10 W4M  
 Sec 6 Tp77 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 64

LOCATION: Sec 1 Tp76 R8 W4M  
Sec 6 Tp76 R7 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 65

LOCATION: Sec 20,21,28,29,32-34 Tp73 R12 W4M  
Sec 4,8-12,14-16,21-23,26-28,34,36 Tp74 R12 W4M  
Sec 1 Tp75 R12 W4M  
Sec 6 Tp75 R11 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Fine grained, clean sand with no clasts.

---

## DEPOSIT 66

LOCATION: Sec 27,34 Tp74 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, sand in trail surface, no clasts.

---

## DEPOSIT 67

LOCATION: Sec 19 Tp75 R10 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

DEPOSIT 68

LOCATION: Sec 2,3,11,12 Tp75 R11 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

See site description below.

---

Site Location: LSD11 Sec12 Tp75 R11 W4M

Site Description:

Clean fine to medium grained sand with clasts to 1.5cm fewer than 0.1%.

---

DEPOSIT 69

LOCATION: Sec 10-13 Tp75 R10 W4M  
Sec 7,8 Tp75 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, sand in trail surface, no clasts.

---

DEPOSIT 70

LOCATION: Sec 8-10 Tp75 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 71

LOCATION: Sec 20,21,27-29 Tp75 R8 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, sand in stream banks, no clasts.

---

## DEPOSIT 72

LOCATION: Sec 1,2,10-16,20-26,28-32 Tp74 R8 W4M

Sec 1 Tp75 R8 W4M

Sec 3-6,8-10,15,16,22 Tp85 R7 W4M

Sec 18-20,28-33 Tp74 R7 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, fine sand with widely scattered erratics to 30cm.

---

## DEPOSIT 73

LOCATION: Sec 3,10,11,14 Tp74 R13 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---



## DEPOSIT 74

LOCATION: Sec 3 Tp74 R13 W4M  
Sec 34 Tp73 R13 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 75

LOCATION: Sec 21,22 Tp74 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, no clasts present in scars left by fallen trees.

---

## DEPOSIT 76

LOCATION: Sec 3,4,10 Tp74 R12 W4M  
Sec 33,34 Tp73 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 77

LOCATION: Sec 28,33,34 Tp74 R11 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

See site description below.

---

Site Location: LSD2 Sec33 Tp74 R11 W4M

## Site Description:

Exposure of 3.5m of fine grained, clean sand with clasts to 5cm fewer than 0.1%.

---

## DEPOSIT 78

LOCATION: Sec 1,12,13 Tp74 R9 W4M  
Sec 6,7,18 Tp74 R8 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Open, pine forest, fine grained sand, no clasts.

---

## DEPOSIT 79

LOCATION: Sec 19,20 Tp74 R8 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 80

LOCATION: Sec 17,19,20 Tp73 R12 W4M

No. of associated pits/sites: 1

No. of samples analysed: 2

## DEPOSIT DESCRIPTION:

See pit description below.

Pit Location: LSD4 Sec16 Tp73 R12 W4M

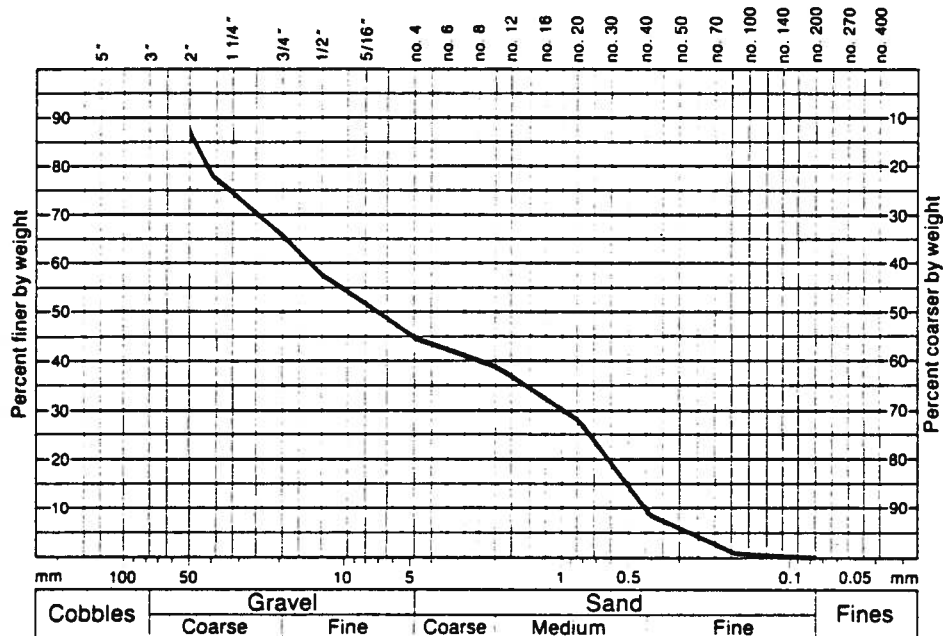
Pit Description:

Exposure 1.5m high. The upper 40cm is iron stained, clean, horizontally bedded sand with clasts to 20cm fewer than 2.5% overlying clean, horizontally bedded sand. Minor lignitic material is present in some beds. Clasts are primarily igneous rocks from the Canadian Shield with quartzite and minor ironstone and oil sand clasts.

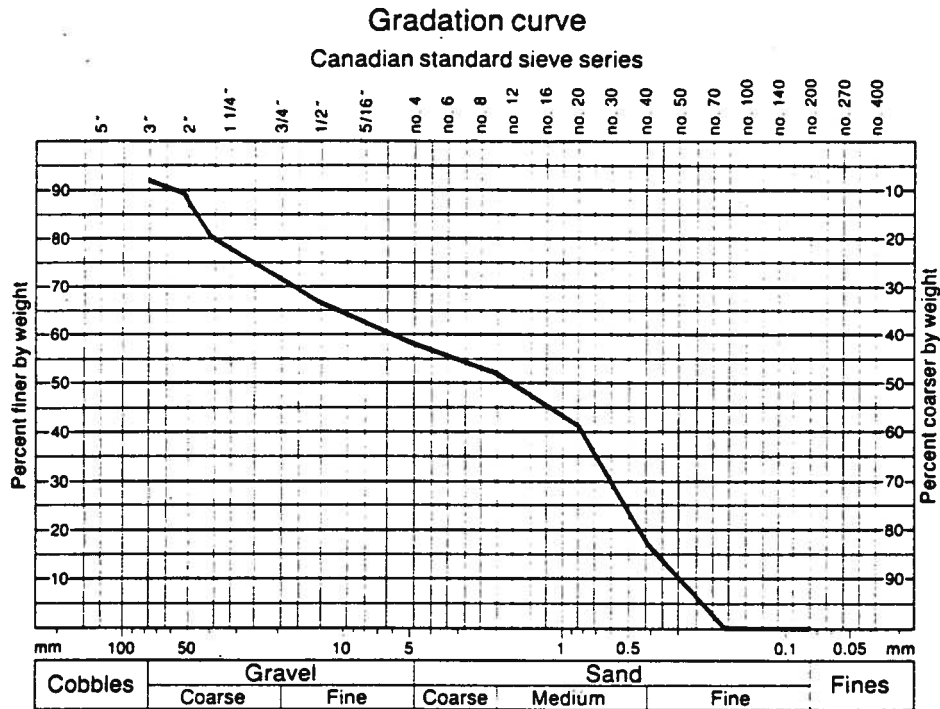
Gradation:                    % cobbles                    43% gravel  
    44% sand                    % fines

Gradation curve

Canadian standard sieve series



Gradation:                    % cobbles                    34% gravel  
    58% sand                    % fines



### DEPOSIT 81

LOCATION: Sec 9,16,20,21 Tp73 R12 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

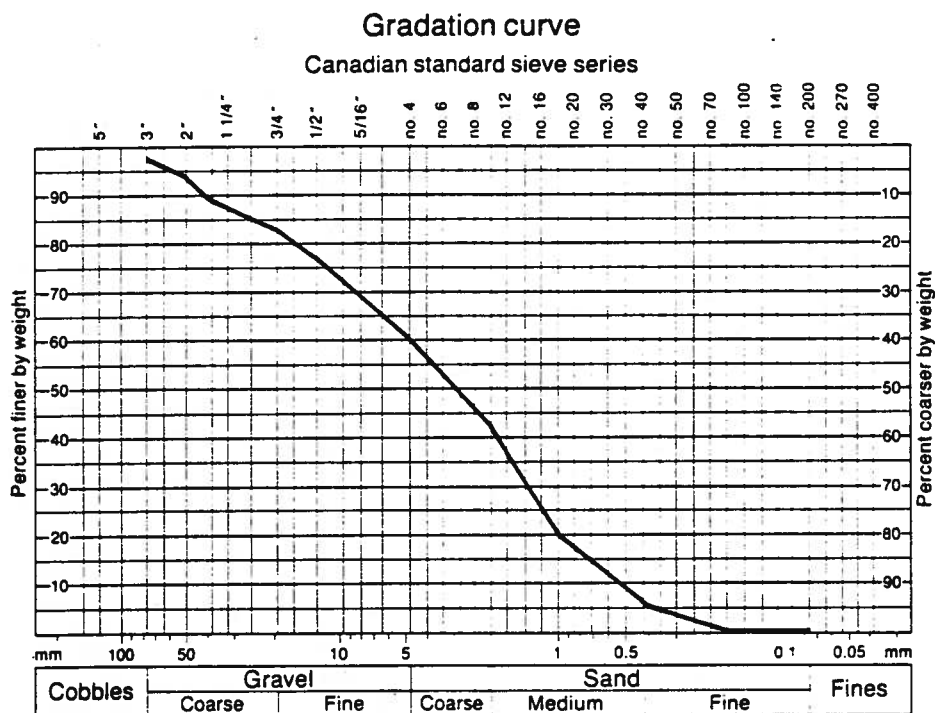
See site description below.

Pit Location: LSD3 Sec21 Tp73 R12 W4M

Pit Description:

Exposures to 2m high on both sides of the road of clean, medium to coarse grained sand with clasts to 40cm fewer than 3.5%.

Gradation:                   % cobbles                   38% gravel  
                                   60% sand                    % fines



### DEPOSIT 82

LOCATION: Sec 3,10,15,16 Tp73 R12 W4M  
 Sec 26,34,35 Tp72 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

#### DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

### DEPOSIT 83

LOCATION: Sec 1,2 Tp73 R10 W4M  
 Sec 5,6 Tp73 R9 W4M  
 Sec 31,32 Tp72 R9 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

#### DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 84

LOCATION: Sec 20,29 Tp72 R13 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 85

LOCATION: Sec 12 Tp72 R13 W4M  
Sec 7,18-20,29,31,32 Tp72 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Flyover. Mostly open, pine forest but has patches of spruce and poplar. No place to land. Probably sand.

---

## DEPOSIT 86

LOCATION: Sec 21-23,26-28,33,34 Tp72 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 87

LOCATION: Sec 2,3,10,15,16,21,22 Tp72 R12 W4M  
Sec 21-26,34-36 Tp71 R12 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

DEPOSIT 88

LOCATION: Sec 4,5 Tp72 R12 W4M  
Sec 5,6,8,9,17,20,21,28,29,32,33 TP71 R71 W4M  
Sec 29-32 Tp70 R12 W4M

No. of associated pits/sites: 1

No. of samples analysed: 0

DEPOSIT DESCRIPTION:

See site description below.

---

Site Location: LSD15 Sec20 Tp71 R12 W4M

Site Description:

Clean, fine sand with no clasts.

---

DEPOSIT 89

LOCATION: Sec 1,12,13 Tp70 R11 W4M  
Sec 7,18 Tp70 R10 W4M

No. of associated pits/sites:

No. of samples analysed:

DEPOSIT DESCRIPTION:

See pit description below.

---

Pit Location: LSD16 Sec13 Tp70 R11 W4M

Pit Description:

Shallow (1.5m maximum depth) pit of dirty, fine to medium grained sand with clasts to 15cm fewer than 2%. Clay below.

---

## DEPOSIT 90

LOCATION: Sec 28,29,31,32 Tp69 R7 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 15%. Not field checked.

---

## DEPOSIT 91

LOCATION: Sec 25,36 Tp73 R7 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 92

LOCATION: Sec 24 Tp73 R6 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 93

LOCATION: Sec 27,28,32-34 Tp73 R5 W4M  
Sec 5,6,8 Tp74 R5 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.



## DEPOSIT 94

LOCATION: Sec 25,26,35,36 Tp73 R5 W4M  
Sec 30,31 Tp73 R4 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 95

LOCATION: Sec 31,32 Tp73 R4 W4M  
Sec 4-9 Tp74 R4 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 96

LOCATION: Sec 26,27,33-35 Tp73 R3 W4M  
Sec 1-5,8-11 Tp74 R3 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 97

LOCATION: Sec 31 Tp73 R5 W4M  
Sec 6,7,14-19,22,23 Tp74 R5 W4M  
Sec 13,14,23,24 Tp74 R6 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 98

LOCATION: Sec 34,35 Tp74 R3 W4M  
Sec 2,3,10,11,14,15,22,23 Tp75 R3 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 99

LOCATION: Sec 34-36 Tp74 R2 W4M  
Sec 31 Tp74 R1 W4M  
Sec 1-3 Tp75 R2 W4M  
Sec 5-8 Tp75 R1 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

## DEPOSIT 100

LOCATION: Sec 12,13 Tp75 R2 W4M  
Sec 7,8,16-21 Tp75 R1 W4M

No. of associated pits/sites: 0

No. of samples analysed: 0

## DEPOSIT DESCRIPTION:

Probably sand with clasts fewer than 1%. Not field checked.

---

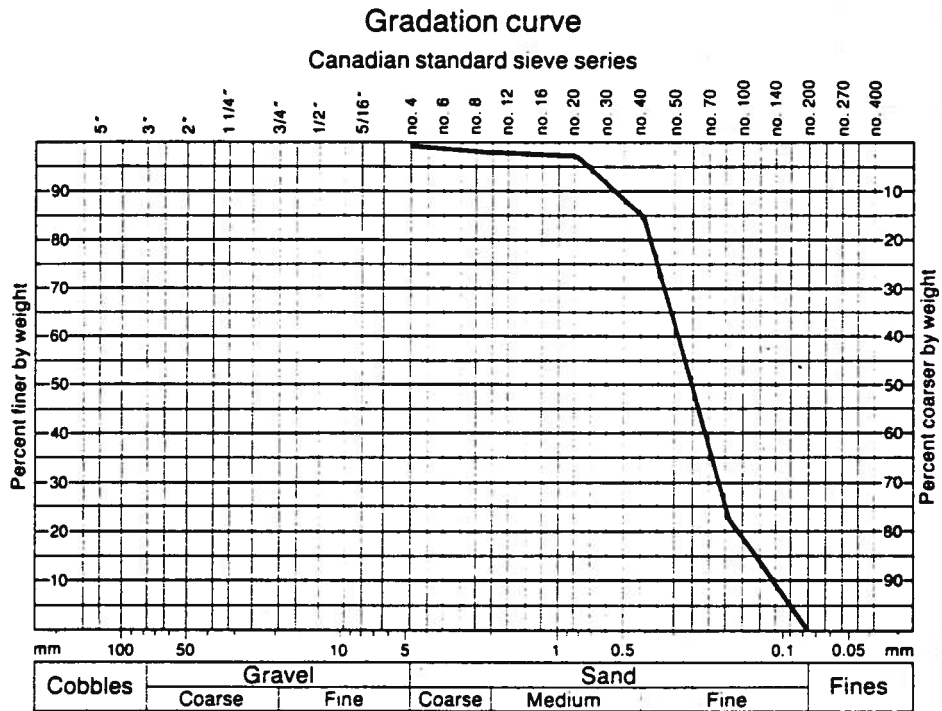
APPENDIX 2  
PITS/SITES OUTSIDE DEPOSIT BOUNDARIES

Site Location: LSD2 Sec6 Tp77 R14 W4M

Site Description:

Roadcut with approximately 8.75m of till overburden over 3.5m of clean, fine to medium grained sand with a few coarse grained sand stringers. Organic fragments outline some shallow dipping cross bedding planes.

Gradation:                   % cobbles                   % gravel  
                                   100% sand                   % fines

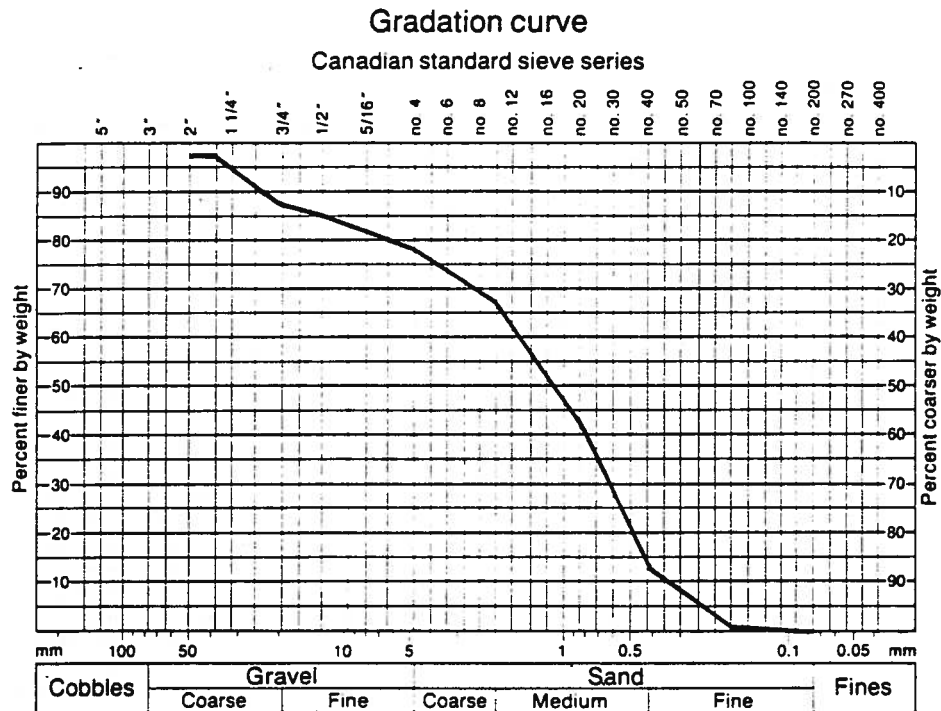


Site Location: LSD14 Sec34 Tp77 R15 W4M

Site Description:

Roadcut exposing 10.5m of clean, fine to coarse grained sand with a few stringers of clay and clasts to 25cm fewer than 5%. Till overburden is approximately 1m thick. Clasts are primarily igneous rocks from the Canadian Shield with hard sandstone, quartzite, ironstone and minor limestone.

Gradation:                   % cobbles                   19% gravel  
                                   78% sand                    % fines



Pit Location: LSD16 Sec6 Tp71 R17 W4M

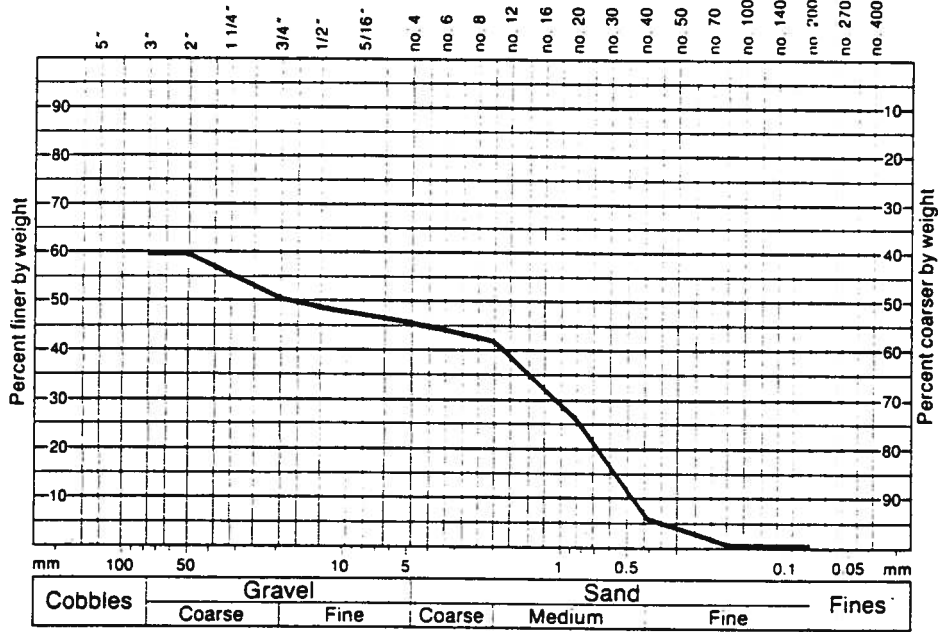
**Pit Description:**

Exposure less than 1.4m high of iron stained, primarily fine to medium grained, clean sand with clasts to 75cm fewer than 1.5% overlying clean, fine to medium grained sand with no clasts. Gross horizontal bedding in the overlying material. The pit is sand with mostly oversize clasts that need crushing to produce gravel. Clasts are primarily igneous rocks from the Canadian Shield with quartzite and ironstone. There is no topographic evidence to suggest the presence of this material.

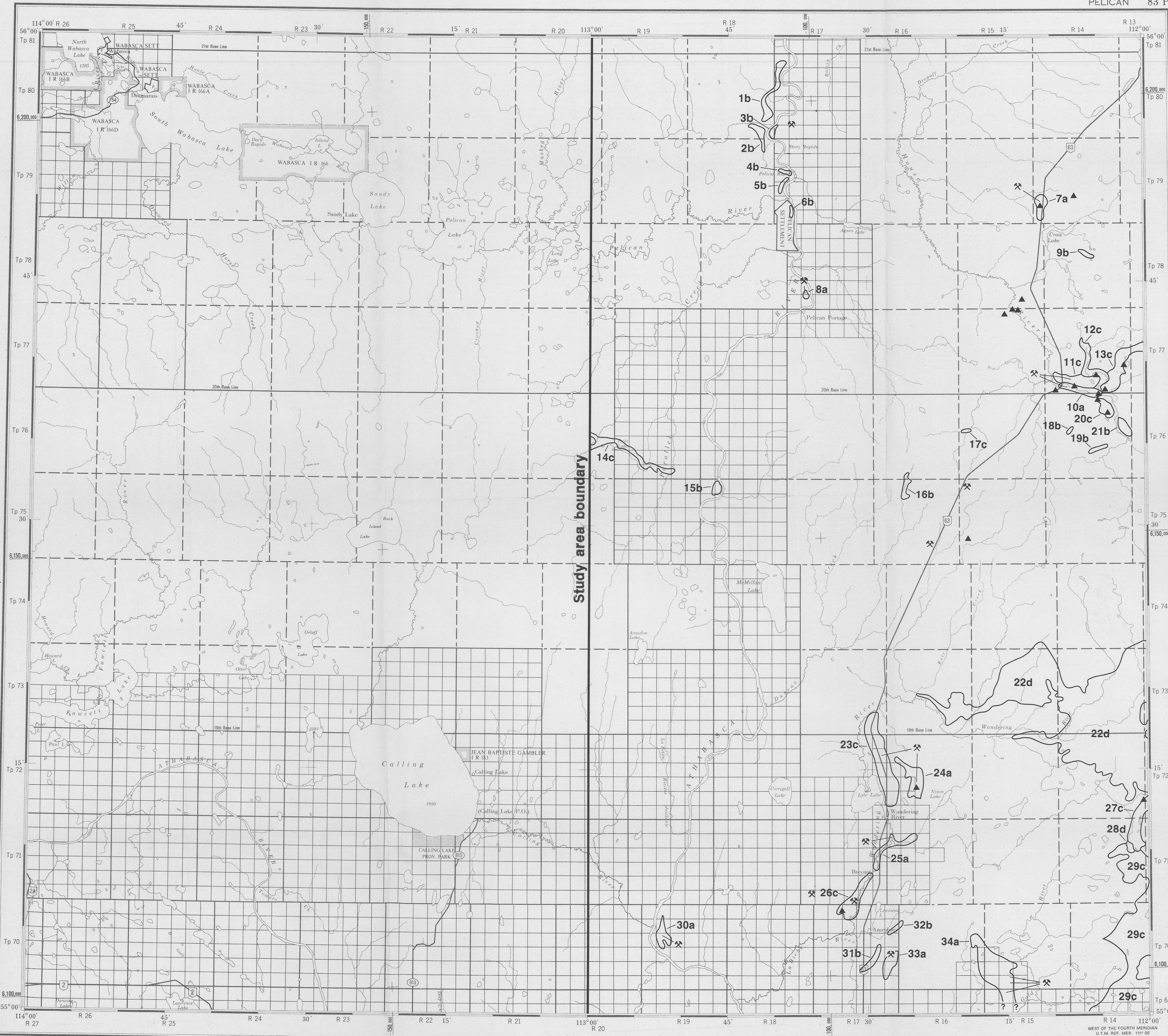
Gradation:                    % cobbles                    15% gravel  
    45% sand                    % fines

**Gradation curve**

Canadian standard sieve series

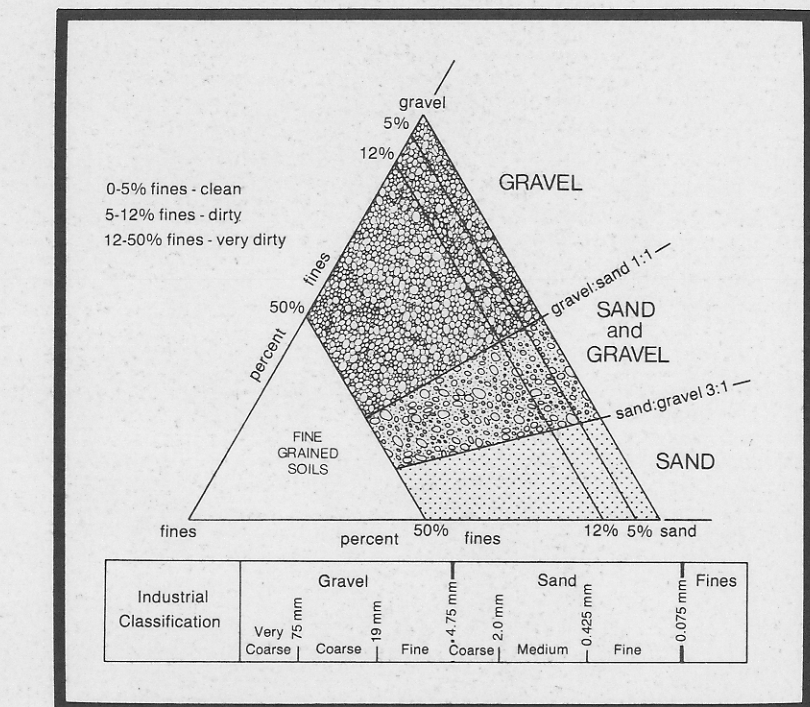






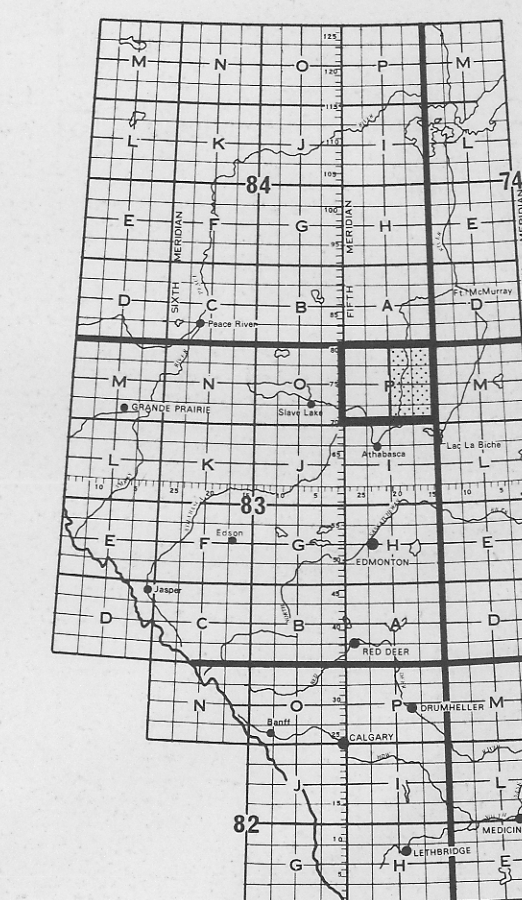
This reconnaissance-level, aggregate potential map is derived from published information, aerial photograph interpretation and limited field checking. As such, deposit outlines are assumed and material descriptions are either assumed or approximate. The sources of information used to produce this map are listed below and terms used in the legend are defined in the ternary diagram.

- Deposit Categories**
- a** Sand. Gravel is estimated to be less than 15% of the total sediment. One or more sites are described in each deposit.
  - b** Sand. Gravel is estimated to be less than 15%. Deposits not field checked.
  - c** Sand. Gravel is estimated to be less than 1% of the total sediment. One or more sites are described in each deposit.
  - d** Sand. Gravel is estimated to be less than 1%. Deposits not field checked.
  - 3a** Deposit number and category
  - Assumed boundary from air photo interpretation
  - Active or inactive pit
  - Sample and/or description site



**Published sources of information**

- Green, R. (1972): Geological Map of Alberta; Edmonton: Alberta Research Council.
- Pettapiece, W. (1986): Physiographic Subdivisions of Alberta; Land Resource Research Centre, Research Branch, Agriculture Canada, Ottawa.
- Scafe, D.W., Edwards, W.A.D. and Boisvert, D.R. (1988): Sand and Gravel Resources of the Ft. McMurray Area; Alberta Research Council Open File Report 1988-16.
- Scafe, D.W., Sham, P.C., and Ray, C.M. (1987): Sand and Gravel Resources of the Pelican (West Central Portion of 83P) Map Area, Alberta; Alberta Research Council Open File Report 1987-02.



**Aggregate Resources**

83P Pelican 1:250,000  
D.W. Scafe, W.A.D. Edwards, D.R. Boisvert

Published 1989  
Geology and compilation 1988-89  
Figure 2

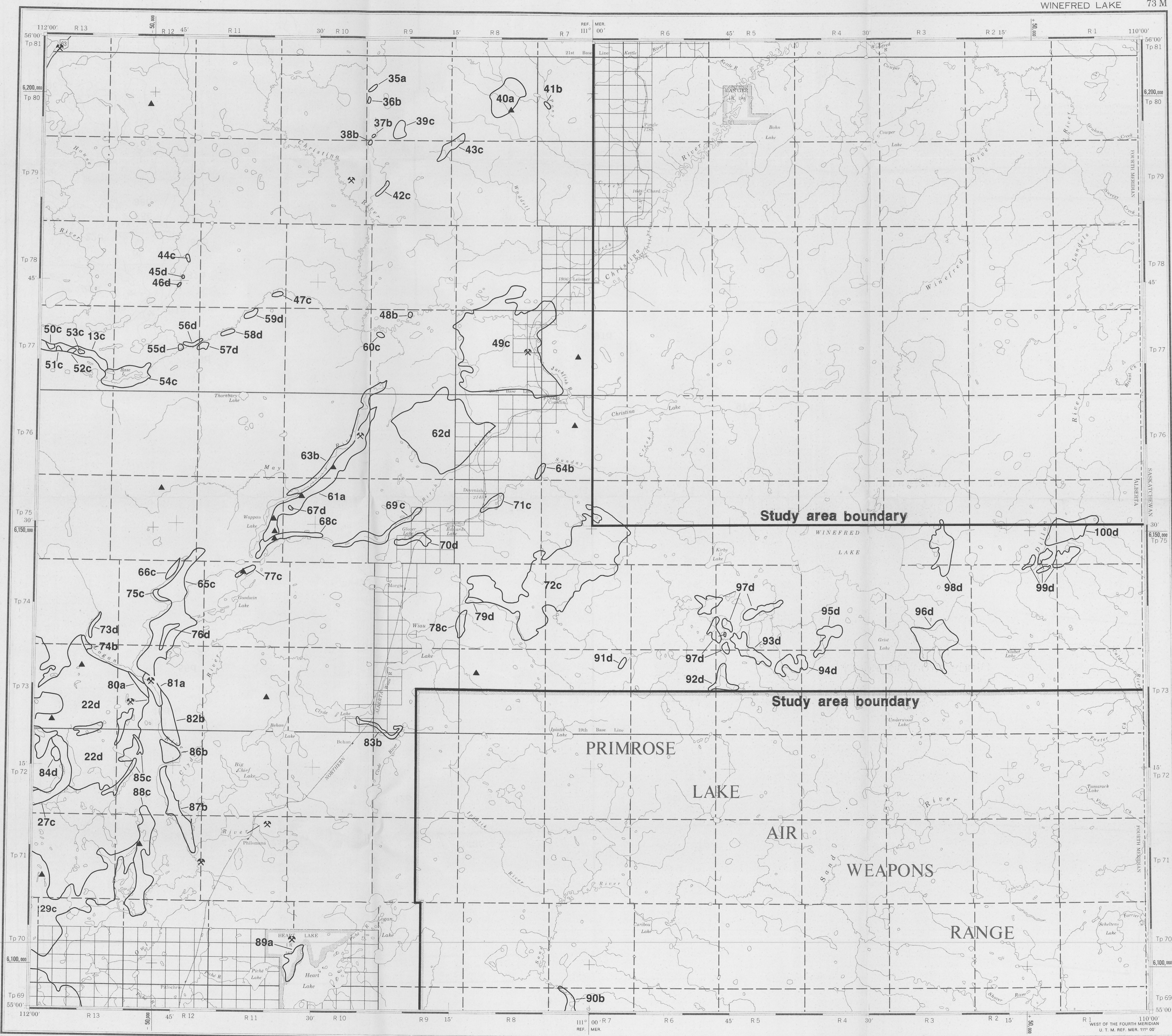
This sand and gravel resource map was prepared by the Alberta Geological Survey as part of an ongoing aggregate inventory of Alberta. This information shown on this map is intended for general land-use planning, land management and aggregate exploration until such time as more detailed maps or reports are available for the area.

Cartography by Alberta Research Council

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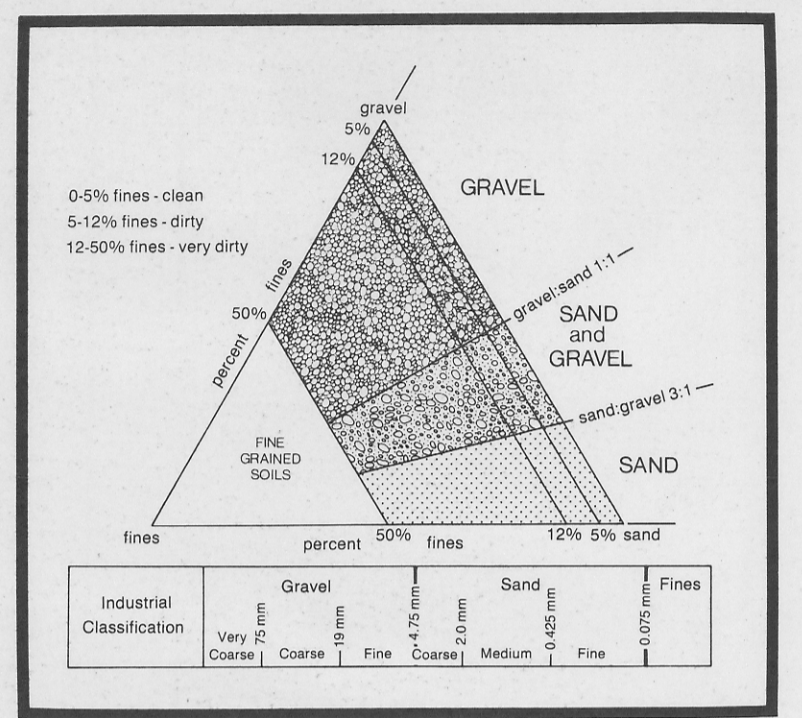
Natural Resources Division  
Alberta Geological Survey



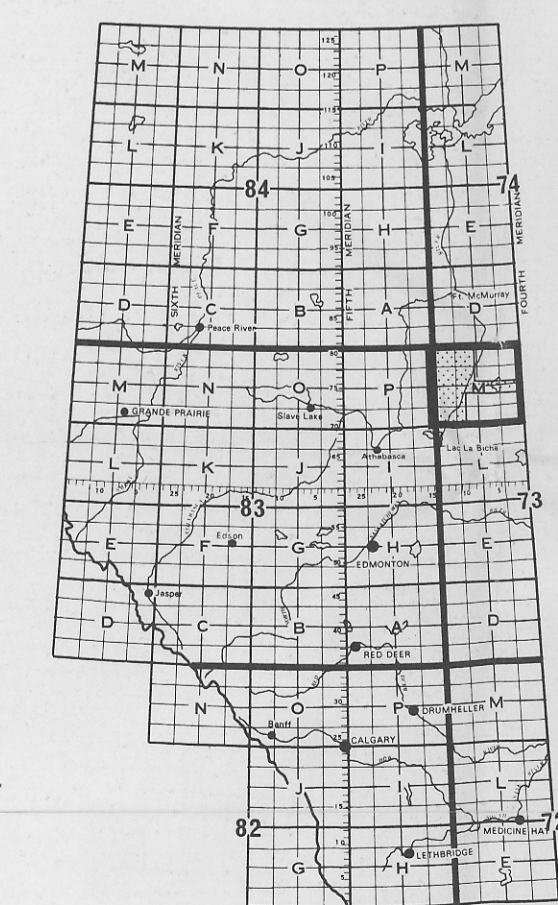


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  - 3a** Deposit number and category
  - Assumed boundary from air photo interpretation
  - Active or inactive pit
  - Sample and/or description site



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  - Pettapiece, W. (1986): Physiographic Subdivisions of Alberta; Land Resource Research Centre, Research Branch, Agriculture Canada, Ottawa.
  - Scafe, D.W., Edwards, W.A.D. and Boisvert, D.R. (1988): Sand and Gravel Resources of the Ft. McMurray Area; Alberta Research Council Open File Report 1988-16.
  - Scafe, D.W., Sham, P.C., and Ray, C.M. (1987): Sand and Gravel Resources of the Pelican (West Central Portion of 83P) Map Area, Alberta; Alberta Research Council Open File Report 1987-02.



### Aggregate Resources

73M Winefred Lake 1:250,000  
D.W. Scafe, W.A.D. Edwards, D.R. Boisvert

Published 1989  
Geology and compilation 1988-89  
Figure 3

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**ALBERTA RESEARCH COUNCIL**  
Natural Resources Division  
Alberta Geological Survey

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