

GRANULAR-AGGREGATE MAPPING IN THE RANDOM ISLAND AND TUG POND MAP AREAS (NTS MAP AREAS 2C/4 AND 2D/1) EASTERN NEWFOUNDLAND

M.J. Ricketts

Geochemistry, Geophysics and Terrain Sciences Section

ABSTRACT

Granular-aggregate mapping in 2012 took place in the Random Island (NTS 2C/4) and the Tug Pond (NTS 2D/1) map areas. Granular-aggregate mapping is part of a continuing regional survey to locate aggregate deposits, to alleviate construction problems resulting from aggregate shortages and poor-quality aggregate. Several granular deposits were identified as suitable for construction aggregates. These are located near Shoal Harbour Pond, Southwest River, Dark Hole Brook, Black River Pond, Tug Pond, Deep Bight River, and in the Western Pond–Frost Pond–Maxs Pond areas. All the deposits are believed to contain clean sources of gravel and sand, and range in volume from about 7 000 to 5 000 000 m³ of aggregate. Some deposits are within 1 km of major road access points. Other deposits are less accessible, or are too small to recommend as potential resource areas.

INTRODUCTION

Mapping of granular aggregates in the Random Island and Tug Pond map areas (Figure 1) is part of an ongoing program to locate, map, and sample sand, gravel, and till, in support of road upgrading and construction activities in the region, and to locate reserves to assist future developments in communities. The mapping of aggregate deposits and the provision of data on the quantity and quality of granular aggregate will assist road builders, contractors and consultants in determining the sources and quality of material in a given area, and evaluate the distance required to transport these materials to a specific job site, a factor that can greatly affect construction costs.

The definition of an aggregate depends on the producer, location, and use of the material (Smith and Collis, 1993). Aggregate, as used in the context of this report, is defined as any hard, inert material such as gravel, sand, crushed stone, or other mineral material that is used in the construction industry (Rutka, 1976; Carter, 1981). The demand for aggregate is closely associated with construction, and road construction activity, particularly maintenance, which is, by far, the most important use of mineral aggregates. Water and sewer systems, driveways, building foundations, backfill and landscaping are also important consumers of aggregate. Aggregates are characterized by their high bulk and low unit value, so that the economic value of a deposit is a function of its proximity to a market area, as well as its quality and size (Vanderveer, 1983).

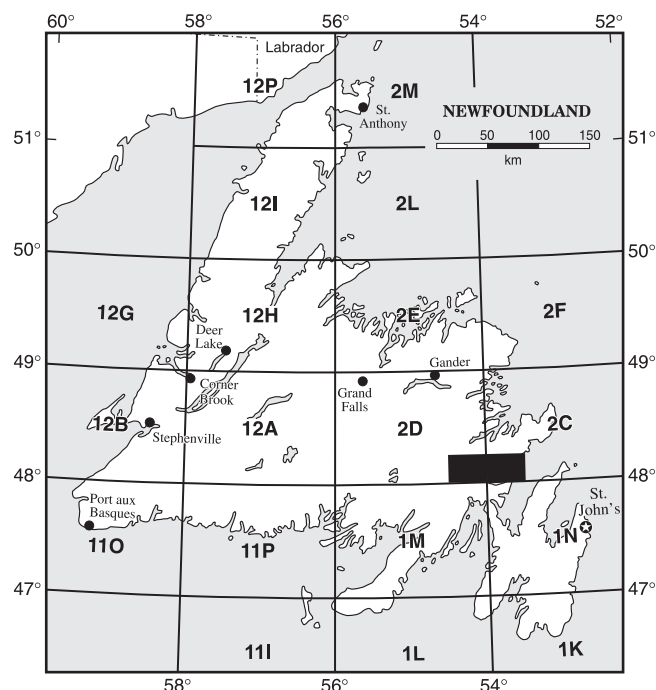


Figure 1. Location of study area.

Comprehensive planning and resource management strategies are required to make the best use of available resources, especially in areas experiencing rapid development. Such strategies must be based on a sound knowledge of the total mineral aggregate-resource base at both local and regional levels. Aggregate materials can be, i) processed and used as

Class A gravel (aggregate with a diameter less than 19 mm having a specified proportion of finer grain sizes and 3 to 6% silt-clay; Department of Transportation, 2008) or Class B gravel (aggregate with a diameter less than 102 mm, having a specified proportion of finer grain sizes and 3 to 6% silt-clay; Department of Transportation, 2008); ii) processed to mix with a cementing agent to form concrete, asphalt and mortar; or iii) used as unprocessed, out of pit material.

The suitability of quarry material for aggregate use depends on its composition. The silt-clay quantity is important. High silt-clay volumes can cause instability, such as flowage. Too much silt-clay in concrete (>2%) can interfere with the bonding process between the aggregate and the cementing agent. High silt-clay aggregate (greater than 15%) can be used for earth-filled dams, fill and subgrade road material. Low silt-clay volumes can result in loss of compaction. The presence of deleterious substances (such as silt-clay coatings or iron-oxide staining on the surface of the aggregate), or of blade-shaped fragments, can cause bonding problems with the cementing agent, or the breakdown of aggregate with time.

Knowledge of the nature and distribution of the surficial aggregate deposits (sand, gravel and low silt-clay materials) can assist in estimating the construction cost of projects requiring aggregate. When it is necessary to identify new aggregate sources for production of large quantities of construction materials, the surficial and bedrock geology of the area are important considerations. In a large-scale operation, it may be more economical to truck granular products longer distances rather than use inferior material close at hand; processing cost could be lower and the quality of the product higher, therefore, offsetting the high cost of transportation.

The suitability of aggregate depends on physical properties and the capability of the rock to withstand stresses placed upon it when it is used as a construction material. The lithology of the pebble fraction (16 to 32 mm) can be evaluated to define the petrographic characteristics (Canadian Standards Association, 1973; Ontario Ministry of Transportation 1994; Bragg, 1995). The petrographic number (PN) can range from 100 to 1000, and is derived by taking the sum of the percentage of each rock type present in the pebble fraction (in a sample of approximately 100 pebbles) multiplied by a petrographic factor (based on soundness and durability) assigned to that rock type (Ricketts and Vatcher, 1996). The petrographic factor is determined by type and grain size of the rock in a given sample, and by weathering (fresh, slightly, moderately, highly, or intensely weathered) and fracturing. Hence, the lower the PN, the better the quality of aggregate material. For example, a clean, hard, fresh

granite would normally have a PN of 100, whereas friable shale would have a PN of 1000. Most deposits contain a combination of different rock types having different petrographic factors. The proportion of each of these components determines the PN. For most purposes, aggregate material used in concrete requires a petrographic number of 135 or less, whereas in road asphalt and Class A and B gravels a PN up to 150 is acceptable (Department of Transportation, 2008).

The presence of silt-clay coatings (clean, thin, medium, or thick), staining, rounding of pebbles, and the number of fracture faces and their sphericity are important considerations in using an aggregate for concrete. These factors affect the bonding capabilities of concrete, and the amount of water necessary to make a concrete, both of which have a direct impact on the strength of a concrete.

STUDY AREA AND PHYSIOGRAPHY

The study area is located between 48°00' and 48°15'N, and 53°30' and 54°30'W. It covers two 1:50 000-scale NTS map areas (Figure 2); Random Island (NTS 2C/4) and Tug Pond (NTS 2D/1). Access to NTS map area 2C/4 and the east and northeast part of 2D/1 is good. There is a network of paved roads (including the Trans-Canada Highway (TCH)), gravel roads, abandoned railway tracks, and walking/ATV trails. The shoreline areas around Smith Sound, Northwest Arm, and Southwest Arm in NTS map area 2C/4 are easily accessible by boat. The west and southwest parts of NTS map area 2D/1 can only be efficiently accessed by helicopter.

Most of the map area is rugged, with elevations above 360 m above sea level (asl) in the Black River Pond area. Several river valleys extend from the highland areas in the west toward Smith Sound, Northwest Arm, and Southwest Arm. These river valleys are located along Shoal Harbour River, Dark Hole Brook, Lower Shoal Harbour River, Northwest Brook, and Black Brook (Figure 2).

SURFICIAL GEOLOGY

Reconnaissance surficial geological mapping at 1:50 000 scale was completed as a precursor to aggregate mapping in the Province, within a 6-km-wide road corridor (Kirby *et al.*, 1983). Detailed surficial mapping of NTS map areas 2C/4 and 2D/1 has been completed by Batterson and Taylor (2003a, b).

The west and north parts of NTS map area 2D/1 consist mostly of eroded till, till blankets, hummocky till and till veneers. A large band of till ridges is located near the central part of NTS map area 2D/1, extending about 25 km north

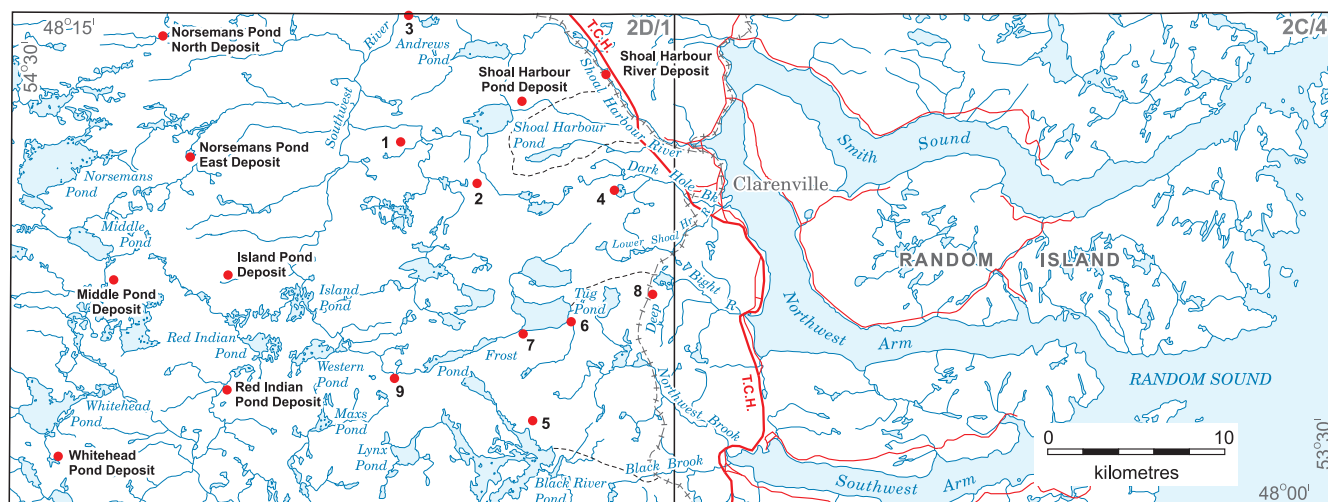


Figure 2. Deposit location map of granular-aggregate sites surveyed.

from the south end of the map area. Other smaller areas of till ridges are located near the west boundary of NTS map area 2D/1. In the southeast of NTS map area 2D/1, concealed bedrock and till veneers are more prominent, with localized deposits of thicker till. Large areas of bog are located throughout the map area, as well as eskers ridges, which range in length from about 230 m near Black River Pond to 2.5 km near Western Pond, and Whitehead Pond. In addition, outwash deposits are located in some of the major valleys in the north and in the southwest of the map area but these only cover about 5 to 10% of the total surficial deposits in NTS map area 2D/1.

In NTS map area 2C/4, till veneers, concealed bedrock and bedrock are more prominent. Thicker till deposits are located in the northwest, and localized till deposits in the southwest. Large areas of bog were mapped in the northwest and southwest. Minor outwash deposits are located in river valleys, and some marine deposits are found in coastal areas.

PREVIOUS AGGREGATE MAPPING

Aggregate resource reconnaissance mapping (Environmental Geology Section, 1983a, b; Kirby *et al.*, 1983) provided site and sample data along all road networks in the Province. Kirby (1993) conducted detailed sampling programs, with the aid of a backhoe excavator, in gravel/sand deposits located along the Shoal Harbour River, and near the east end of Shoal Harbour Pond. In addition, geotechnical bedrock maps were compiled at a scale of 1:250 000 (Bragg, 1985). Later, Bragg (1994) released site location maps at 1:50 000 scale showing rock types and petrographic numbers. This was followed by a report (Bragg, 1995) with information on the petrographic quality of different rock types to determine their potential as construction aggregate.

MAPPING AND ANALYTICAL METHODS

Assessing the potential use and value of granular aggregates can be complex, especially when a variety of different material types occur within any given aggregate deposit. Interpretation of aerial photographs (1:50 000-scale black-and-white, and 1:12 500-scale colour photographs) is the first stage in locating potential deposits. Airphoto interpretation is used to produce preliminary surficial geology maps that show the distribution and nature of the various deposits found within an area. These maps commonly show a variety of tills, sand, and gravel deposits. Till is a sediment deposited by glaciers, commonly with a wide variety of grain sizes. Sand and gravel are commonly formed by fluvial action, by either glacial meltwater or streams.

Granular aggregate maps are a derivative of surficial geology maps supplemented by ground proofing and sampling. They subdivide potential aggregate deposits into high, moderate, or low potential for aggregate production. The size of the deposit can be determined if its areal extent and average thickness are known or can be estimated. Thickness values are approximations, based on the face heights of pits developed in the deposit, roadside exposure, or features of the general landscape such as the height of ridges or terraces above the surrounding terrain. From all data, individual deposits may be assigned one of five zones to describe the aggregate potential (Kirby *et al.*, 1983).

In addition to the data collected from aerial photographs, the composition of various sediment types (Table 1) was described using parameters defined by Carter (1983). Data were obtained in the field by examining natural exposures (*e.g.*, stream-cuts, shorelines, and gullies) or man-made exposures (*e.g.*, road-cuts, and pit and quarry excava-

Table 1. Composite soil sediment description (Carter, 1983)

Description	Composition
Slightly sandy gravel	>95% gravel
Sandy gravel	5 to 20% sand
Very sandy gravel	>20% sand
Sand/gravel	About equal
Very gravelly sand	> 20 % gravel
Gravelly sand	5 to 20 % gravel
Slightly gravelly sand	>95% sand

tions). Where exposures were not available, samples were collected from 1-m-deep hand-dug pits. In some places, hand-dug pits were not practical because of boulders or a thick, cemented B-horizon, making it difficult to see the undisturbed parent material. Lack of exposures meant that deposit thickness was difficult to assess. The scarcity of vertical sections, combined with the presence of a concealing surface mat of organic material in many places, made positive interpretation of the nature and extent of the glacial sediments heavily dependent upon evaluation of the geomorphology. Thus, in most instances, surface form was an important aspect in recognition of the unit mapped. Obvious landform boundaries were the basis of much delineation. Other features recorded in the field were sediment thickness, stoniness, presence of compact layers, and the presence of vegetation.

Approximately 15 kg of material were collected for field sieving at each site. Field sieving and petrographic analysis were performed on most samples containing >8 mm size material. A split (70 to 140 g) of the sand–silt–clay fraction (<8 mm) was retained for laboratory sieve analysis, which involved drying and splitting the sample to a manageable size (70 to 140 g) and wet and/or dry sieving of each sample following the procedures outlined by Ricketts (1987). These data were used to outline zones of aggregate potential on aggregate resource maps.

AGGREGATE POTENTIAL

Surficial deposits in the map area consist of till, glaciofluvial sand and gravel, marine sand–silt–clay, and organic zones. Till is widespread over most of the area, varying in composition, commonly in relation to underlying bedrock. Generally, tills have a higher silt–clay content than sands and gravels, which renders most of these deposits unsuitable for most construction purposes, unless washed to remove the silt. Potential quarry sites for low silt–clay tills are outlined on 1:50 000-scale maps (Ricketts, 2013a,b). Sand and gravel have the greatest economic potential. These types of deposits were sampled at nine locations in NTS map area 2D/1. No significant deposits were found in NTS map area 2C/4. Textures of deposits ranged from gravelly sand to sandy gravel.

Several sand and gravel deposits in the map area are not discussed in this report (Figure 2). Two of these deposits are located near the east end of Shoal Harbour Pond, and along Shoal Harbour River. Mapping, backhoe test-pits and high-density sampling were previously conducted in these areas (Kirby, 1993; Environmental Geology Section, 1983b). Other deposits were outlined from aerial photograph interpretation, but were not sampled in the field because of their distance from roads and were not accessible by foot traversing. These deposits are located near north and east of Norseman's Pond, south of Middle Pond, south of Whitehead Pond, southwest of Red Indian Pond, and west of Island Pond. At these locations, there is insufficient information to determine the sand and gravel potential.

Petrographic analyses were completed on 76 pebble samples, showing a range of petrographic numbers from 103 to 247. The higher numbers are from till samples collected in areas where weathered siltstone and shale were part of the pebble fraction. Petrographic classification and petrographic quality were determined using a list of petrographic factors for rock types in Newfoundland and Labrador (Table 2).

Table 2. Petrographic classification (Bragg, 1995)

Classification	Uses
Good (PN 100-135)	Excellent for major asphalt/concrete construction
Fair (PN 136-300)	May be used in minor construction (gravel roads, house foundations, minor retaining walls, low-traffic asphalt roads) if it passes other required specifications
Poor (PN 301-600)	Should only be used as fill material
Deleterious (PN 601-1000)	Unsuitable for aggregate use

Data are summarized in Table 3. Potential deposit reserves range from 7 000 m³ to 5 000 000 m³.

DEPOSIT 1

Deposit 1 is located 2.8 km southwest of Shoal Harbour Pond, and 8 km from a forest access road on the west side of the TCH (Figures 2 and 3). The deposit consists of an esker complex and hummocky gravel, in an area covering more than 2 km². It is 2.5 km long and bogland is prominent in areas between the esker ridges; this deposit is 4 to 10 m thick (Plate 1).

Table 3. Summary results of sand and gravel deposits sampled in NTS map areas 2C/4 and 2D/1

Deposit	Estimated m ³	# of Samples Analyzed	%Gravel >5 mm	%Sand .078 to 5 mm	%Sl-Cl <.078 mm	PN Range Values	Comments
1	5 000 000	6	27.5	71.2	1.3	106, 122, 131, 138	Esker and hummocks; very gravelly sand
2	10 000	1	24.2	75.7	0.1	143	Esker; very gravelly sand
3	300 000	7	42.1	56.7	1.2	129, 132, 144, 151	Esker and hummocks; gravel-sand
4	20 000	2	59.7	40.0	0.3	120, 138	Esker; very sandy gravel
5	7 000	2	8.6	91.1	0.3	112	Esker; Gravelly sand
6	100 000	5	50.8	47.5	1.7	116, 119, 123, 124, 132	Eskers; gravel-sand
7	70 000	2	66.6	32.9	0.5	128, 130	Esker; very sandy gravel
8	80 000	6	55.2	42.7	2.1	103, 113, 116, 124, 125, 141	Esker and hummocks; gravel-sand
9	300 000	5	21.1	78.3	0.6	131, 146	Eskers; very gravelly sand

Note: Estimated quantities in table are based on airphoto interpretation and observations at field sample locations. Grain-size percentages are based on a compilation of sample data for each deposit. Petrographic analyses were conducted on samples that contained grain-size material greater than 16 mm.

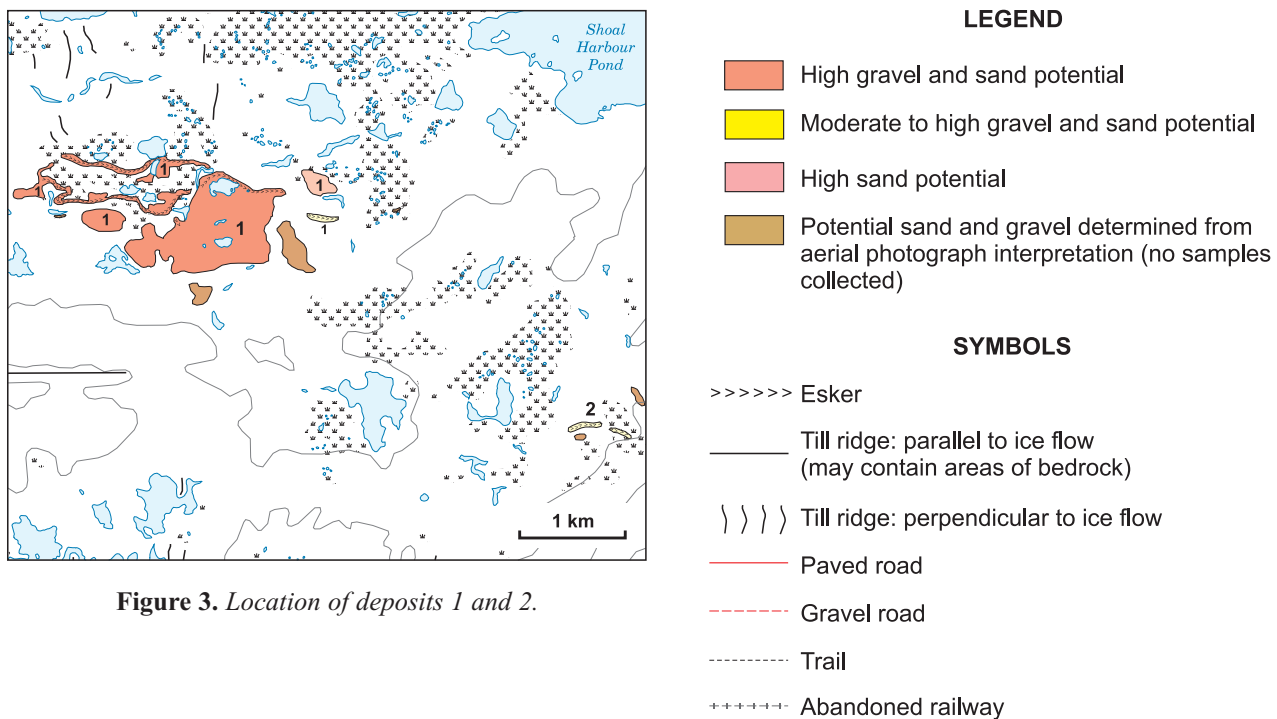




Plate 1. The 10-m-high esker west of Shoal Harbour Pond.

The deposit is estimated to contain 5 000 000 m³ of very gravelly sand. Grain-size analysis of six samples collected from 0.8-m- to 1.3-m-deep pits show an average of 27.5% gravel, 71.2% sand, and 1.3% silt-clay (Table 3). Sand content varied from 50.1 to 99.99%, and boulder content is estimated to be less than 10%. Pebbles consist of fresh to moderately weathered granite (50%), fresh to moderately weathered volcanics (32%), fresh sandstone (8%), fresh granodiorite (5%), fresh siltstone (3%) and quartz pebbles (2%). Petrographic numbers of four samples are 106, 122, 131, and 138.

DEPOSIT 2

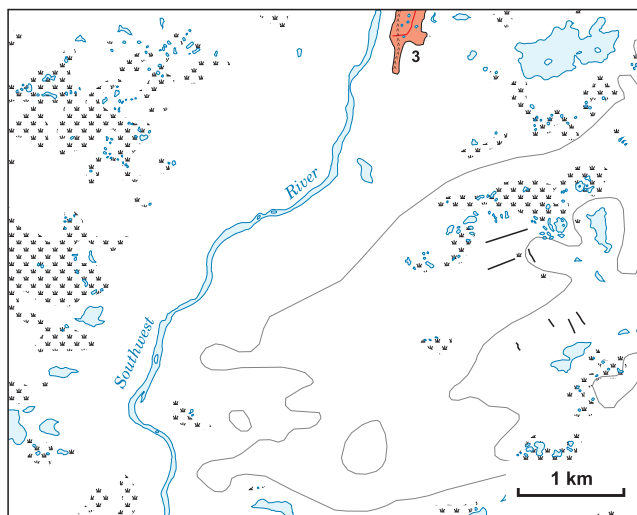
Deposit 2 is an esker located 2.8 km south of Shoal Harbour Pond, and 2.3 km west of a forest access road on the west side to the TCH (Figures 2 and 3). Till veneers, till blankets, concealed bedrock and bog are prominent in this area.

Deposit 2 is a 450-m-long ridge, and is 1 to 4 m high. It contains approximately 10 000 m³ of very gravelly sand. Grain-size analysis of one sample collected from a 1.2-m-deep pit, contained 24.2% gravel, 75.7% sand, and 0.1% silt-clay (Table 3). Pebbles consist of fresh to lightly weathered volcanics (70%), fresh sandstone (11%), fresh granite (10%), intensely weathered, undefined pebbles (6%), granodiorite (2%), and fresh siltstone (1%). The sample has a PN of 143.

Potential deposits, outlined by aerial photographs, but unsampled, are located within 400 m of the esker. Individually, these deposits are estimated to contain 10 000 m³ and 20 000 m³ of aggregate.

DEPOSIT 3

Deposit 3 is located near the east side of Southwest River in the north part of NTS map area 2D/1 (Figures 2 and 4), and extends to the adjoining NTS map area 2D/8.



LEGEND

- High gravel and sand potential
- Moderate to high gravel and sand potential
- High sand potential
- Potential sand and gravel determined from aerial photograph interpretation (no samples collected)

SYMBOLS

- >>>>> Esker
- Till ridge: parallel to ice flow (may contain areas of bedrock)
- } } } Till ridge: perpendicular to ice flow
- Paved road
- Gravel road
- Trail
- +++++ Abandoned railway

Figure 4. Location of deposit 3.

Deposit 3 was extensively quarried for sand-size material in the past but was abandoned in recent years. It is accessible by a gravel-base road from the Trans-Canada Highway (TCH). There are large stockpiles of coarse aggregate in the quarried area, material left behind after sand removal (Plates 2 and 3).

Deposit 3 consists of a 600-m-long esker and adjoining outwash material in an area more than 100 000 m². Aggregate reserves are estimated to be about 300 000 m³. Grain-size analysis of seven samples collected from 2- to 12-m-high quarry exposures show an average of 42.1% gravel,



Plate 2. Quarry area on the east side of the Southwest River, in the north part of NTS map area 2D/1.

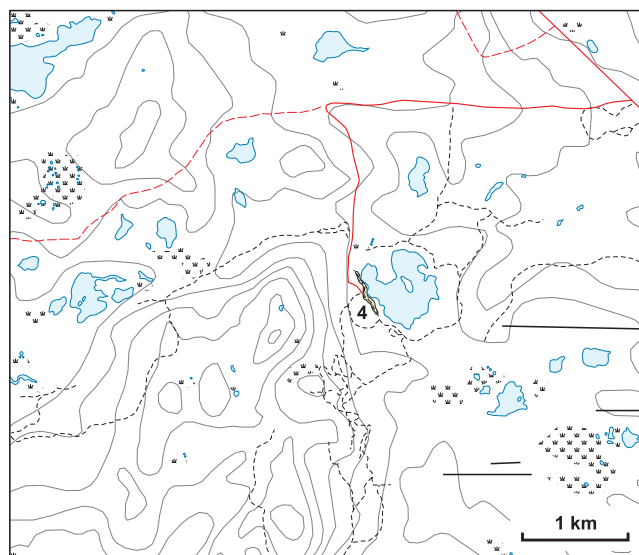


Plate 3. Coarse aggregate remaining after sand removal in quarry on the east side of the Southwest River in the north part of NTS map area 2D/1.

56.7% sand, and 1.2% silt-clay (Table 3). Sand content varies from 35 to 96%, predominantly between 0.125 and 2 mm, which account for more than 35% of the total volume. There is also a large zone of fine sand and silt nearby, but outside the map area. Pebbles consist of fresh granite (45%), fresh to moderately weathered volcanics (24%), fresh to slightly weathered siltstone (12%), fresh to slightly weathered sandstone (10%), fresh to moderately weathered gneiss (5%), fresh gabbro (3%) and quartz pebbles (1%). Petrographic numbers of 4 samples are 129, 132, 144, and 151. Although petrographic numbers of the pebble fraction show good to fair aggregate quality, visual observations around stockpiles of coarser material found weathered shale and siltstone, which normally indicates poor quality.

DEPOSIT 4

Deposit 4 is an esker located near the base of the ski slopes at White Hills, less than 1 km southwest of Dark Hole Brook (Figures 2 and 5). It is approximately 70 m from a paved road, which leads to the ski slopes. A cross-country ski trail, and a pole line for lighting, follows the length of the esker (Plate 4).



LEGEND

- High gravel and sand potential
- Moderate to high gravel and sand potential
- High sand potential
- Potential sand and gravel determined from aerial photograph interpretation (no samples collected)

SYMBOLS

- >>>>> Esker
- Till ridge: parallel to ice flow (may contain areas of bedrock)
- } } } Till ridge: perpendicular to ice flow
- Paved road
- - - - Gravel road
- Trail
- + + + + + Abandoned railway

Figure 5. Location of deposit 4.

Deposit 4 is 450 m long, and has an average thickness of approximately 5 m. It contains an estimated 20 000 m³ of aggregate. Grain-size analysis of two samples collected from 1.8- and 2-m-deep pits show an average of 59.7% gravel, 40.0% sand, and 0.3% silt-clay (Table 3). Sand content was 29.02 and 50.9% in the two samples. Pebbles consist of fresh to moderately weathered volcanics (86%), fresh granite (8%), fresh sandstone (4%), and quartz pebbles (2%). Petrographic numbers of 120 and 138 were determined from analyses of two samples.



Plate 4. *Esker ridge southwest of Dark Hole Brook.*

DEPOSIT 5

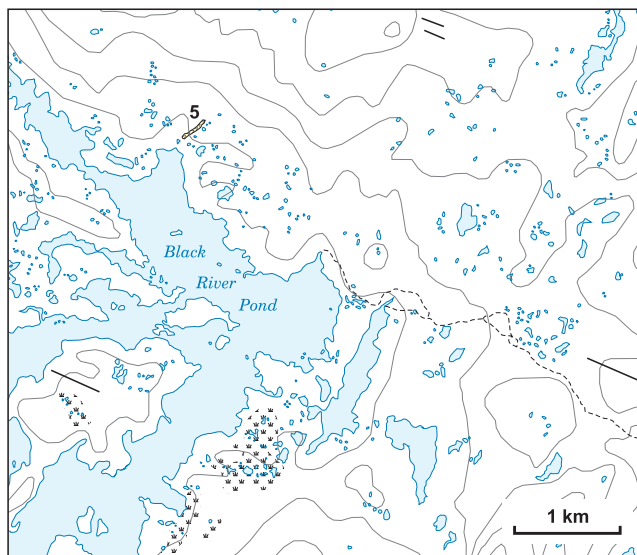
Deposit 5 is located near the northeast end of Black River Pond, and 2 km from an ATV trail leading to the east end of Black River Pond. The nearest road is almost 7 km east of the deposit (Figures 2 and 6). Deposit 5 is a 230-m-long esker, 2- to 6-m-high (Plate 5), and contains approximately 7000 m³ of gravelly sand. Grain-size analyses of two samples collected from 1.0-m- and 1.2-m-deep pits show 8.6% gravel, 91.1% sand, and 0.3% silt-clay (Table 3). Dominant grain sizes were in fine to medium sieves, containing more than 60% of the total sample. Pebbles consist of fresh to slightly weathered granite (88%), and fresh volcanics (12%). The sample has a PN of 112.



Plate 5. *A 6-m-high esker near Black River Pond.*

DEPOSIT 6

Deposit 6 is located near the southeast end of Tug Pond (Plate 6), 1 km south of an ATV trail to the east end of Tug Pond. The nearest road is 3.3 km east (Figures 2 and 7). This deposit consists of two eskers. The esker near the Tug Pond shoreline is 350 m long and 2 to 6 m high. The esker going in an east direction from Tug Pond is 500 m long and 9 to 10 m high. A zone of fluvial sediment is located along a small stream between the two eskers.



LEGEND

- High gravel and sand potential
- Moderate to high gravel and sand potential
- High sand potential
- Potential sand and gravel determined from aerial photograph interpretation (no samples collected)

SYMBOLS

- >>>>> Esker
- Till ridge: parallel to ice flow (may contain areas of bedrock)
- >>> Till ridge: perpendicular to ice flow
- Paved road
- - - - Gravel road
- Trail
- + + + + + Abandoned railway

Figure 6. *Location of deposit 5.*

Deposit 6 contains an estimated 100 000 m³ of sand and gravel. Grain-size analysis of five samples collected from 1.2-m- to 2-m-deep pits and one 2-m-shoreline exposure show 50.8% gravel, 47.5% sand, and 1.7% silt-clay (Table 3). Sand content varied from 28 to 63%. Pebbles consist of fresh volcanics (66%), fresh to slightly weathered sandstone (15%), fresh to moderately weathered granite (12%), fresh to moderately weathered siltstone (6%), and fresh granodiorite (1%). Petrographic numbers of five samples are 116, 119, 123, 124, and 132.



Plate 6. A 6-m-high esker along the southeast end of Tug Pond.

DEPOSIT 7

Deposit 7 is an esker located near the southwest end of Tug Pond (Plate 7) in an area of till veneers and concealed bedrock. Small areas of bog border the esker. The nearest road is over 6 km east of the deposit (Figures 2 and 7).

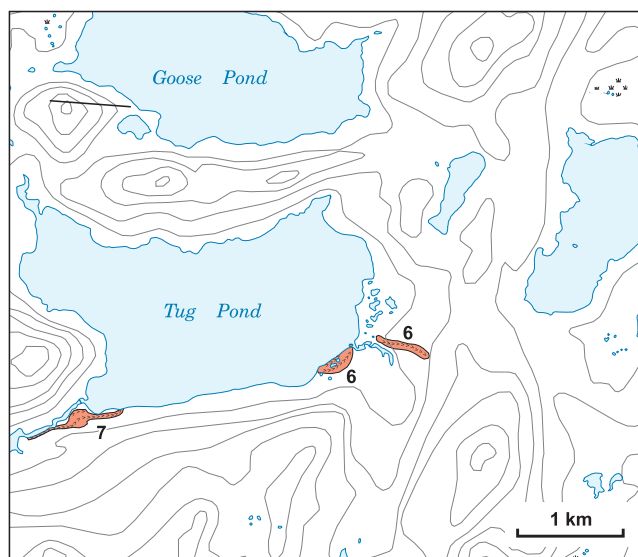


Plate 7. The 11-m-high eskers near the southwest end of Tug Pond.

The esker is 1 km long, and 4 to 11 m high. It contains an estimated 70 000 m³ of very sandy gravel. Grain-size analysis of two samples collected from 0.9-m- and 1.2-m-deep pits show 66.6% gravel, 32.9% sand, and 0.5% silt-clay (Table 3). Sand content was 27.9 and 37.8%. Pebbles consist of fresh volcanics (50%), fresh to slightly weathered sandstone (24%), fresh to moderately weathered siltstone (14%), fresh to slightly weathered granite (9%), and fresh granodiorite (3%). Petrographic numbers of two samples are 128 and 130.

DEPOSIT 8

Deposit 8 consists of a segmented esker and hummocky gravel (Plate 8) located between Deep Bight River and the abandoned railway line in the eastern part of NTS map area 2D/1. The west end of the esker is about 50 m from the abandoned railway line (Figures 2 and 8).



LEGEND

- High gravel and sand potential
- Moderate to high gravel and sand potential
- High sand potential
- Potential sand and gravel determined from aerial photograph interpretation (no samples collected)

SYMBOLS

- >>>>> Esker
- Till ridge: parallel to ice flow (may contain areas of bedrock)
- >>> Till ridge: perpendicular to ice flow
- Paved road
- - - Gravel road
- Trail
- + + + + + Abandoned railway

Figure 7. Location of deposits 6 and 7.

Deposit 8 contains approximately 80 000 m³ of aggregate. Grain-size analysis of six samples collected from 1.2-m- to 1.5-m-deep pits (Plate 9) show 55.2% gravel, 42.7% sand and 2.1% silt-clay (Table 3). Sand content varies from 26.7 to 67.8% in collected samples. Smaller deposits having similar grain-size content are located on the west side of the abandoned railway line. Pebbles consist of fresh to slightly weathered volcanics (42%), fresh to moderately weathered granite (35%), fresh to moderately weathered sandstone (17%), fresh to slightly weathered siltstone (3%), highly to intensely weathered undefined pebbles (2%) and fresh gran-



Plate 8. The 10-m-high esker north of Deep Bight River near the east end of NTS map area 2D/1.



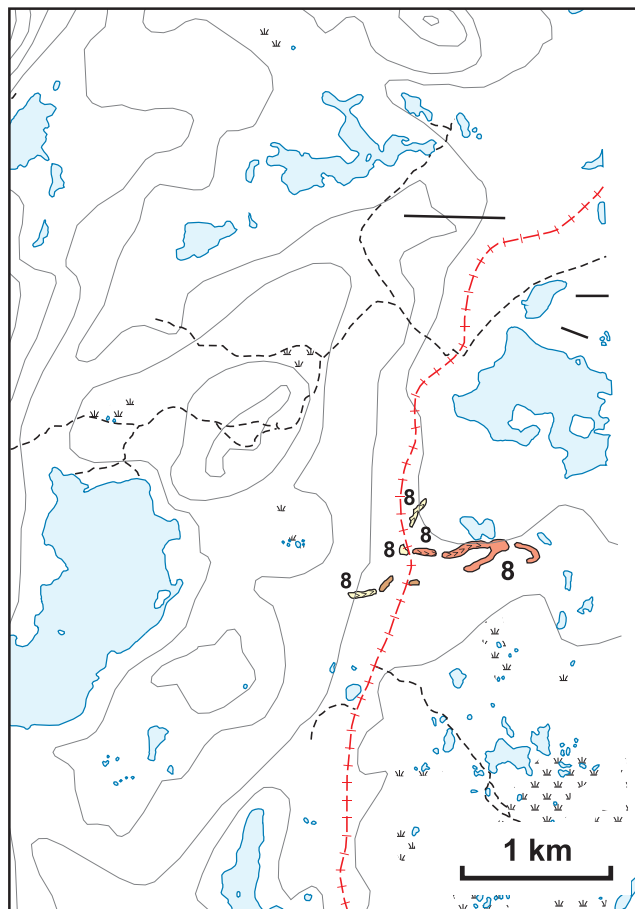
Plate 9. Gravel in a 1.5-m-deep pit at top of 7-m-high esker north of Deep Bight River near the east end of NTS map area 2D/1.

odiorite (1%). Petrographic numbers of six samples are 103, 113, 116, 124, 125, and 141.

DEPOSIT 9

Deposit 9 is located between Western Pond, Maxs Pond, and Frost Pond in the southern part of NTS map area 2D/1. It is over 11 km west of the nearest road (Figures 2 and 9). Eroded till, till blankets, concealed bedrock, bog and till ridges are to be found in this area.

Deposit 9 consists of segmented eskers (Plate 10) containing an estimated 300 000 m³ of very gravelly sand. Grain-size analysis of five samples collected from 1.3-m- to 1.5-m-deep pits show 21.1% gravel, 78.3% sand and 0.6% silt-clay (Table 3). Sand content varies from 50.2 to 94.1% in collected samples. Pebbles consist of fresh to moderately weathered volcanics (39%), fresh to slightly weathered sandstone (24%), fresh to slightly weathered granite (22%), and fresh siltstone (13%), and quartz pebbles (2%). Petrographic numbers of two samples were 131 and 146.



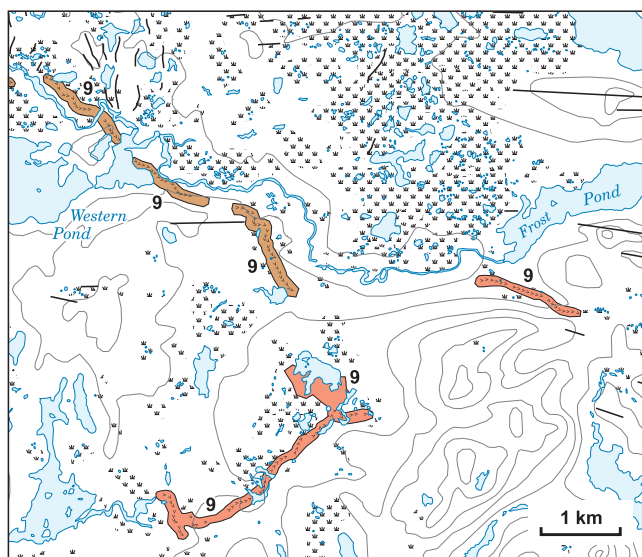
LEGEND

- High gravel and sand potential
- Moderate to high gravel and sand potential
- High sand potential
- Potential sand and gravel determined from aerial photograph interpretation (no samples collected)

SYMBOLS

- >>>>> Esker
- Till ridge: parallel to ice flow (may contain areas of bedrock)
- >>> Till ridge: perpendicular to ice flow
- Paved road
- Gravel road
- Trail
- + + + + + Abandoned railway

Figure 8. Location of deposit 8.



LEGEND

- High gravel and sand potential
- Moderate to high gravel and sand potential
- High sand potential
- Potential sand and gravel determined from aerial photograph interpretation (no samples collected)

SYMBOLS

- >>>>> Esker
- Till ridge: parallel to ice flow (may contain areas of bedrock)
- } } } Till ridge: perpendicular to ice flow
- Paved road
- - - Gravel road
- Trail
- + + + + + Abandoned railway

Figure 9. Location of deposit 9.

SUMMARY

Deposits sampled during the 2012 field season range in quantity from 7000 to 5 000 000 m³. Deposits may be suitable for quarry development depending on their location, quantity, and quality of material and the type of material needed, whether for use in road construction, asphalt, cement, or for winter ice control. Deposits are located less than 1 to 11 km from access roads. Sediment types collected varied from very gravelly sands to very sandy gravels. Some deposits had near equal amounts of gravel and sand



Plate 10. The 6-m-high esker east of Maxs Pond.

content. High boulder content was not encountered in most deposits, although deposits may require screening or crushing to get the aggregate grain-size fractions required in some construction projects. Petrographic numbers are less than 150, indicating a good to fair petrographic quality.

Some deposits are not accessible by road. It will not be economically feasible to quarry in these areas if roads have to be constructed and aggregate has to be trucked over a long distance. The smaller deposits may be more suitable for pit-run operations, but not for the large construction projects, where asphalt or concrete plants are required.

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