Current Research (1987) Newfoundland Department of Mines and Energy,
Mineral Development Division, Report 87-1, pages 49-56

DETAILED AGGREGATE-RESOURCE ASSESSMENTS NEWFOUNDLAND AND LABRADOR

F.T. Kirby
Quaternary Geology Section

ABSTRACT

This report summarizes the results of the 1986 field work to assess in detail the aggregate potential of a) St. George's–Stephenville Crossing municipal planning areas, b) the Eastport–Traytown–Glovertown municipal planning areas, and c) the Goose Bay–Happy Valley–North West River region.

The study has verified that the insular Newfoundland study areas have large deposits of sand and gravel within their planning boundaries. Urban-type developments and restrictive land-use planning are, however, threatening to sterilize many of the resource areas. To prevent this, appropriate policies must be developed to ensure adequate resource areas are designated for extraction and protected from conflicting land uses.

In Labrador, the study area includes a large glaciomarine–glaciolacustrine terrace complex. These terraces are composed almost exclusively of sand and minor amounts of gravel. A large deposit of gravel in a possible end moraine is located at North West River, and presently supplies the whole region with coarse aggregate materials. The study has extended the known limits of this deposit. Land-use conflicts may prevent access to these resources.

INTRODUCTION

A program of aggregate-resource assessment is ongoing, and was initiated in 1982 to evaluate in detail the aggregate-resource potential of selected areas of the province. The focus of the program has been on areas where municipal planning is ongoing. The existing regional aggregate-resource data (Kirby *et al.*, 1983) is of invaluable assistance in defining conflict areas, but was not adequate to provide detailed information on the aggregate resources necessary to resolve these conflicts. These detailed studies bridge this gap. To date, aggregate surveys in thirty-seven municipal-planning areas have been completed and the results forwarded to the Department of Municipal Affairs for inclusion in these municipal plans. In most cases the recommendations have been adopted, in other cases they have been modified or discussions are underway to resolve outstanding conflicts.

The 1986 field season was confined to three areas of the province: a) St. George's–Stephenville Crossing, b) Eastport–Traytown–Glovertown (Figure 1), and c) Goose Bay–Happy Valley–North West River (Figure 4).

Field Program

Prior to field work, all available aggregate-resource and surficial data were reviewed. From this data review, target areas were preselected for detailed aggregate analysis.

The first phase of field work involved vehicular traversing along all roads and trails to update the data on previously sampled and unsampled surficial deposits (Kirby *et al.*, 1983). Foot traversing was conducted in the preselected resource areas and other areas of potential quarry development. Sites were then selected for test pitting.

Backhoe test pitting was utilized where possible to determine the extent, quantity and quality of the aggregates sampled. Where a backhoe was not available, shallow hand-dug pits, 1 to 2 m in depth, were utilized.

Data Analysis and Storage

A total of 340 aggregate samples were collected during the 1986 field program. Samples of unconsolidated aggregates containing plus 8-mm-size material were field sieved, and a split of the minus 8-mm fraction was retained for laboratory sieve analysis (Kirby *et al.*, 1983). A split (about 100 pebbles) of the 16- to 31.6-mm pebble fraction was retained for field lithological and petrographic analyses.

Prior to 1986, all aggregate-resource data were incorporated into the Scientific Information Retrieval (S.I.R.) computer system. In 1986, the Mineral Develpment Division aquired its own super-micro computer (HP9000/560), which will enable the in-house storage and computing of all aggregate-resource data.

STUDY RESULTS

St. George's–Stephenville Crossing

A detailed evaluation of the aggregate-resource potential of the area was undertaken because municipal plans are being developed for these areas. Existing aggregate-resource data for the areas show that a large percentage of the area is underlain by extensive glaciofluvial deposits of sand and

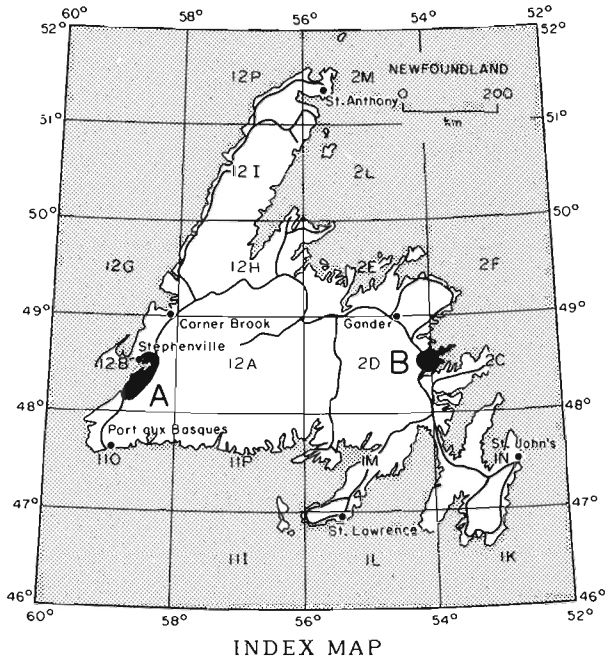

Figure 1. *Location of Newfoundland field areas, 1986.*

gravel (Figure 2). Many of these areas have undergone residential development, particularly along the coast, and large areas are identified on current plans by the Department of Municipal Affairs as having agriculture and forestry (silviculture) potential. This survey attempted to identify the quality aggregate deposits in the areas, so selected deposits can be protected to meet the future requirements of the region.

St. George's planning area. In the St. George's municipal planning area, there are extensive outwash deposits of sand and gravel along Little Barachois Brook, Flat Bay Brook, and the coast (Figure 2). Two eskers were also identified. A total of seven aggregate-resource areas were identified and 31 backhoe test pits were dug during the survey.

For the most part, the aggregates range from pebble–cobble gravel to sandy pebble gravel (Table 1). The deposits are commonly stratified and have silt–clay contents ranging from 0.37 percent to 4.4 percent. The petrographic characteristics of the pebble fraction are generally good, and the average petrographic number ranges from 104 to 156 (Table 1). Till samples collected in the area have a very low aggregate potential, having average silt–clay contents in excess of 15 percent.

There is very little exposed bedrock due to extensive drift cover. The only bedrock exposures noted in the area were highly weathered red sandstone exposed along the coast, but this rock has very little quarry potential. Anorthosite is exposed on the foothills of the Long Range Mountains and has excellent quarry potential, but the availability of extensive outwash deposits in the area will make extraction of the anorthosite unlikely, except to meet armour-stone or similar requirements.

Stephenville Crossing planning area. In the Stephenville Crossing area there are extensive deposits of outwash sand and gravel and a number of eskers. A total of four aggregate-resource areas were identified and eight backhoe test pits were dug during the survey. Although extensive, many of these deposits are covered by thick peat deposits, which made backhoe test pitting impossible. Probing of these bogs revealed depths in excess of 2.5 m (the peat potential was not assessed by this survey).

The deposits are generally composed of stratified sandy pebble–cobble gravel having an average silt–clay content between 0.25 and 1.66 percent (Table 1). The petrographic characteristics of the samples collected are good, and the average petrographic number ranges from 119 to 160 (Table 1). Tills are confined to thin veneers over bedrock and have little quarry potential.

Bedrock exposures in the study area are confined almost exclusively to the northern part of the study area. These exposures are mainly composed of gabbro, granite and granite gneiss. If processed, these deposits would make excellent coarse aggregate materials, but the extensive high-quality deposits of sand and gravel in the area may preclude the use of these sources in the immediate future.

Eastport–Traytown–Glovertown

Each of these municipal planning areas lie at the terminus of major outwash trains (Jenness, 1963). At Eastport and Traytown, these major outwash systems terminate in major delta systems (Dyke, 1972). At Glovertown, the outwash deposit is confined to a low terrace that runs parallel to the Terra Nova River.

Eastport planning area. The Eastport delta system, which also includes Sandy Cove and Sandringham (Figure 3), is an extensive delta system composed of stratified sand and gravel (Table 1) underlain by laminated silt and clay of marine origin. Due to the relatively flat surface of the delta and its fertile and well drained soil, much of this area has been developed. Consequently, very little of the area is available for aggregate extraction. As a result of the increasing pressure for residential development on the remaining undeveloped land, the study was undertaken to identify and to recommend areas for conservation for present and future aggregate extraction. Two areas of aggregate potential were identified (Table 1). A total of 14 backhoe test pits were dug to obtain representative samples. Sieve analyses show that the composition of the delta surface consists of sandy gravel having a silt–clay content of less then 0.5 percent (Table 1). The petrographic characteristics of the samples collected give an average petrographic number between 130 and 142.

Tills in the area are generally thin veneers over bedrock; thicker accumulations occur at the base of some steep slopes. The tills, for the most part, are of poor quality having a silt–clay content averaging greater than 15 percent.

The major bedrock types exposed in the study area are shale and minor sandstone (S. O'Brien, *this volume).* Generally these rocks are of poor quality but locally they may be suitable as a source of aggregate material.

Traytown planning area. The original settlement of Traytown was built on the coastal lowland adjacent to the

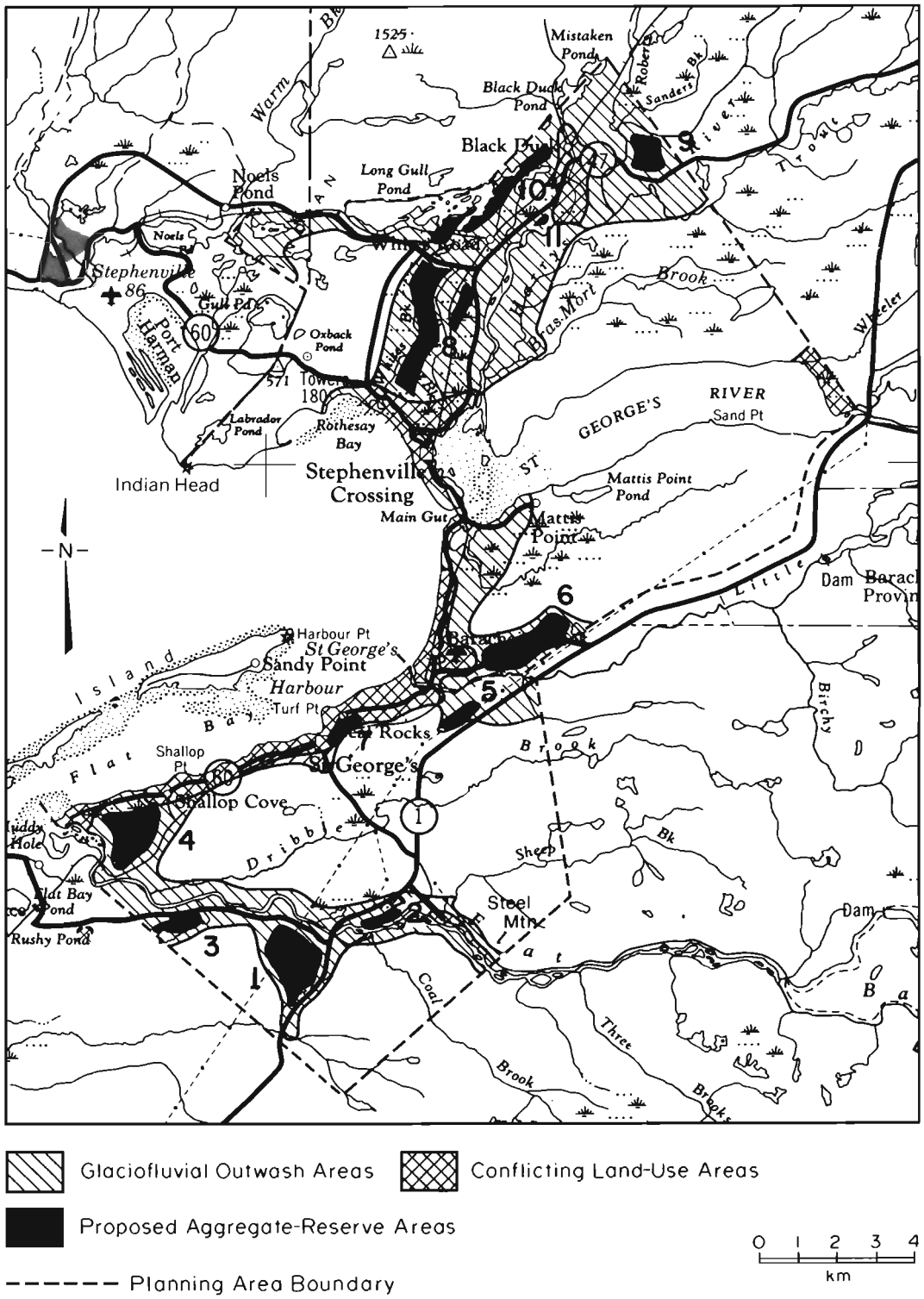

Figure 2. *Aggregate-reserve areas within the St. George's–Stephenville Crossing Municipal planning areas.*

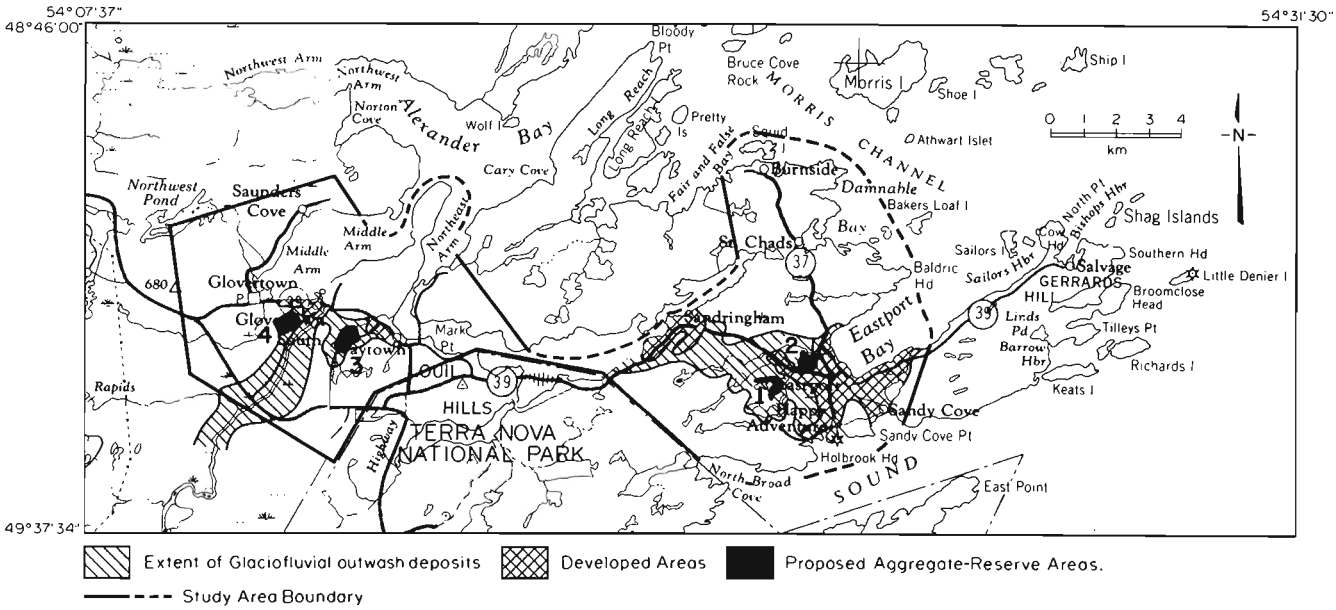

Figure 3. *Aggregate-reserve areas in the Eastport Peninsula.*

Table 1. Summary of sieve analyses by area

Deposit	Number of samples collected	Average petrographic number	Gravel %	Sand %	Silt–clay %	Comments
St. George's						
I	7	140	64.1	35.4	0.51	Predominantly stratified pebble–cobble gravel; average depth of backhoe test pits was 2.4 m
II	5	138	61.1	38.5	0.39	Deposit ranging from unstratified pebble–cobble–boulder gravel to a pebble–cobble gravel; average depth of backhoe test pits was 2.2 m
III	3	156	60.3	39.3	0.46	Predominantly unstratified sandy pebble gravel in a vegetated esker ridge; average depth of the shallow hand-dug pits was 0.9 m
IV	5	114	49.2	50.4	0.37	Stratified pebble–cobble gravel in a number of quarry exposures; samples were taken from 3- to 8-m-high quarry faces; deposit is overlain by bog cover 1.5 to 2.5 m thick
V	3	135	54.9	44.5	0.79	Sandy pebble–cobble gravel in a vegetated esker ridge; average depth of the backhoe test pits was 2.2 m
VI	10	104	48.0	47.6	4.47	Sandy pebble–cobble gravel in a glaciofluvial terrace; quarry exposures average 6 m, backhoe test pits average 2.3 m
VII	2	–	0	98	2	Stratified sand containing minor pebbles; quarry exposure depth is 6.5 m

Table 1. *(Concluded)*

Deposit	Number of samples collected	petro-graphic number	Gravel %	Sand %	Silt–clay %	Comments
Stephenville Crossing						
I	9	119	67.4	30.1	0.31	Stratified pebble–cobble gravel in glaciofluvial terrace; average exposure depths range from 2.3 m in backhoe test pits to 8 to 10 m in quarries; portions of this deposit are overlain by 2 to 3 m of bog
II	3	143	85.2	14.8	0.25	Pebble–cobble gravel exposed in backhoe test pits; average depth of the pits was 2.4 m
III	4	138	63.1	36.4	0.46	Sandy pebble–cobble gravel from vegetated esker ridges; exposures range from 0.8 m in shallow hand-dug pits to 6 m in quarry exposures
IV	1	160	66.0	32.3	1.66	Sandy pebble–cobble gravel that shows some stratification; the exposure height was 6.5 m from a quarry
Eastport						
I	12	130	57.3	42.2	0.46	Sandy pebble–cobble gravel in a glaciofluvial delta deposit; the average depth of the backhoe test pits was 3.2 m
II	5	142	47.2	52.5	0.31	Sandy pebble–cobble gravel in a glaciofluvial delta deposit; the average depth of the backhoe test pits was 3.2 m
Traytown						
I	11	119	31.0	68.8	0.28	Sandy pebble–gravel in a glaciofluvial delta deposit; the average depth of the backhoe test pits was 3.8 m
Glovertown						
I	6	146	55.3	41.9	2.63	Possible kame deposit, boulder–pebble–cobble gravel over silty–sandy till; the average exposure depth in a number of quarries was 5.5 m (This deposit is being rapidly depleted)
Goose Bay						
I	4	120	42.4	57	0.59	Medium to fine grained sand (7 m thick) over stratified pebble–cobble gravel (5 m thick) (Test pitting in the area of the sand exposure failed to intersect further gravel)
II	2	125	48.3	51.2	0.5	Sandy pebble–cobble gravel in an abandoned gravel quarry (This deposit is 90 percent depleted–test pitting around the perimeter of the existing deposit failed to locate further gravel reserves)
III	1	-	0.2	99.7	0.10	Medium to coarse grained sand containing minor pebbles; used as a source of ice-control sand for the town of Happy Valley–Goose Bay; exposures in quarry faces are 5.5 m high
North West River						
I	13	179	41.1	58.1	1.07	Stratified, pebble–cobble gravel containing sand lenses in a possible end moraine; exposures in quarries range from 4 to 10 m in height in hand-dug pits, exposures average 1.8 m

forefront of the delta face. Recent residential development has begun to develop on the top surface of the delta, thereby sterilizing a portion of the delta from any aggregate extraction. Farther inland, much of the delta is undeveloped but privately owned.

The delta is composed of a very sandy gravel containing sand lenses, and has an average silt–clay content of 0.28 percent (Table 1). The petrographic characteristics of the samples collected from 10 backhoe test pits give an average petrographic number of 119 (Table 1). One area has been identified as a potential source of aggregate material (Figure 3). Tills in the area are usually thin veneers (less than 1 m thick) over bedrock, but locally reach depths in excess of 3 m. Tills are commonly silty and of poor quality, but could be used as a source of fines when mixed with crushed bedrock in asphalt production. The bedrock in the area is mainly composed of argillite, slate and tuff. All of these rock types are suitable as a source of coarse aggregate materials, and have been used as such.

Glovertown planning area. In the Glovertown area, the majority of the glaciofluvial deposits are confined to a low-lying terrace parallel to the Terra Nova River. This deposit is composed entirely of sand containing a few scattered pebbles. A kame-like deposit composed of cobble gravel overlying till is the primary source of aggregate in this area, and is rapidly being depleted (Figure 3). This deposit is composed, for the most part, of a boulder–cobble–pebble gravel (Table 1) overlying a sandy till; the gravel has an average silt–clay content of 2.63 percent. The petrographic characteristics of the deposit are good, and it has an average petrographic number of 146 (Table 1). Other kame-like deposits composed of a somewhat sandier gravel have been sterilized due to community expansion. Tills in the area are very silty and have a silt–clay content in excess of 20 percent. One area has been identified as a potential source of aggregate (Figure 3).

Bedrock exposure in the area is similar to that at Traytown, and is composed mainly of argillite, slate and tuff. These have been used in the past and are excellent sources of coarse aggregate materials. Large reserves of these rock types are available in the immediate area.

Goose Bay–Happy Valley–North West River

Happy Valley–Goose Bay planning area. Almost all the Happy Valley–Goose Bay planning area is situated on a glaciomarine–glaciofluvial terrace system composed of sand containing some clay and gravel pockets (Figure 5). With the potential development of Goose Bay as a major NATO air base, it became evident that large quantities of coarse aggregates might be required. This survey was undertaken to identify any gravel deposits within the dominantly sand terraces of the area. Two areas were previously identified (Kirby *et al.*, 1983) as potential gravel sources, but subsequent backhoe test pitting this past year failed to extend the known limits of these deposits. These two areas, as well as one area containing coarse grained sand, have been identified as having the potential to supply limited quantites of gravel. They may also supply coarse sand for use in concrete and

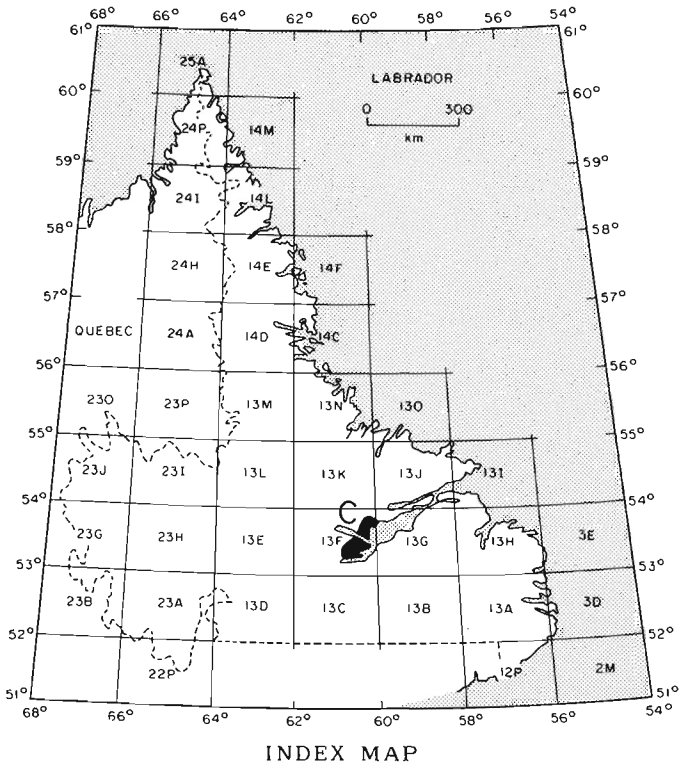

Figure 4. *Location of Labrador field areas, 1986.*

ice control. Till in the area is of a poor quality having silt–clay contents in excess of 14 percent.

The main bedrock units exposed in the study area are monzonite, granite and anorthosite (Wardle and Ash, 1986). The main source of coarse aggregates in the past has been a gabbro–monzonite rock quarry located at Dome Mountain, within the restricted zone of a Canadian Armed Forces radar base.

North West River planning area. The North West River planning area contains a large reserve of high-quality aggregate materials (Figure 5) that is the major source area for the region. These materials are confined to a possible end– moraine deposit composed of stratified sand and gravel, and have an average silt–clay content of 1.07 percent (Table 1). The petrographic characteristics of the deposit are good having an average petrographic number of 179. Terraces in the planning area are composed of sand containing scattered pebbles, and are a continuation of those at Goose Bay. Tills in the area are confined to thin veneers over bedrock and are of poor quality; silt–clay contents are in excess of 15 percent.

The major bedrock unit exposed in the study area is anorthosite. This rock is a good source of coarse aggregate material and has been used in the past.

SUMMARY

A total of 345 aggregate samples were collected and analyzed during the 1986 field season. Work conducted in the three field areas has identified suitable reserves of

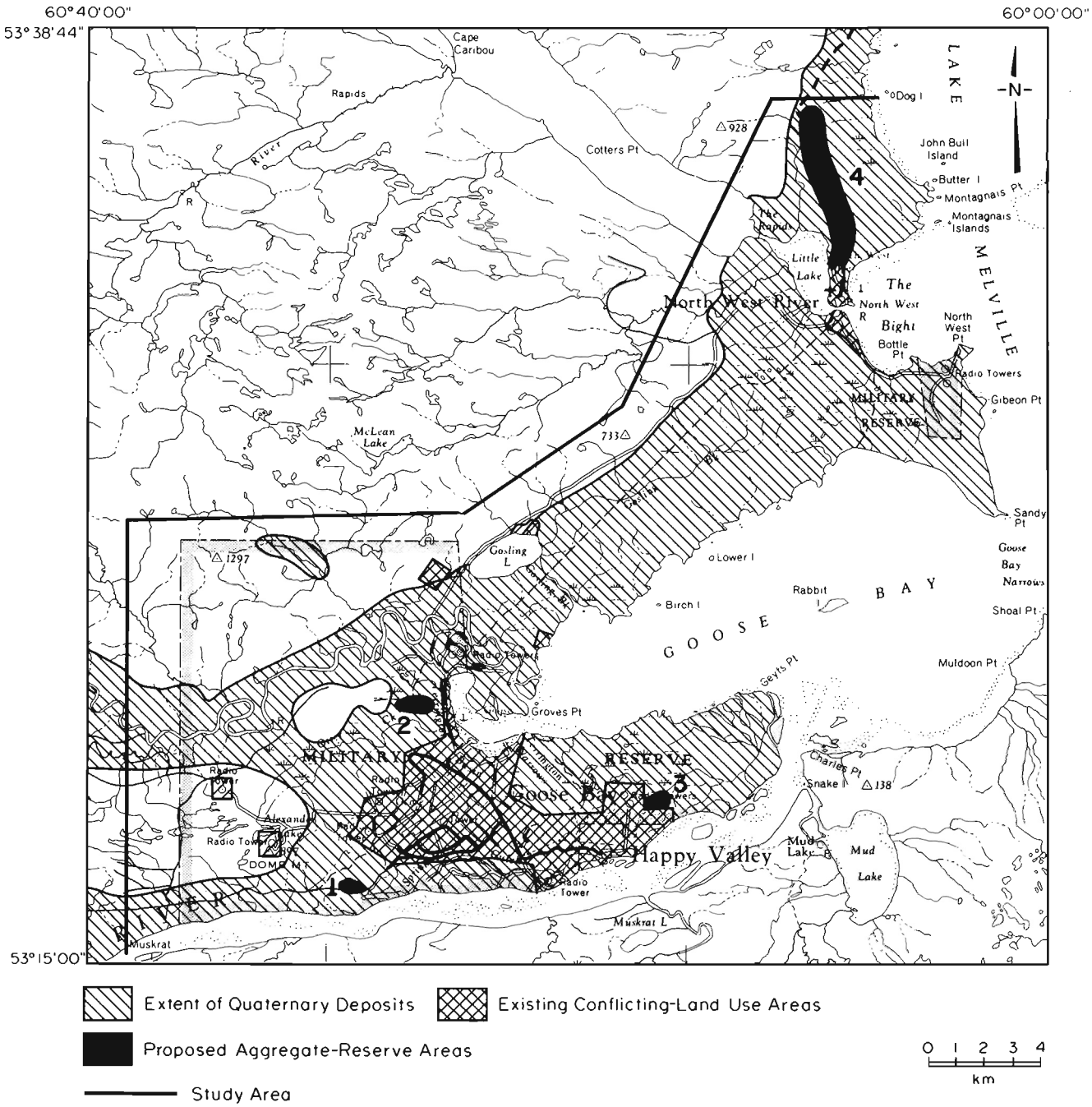

Figure 5. *Aggregate-reserve areas in the Goose Bay–Happy Valley–North West River region.*

aggregate material to meet the present and future needs of these areas, provided access is guaranteed. These areas have been identified as aggregate-resource areas, and this information will be forwarded to the Department of Municipal Affairs for inclusion into municipal or other plans for these areas. Land-use planners must designate sufficient aggregate-resource areas in order to ensure an adequate supply of materials is available to meet the regions' future construction requirements.

ACKNOWLEDGEMENTS

The author wishes to thank Jim Rogers for his very capable assistance in the field, Christine Blackwood for her prompt results from the laboratory, and Wayne Ryder, Sidney Parsons and Ted Hall for their logistical support. This report was critically reviewed by Jerry Ricketts, Martin Batterson and Doug Vanderveer.

REFERENCES

Dyke, A.S.
1972: A geomorphological map and description of an emerged Pleistocene delta, Eastport Peninsula, Newfoundland. Maritime Sediments, Volume 8, pages 68-72.

Jenness, S.E.
1963: Terra Nova and Bonavista Bay map areas, Newfoundland. Geological Survey of Canada, Memoir 326, 184 pages.

Kirby, F.T., Ricketts, R.J. and Vanderveer, D.G.
1983: Inventory of aggregate resources in Newfoundland and Labrador, information report and index maps. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 83-2, 36 pages.

O'Brien, S.J.
This volume: Geology of the Eastport (west half) map area, Bonavista Bay, Newfoundland.

Wardle, R.J. and Ash, C.
1986: Geology of the Goose Bay–Goose River Area. *In* Current Research. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 86-1, pages 113-123.