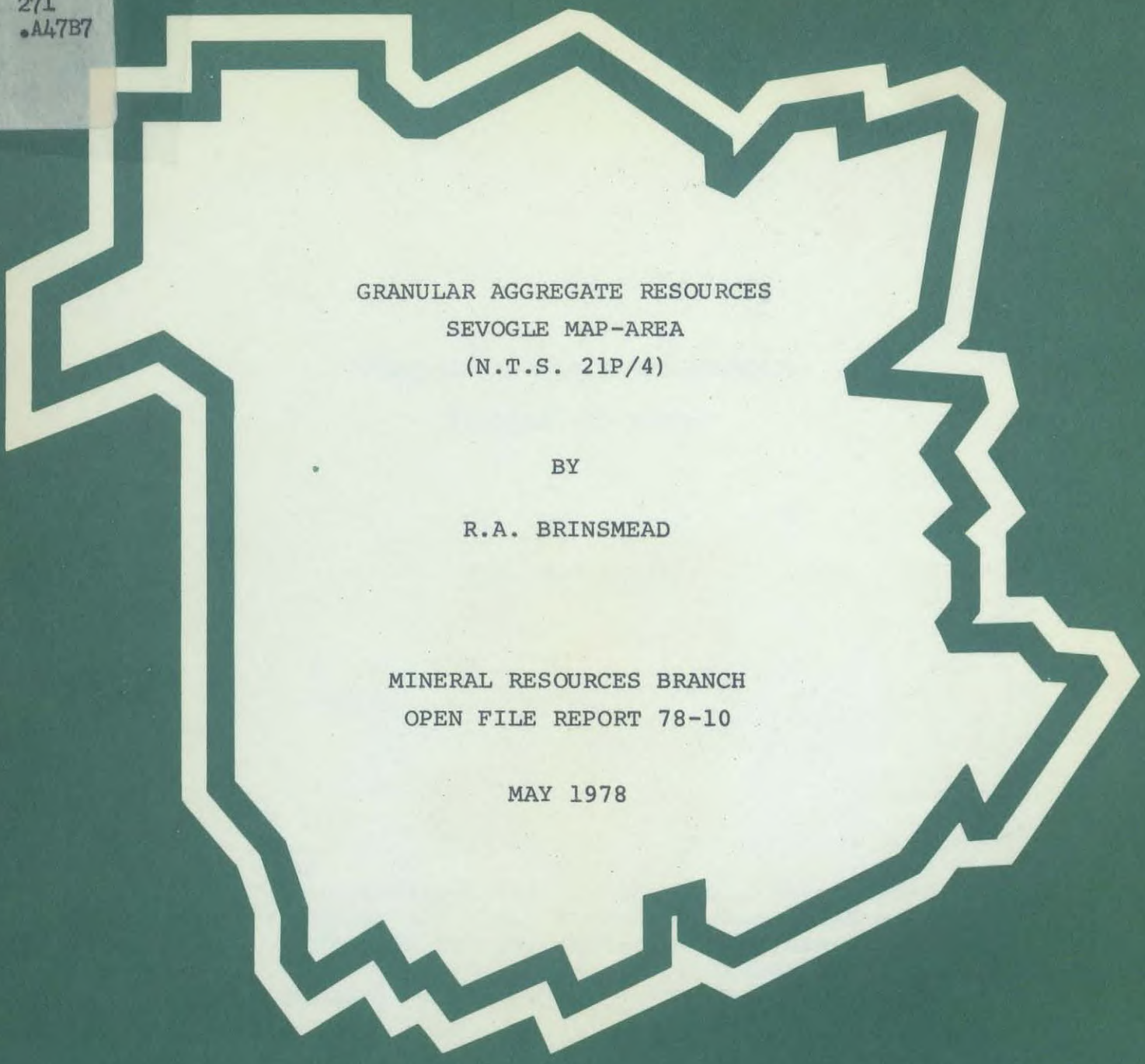

GRANULAR AGGREGATE RESOURCES
SEVOGLE MAP-AREA
(N.T.S. 21P/4)

BY

R.A. BRINSMEAD

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GRANULAR AGGREGATE RESOURCES OF SEVOGLE MAP-AREA

R.A. BRINSMEAD

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ABSTRACT

This paper provides an evaluation of the distribution, extent, thickness and quality of surficial granular aggregate deposits in the Sevogle map-area (21P/4), New Brunswick. The report details reserve volumes of the major aggregate sources, and deals with management of the aggregate resources and genesis of the deposits.

The entire area appears to have been glaciated, the ice-movement direction in the east half being approximately north-northwest, and the principal direction in the west half, that of the Nepisiguit lobe, being north-northeast, resulting in a probable line of interlobation along the Portage River. Recession of the glacial mass has left few deposits of granular material in the east half of the area, but in the west is documented by a succession of major ice-marginal features. The southward-retreating ice margin blocked regional drainage, resulting in the ponding of proglacial Lake Sevogle in the Northwest Miramichi valley at about 260 feet above present sea level. The major feature of this lake is a very large glacio-fluvial delta at the mouth of the Sevogle River, in which a lower unit of varved sediments is locally exposed.

Field methods included the examination of all natural and man-made subsurface exposures, and the making of new exposures with shovel, hand-auger and hand-held power auger. Aerial photographs were used both in the field and in the office for defining deposit boundaries. Hammer-seismic profiles aided in determining material thickness. In the laboratory, mechanical

and lithologic analyses were performed on gravel samples.

Reserves of granular aggregate are contained in large ice-contact stratified deposits associated with several static ice-marginal positions, glaciofluvial outwash bodies deposited by streams issuing from the ice-margins, deltaic deposits formed where sediment-laden meltwaters flowed into ponded water, and ancient alluvial deposits formed during post-glacial down-cutting by the river system into pre-existing deposits. Total granular aggregate reserves of about 58 million cubic metres are documented, most being in the west half of the area. A high percentage of the material is of excellent quality.

A large proportion of the major granular aggregate deposits occur on uninhabited Crown land, providing an excellent situation for planning of a pilot resource-management program, under which resource areas can be released for development in an efficient, orderly manner, without conflict with populated areas.

INTRODUCTION

The Study Area

The Sevogle map-area is situated in northeastern New Brunswick, lying north and west of the town of Newcastle (Figure 1). The area is bounded by latitudes 47°00' and 47°15' North, and longitudes 65°30' and 66°00' West, and represents 1060 square kilometres (410 sq. mi.) of land. The base-map for the present work is the National Topographic System's Sevogle map sheet (21 P/4) at 1:50,000 scale.

Access

Much of the area is well-serviced with roads. The paved highways 430 and 425 provide rapid primary access to all but the northeastern quarter of the area. A secondary system of easily-traversed gravel-surfaced forest access roads leads into a logging haul-road tertiary system that allows access to almost any point of interest. Parts of the tertiary system are negotiable by 2-wheel drive truck, while foot traversing is necessitated in some instances. The northeastern corner of the area is serviced by secondary- and tertiary-level roads, but a limited portion of the north-central reaches of the area is accessible only with difficulty on foot.

Duration of the Study

Field investigations in the area were conducted from June to early October, 1977. Laboratory and office studies involved in the preparation of this report were undertaken during the ensuing winter months.

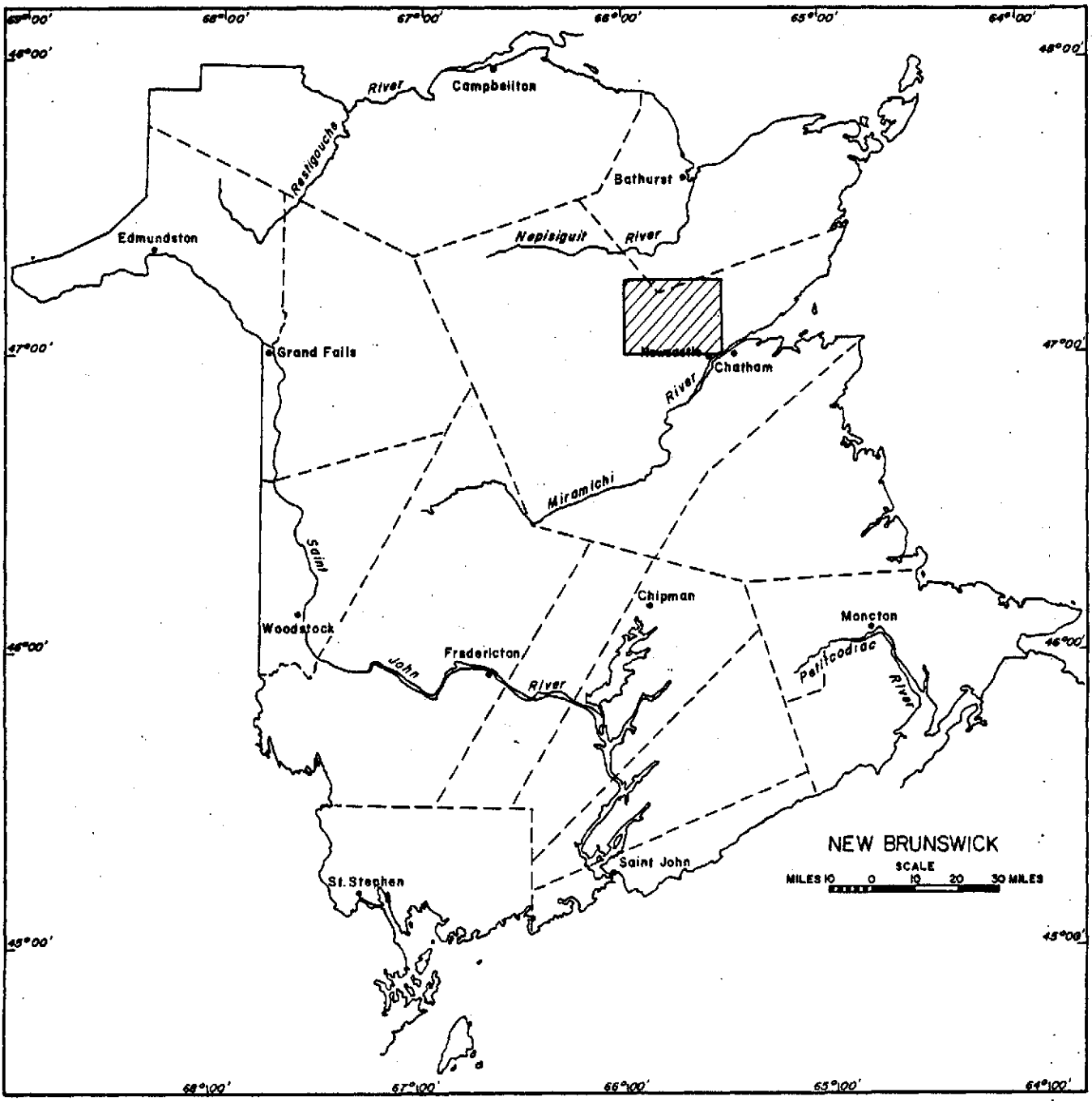

Figure 1: Location of Sevogle map-area

Aims of the Study

This project is designed to provide information on the distribution, extent, thickness, and quality characteristics of granular aggregate deposits in the Sevogle map-area. This is regarded as being the major area with potential to supply large volumes of high-quality aggregate to the Newcastle-Chatham urban area. The aim is to produce information that is useful both to producers and consumers of granular aggregates in their search for workable deposits, and also to land-use planners concerned with the efficient use of available resources and with the minimization of land-use conflicts.

Topography

The Sevogle map-area encompasses portions of two divisions of the Appalachian physiographic region (Bostock, 1969). East of the Northwest Miramichi River, the subdued topography of the Maritime Plain division pervades. The overall flatness of the terrain is broken by shallow, broad stream valleys that are interspersed by the low, rounded swellings of the interfluves. Maximum elevations range from 300-400 feet above sea level (a.s.l.) in the south, up to 500-600 feet* a.s.l. in the north.

The northeastern third of this physiographic division is drained generally eastward, by the slow-flowing Bartibog River and its tributaries. These streams rise in widespread boggy areas whose drainage is impeded by systems of minor ice-

*Because the topographic contours on the base-map on which the granular aggregate deposits are plotted depict elevations in feet, all references to elevations in this report are also in feet.

disintegration features. The main valleys of this drainage system are preglacial, the modern drainage having reoccupied already-existing routes of flow. The south-central third of the division drains southwards via the Northwest Millstream and its tributaries, to flow into the Northwest Miramichi south of the map-area. These streams meander over the flat land in a glacially disturbed and immature drainage pattern that becomes confined in its lower reaches to a broad valley that is again regarded as being preglacial. The western third of the Maritime Plain division is drained westward directly into the Northwest Miramichi by a series of parallel, short, relatively fast-flowing small streams. These streams descend from the maximum elevation at the edge of the Maritime Plain, and are incised into this ridge. Drainage gradient is commonly about 19 m/km (100 ft/mi), decreasing substantially close to the Northwest Miramichi.

The Northwest Miramichi River approximately marks the boundary between the Maritime Plain and the New Brunswick Highlands physiographic divisions. The Highlands division slopes gently upward towards the west, from an elevation of about 250 feet immediately west of the river, to elevations ranging between 600 and 800 feet a.s.l. at the western boundary of the area. Generally, local relief is not very pronounced within the map-area. The highlands attain much greater elevations several kilometres west of the map-area.

The highland division is drained by the Northwest Miramichi River and its tributaries, including the Sevogle, a major drainage subsystem. The main streams are incised into

bedrock along portions of their courses, forming steep-sided chasms. At one point, the gorge of the Northwest Miramichi is about 45 m (150 ft) deep. The North Branch of the Sevogle, near the western boundary of the area, is incised deeply into thick glacial till; this till valley-fill indicates that this and probably all the major river courses are preglacial features.

Previous Geological Work

Bedrock geology of the area or parts of it has been examined by a number of individuals. R. W. Ells conducted the first detailed geological examination of the northern part of the area (Ells, 1883). E. W. Shaw described the bedrock geology of the area west and south of the Northwest Miramichi River (Shaw, 1936). Part of this area was reassessed by K. R. Dawson in his examination of the geology of the west half of the Sevogle map-area (Dawson, 1961). Charles H. Smith examined the geology of the east half of the Sevogle map-area in the process of producing a regional compilation map of bedrock geology of the Bathurst-Newcastle area (Smith, 1957). More recently, detailed mapping of limited areas of interest has been published by the provincial government. These and most of the previous publications are listed by Carroll, 1977.

Late in the nineteenth century, Robert Chalmers conducted a regional study of the surficial geology in eastern New Brunswick, which includes the Sevogle map-area (Chalmers, 1895). Brief references to unconsolidated surficial deposits were made by Shaw (1936) and Dawson (1961) in their bedrock reports referred to above.

During the summers of 1976 and 1977, a project was conducted by the Geological Survey of Canada to study the regional Quaternary geology of the Bathurst map-area (21P). Progress reports have been published in the Current Research publications of G.S.C. (Gauthier et Cormier, 1977; Gauthier, 1978).

BEDROCK GEOLOGY

Bedrock formations in the Sevogle map-area range in age from Ordovician or earlier, to Pennsylvanian.

Most of the area west of the Northwest Miramichi River, generally corresponding to the area designated as the New Brunswick Highlands physiographic division, comprises rock units of pre-Silirian age, some of which are highly metamorphosed. These include quartzite and slate, rhyolite flows, pyroclastic rocks, sills of quartz-feldspar porphyry, mafic lavas, shale, greywacke, conglomerate and schist. Several small intrusions of diabasic gabbro, thought to be of Devonian age, outcrop in the northwestern corner of the map-area.

Nearly the entire area east of the Northwest Miramichi, and a smaller area west of it, corresponding to the Maritime Plain physiographic division, comprise rocks of Pennsylvanian age. Flat-lying red conglomerate, sandstone and shale of the Bathurst Formation overlie the pre-Silurian rocks with profound unconformity, and are in turn overlain by grey sandstone of the Clifton Formation, with a conformable contact. The Pennsylvanian strata are continuous eastwards to the Gulf of St. Lawrence.

A small outlier of the Bathurst Formation is found on pre-Silurian rocks west of the map-area, indicating that the present surface of the pre-Silurian rocks has been re-exposed relatively recently, and closely approximates the pre-Pennsylvanian erosional surface.

For detailed information on bedrock geology, the user should consult references cited at the end of this text.

GLACIAL HISTORY

Evidence of glaciation of the land by great ice masses is encountered throughout the area. Where bedrock is exposed, glacially smoothed, polished and striated surfaces are noted. Over much of the area, the bedrock is covered by glacial till, the surface of which, in places, is sculptured by the moving ice. Proglacial ridges of till and gravel, and areas of glaciofluvial gravel give further evidence of intense regional glaciation.

Flow direction of ice

The direction of ice flow in the area is directly indicated by glacial striations and by drumlinoid ridges moulded in glacial till. Over most of the area lying west of the Northwest Miramichi River, these features define an ice movement towards the north-northeast, oriented between 025° and 035°. This ice movement is documented north of the Sevogle map-area in the lower reaches of the valley of the Nepisiguit River within the Bathurst (21 P/12) map-area (Gauthier et Cormier, 1977). Because the ice mass is recognized in the Nepisiguit

valley, it will be referred to as the Nepisiguit lobe.

Striations at the extreme western edge of the northwest corner of the area, and crosscutting striations just west of the area boundary in this locality, may indicate a later east-northeastwards ice movement, oriented between 060° and 075°. The critical site shows striations on conglomeratic sandstone oriented at 070°, with no recognized sense of movement, superimposed on a clearly older glacial groove oriented at 030°, with sense of movement shown by a streamlined mold of uneroded sandstone matrix extending northeastwards from a pebble in the conglomerate.

On the Pennsylvanian rocks east of the Northwest Miramichi, striation occurrences are much less common than to the west of the river. Outcrop surfaces on the sandstone weather rapidly, and therefore only freshly-exposed surfaces have striae preserved. Striae were observed at a few locations in the eastern third of the map-area. Orientations range between northwest and north, with sense of movement towards the north or northwest being evident in a few instances. This indicates an ice mass with a direction of movement oblique to that of the northeast-moving ice west of the river. A two-lobe theory seems necessary to explain the observed striations.

Ice retreat

East half:

Restriction of mapping activities to the outlining of units of granular material has limited the number of deposits depicted in the east half of the area. A static position of

the ice margin is marked by a till end-moraine at location P4-11, south of the Bartibog River. Morainic remnants probably originating from the same event lie to the southeast of this location, and also to the west near location P4-10. Minor outwash deposits are associated with this marginal position, as well as ice-contact stratified deposits, those at the ice margin being contemporaneous with the moraine, and some northeast of the moraine being of slightly earlier deposition.

No other prominent ice-marginal deposits were encountered within the area of Pennsylvanian bedrock, and surficial features south of the Bartibog River end moraine indicate downwasting of primarily stagnant ice. In the northeastern quarter of the map-area, subglacial meltwater channels are marked by two systems of esker segments leading up to the proximal side of the end moraine, but extending no farther. A few small kames were encountered in this area also.

In the north-central portion of the map-area, west of Busby, the land is patterned by a system of minor recessional moraines interspersed by boggy ground, resulting in a striking washboard appearance, visible on aerial photographs. The long axes of the low ridges have a southeast orientation, which reflects the attitude of the ice margin during recession, but bears no relationship to the direction of glacial advance.

Over much of the remainder of the Pennsylvanian area, till mantles the bedrock without exhibiting topographically distinct forms. The till cover has altered the topographic characteristics of substantial areas only to the extent of impeding surface drainage, resulting in widespread boggy areas.

Low, rolling ridges south of Highbank exhibit a substantial thickness of till, and might be interpreted as end moraines.

West half:

The disintegration and retreat of the glacial mass in the west half of Sevogle map-area is documented by complex systems of glaciogenic deposits. Several temporary static positions of the ice margin are recorded by massive morainic and other ice-contact deposits. Large constructional features such as these indicate a dynamic ice mass, a hypothesis supported by the almost total lack of esker ridges west of the Northwest Miramichi River. Associated with these systems are contemporaneously-formed glaciofluvial outwash and glaciofluvial deltaic (glaciolacustrine) deposits. Later fluvial terraces of post-glacial age occur along the main drainage routes.

Tomogonops Phase

In the vicinity of the confluvence of the Northwest Miramichi and Tomogonops Rivers, a static position of the toe of the northeast-moving ice lobe is marked by remnants of multiple end-moraine ridges. Southwest of there, north of the mouth of Little River, additional remnants of a large morainic ridge are encountered, that are regarded as belonging to the same event as the Tomogonops moraines. They are deposited in continuity with a flat-surfaced to terraced granular deposit extending south and then west from the southernmost extent of the ridge. This is considered to be a kame-terrace formed between the ice margin and a bedrock knob partly encircled by the deposit.

Meltwater drained northeastward through a bedrock gap near the western extremity of the deposit, and in the gravel pit at P4-49 variable ice-contact stratified material is seen to grade into more regular outwash material away from the ice-front. Additional granular material was deposited as outwash bodies immediately west of the morainic ridge by northward-flowing meltwaters confined by higher land to the west.

Proglacial Lake in Portage River Valley

Whereas the glaciofluvially-transported material of the Little River deposits lies above the 400 foot contour and is interpreted as outwash, the glaciofluvial deposits that are accessory to the moraines at the mouth of the Tomogonops are encountered at elevations up to only a little over 250 feet a.s.l., and their internal morphology is distinct from the outwash deposits. They are interpreted as remnants of a glaciofluvial delta deposited in a proglacial lake ponded in the valley of the Portage River and its tributary, McKay Brook. At this stage, the lake extended northwards from the ice margin approximately 11 km (7 mi.) to its outlet at the McKay Brook-Gordon Meadow Brook drainage divide in the Nepisiguit Falls (21P/5) map-area. The elevation of this divide, at about 260 ft. a.s.l. (Gauthier, 1978), defines the level of the glacial lake, and corresponds closely to the maximum surface elevations of the local glaciofluvial deltaic remnants, and of others farther south. As the ice margin receded southwards from the Tomogonops position, the glacial lake expanded progressively to occupy the newly-deglaciated valley of the Northwest Miramichi River as well as the Portage, up to the maximum level of 260 feet.

Possible Interlobate Moraine

An elongate system of rounded hummocks of ablation till was encountered along the Portage River, overlapping the north edge of the map-area and extending into the adjacent Nepisiguit Falls area. This is interpreted as an interlobate moraine, and if the interpretation is valid, it marks the line of coalescence of the northeastward-flowing Nepisiguit lobe ice with the ice lobe flowing north-northwestward across the east half of Sevogle map-area. Unfortunately, poor access and sparse bedrock exposure in a large area east of the Northwest Miramichi and Portage Rivers leaves a wide gap between these deposits and the nearest striation locations defining the northwestward movement. Until closer striations can be found to validate the extent of the northwestward movement as far as the Portage River, an interlobate origin for these deposits remains only a hypothesis. A large, north-trending ridge of ice-contact stratified material at location P4-54, north of the mouth of Smoker Brook, may also be an interlobate deposit, but the lack of striations to the east makes the application of the interpretation to this deposit equally uncertain.

McLaughlin Brook Phase

Two end moraine remnants, one on either side of the Northwest Miramichi at the mouth of McLaughlin Brook, mark another static position of the ice margin. Meltwater-transported sediments deposited in the glaciolacustrine waters to the north are represented as glaciofluvial deltaic deposits on the map. The McLaughlin Brook morainic deposits do not appear to be time-

correlative to any other recognizable ice-marginal deposits in the map-area.

During recession of the ice from this marginal position, deltaic deposits were formed on the east side of the Northwest Miramichi to the south of the moraines. Also during this interval, substantial outwash deposits were formed along the Northwest Miramichi at the western extremity of the map-area, near the mouths of Tozer and Stony Brooks.

Sevogle North Branch Phase

Back-melting of the margin of the Nepisiguit lobe ice to a position south of the divide between the Northwest Miramichi and the North Branch Sevogle River, resulted in deposition of two masses of ice-contact stratified material between the ice front and the adjacent bedrock elevation. The more westerly of the two comprises kame-like mounds surrounded by kame terrace sediments. Early drainage of meltwater was northward through a gap at location P4-42, where the material grades into glaciofluvial outwash. Later drainage, after slight recession of the ice margin, was eastward through a bedrock low at the head of Camp Doris Brook, while the lower portion of the Sevogle remained ice-blocked. Meltwater moving towards this outlet was responsible for formation of the kame and kame terrace deposits at P4-45. Finally, full opening of this outlet at about 450 ft. elevation probably dictated the surface elevation of the outwash terrace at location P4-43a. Limited proglacial ponding likely prevailed in the valley of the North Branch Sevogle River during this episode.

Square Forks Phase

A large end-moraine complex west of the Sevogle North Branch, about 2.3 km (1.5 mi.) upstream from the Square Forks, marks a major stance of the ice margin. The distal side of the main ridge exhibits relief of about 30 m (100 ft.) at its highest point, but the ridges are traceable for only a short distance. Meltwater probably spilled eastward along the ice margin, flowing by way of a network of channels cut in till, to enter the glacial lake in the Northwest Miramichi valley.

Estey Lake Phase

The next important static position of the receding ice margin is recorded by a multi-crested end moraine lying south of the Big Sevogle River at Estey Lake. Like most of the end moraines in the map-area, it consists largely or entirely of stratified granular material. Estey Lake occupies a kettle hole within the moraine, with a morainic crest lying on either side of it.

Paleodelta of Glacial Lake Sevogle

Although there are no correlative morainic remnants to mark the position of the ice margin east of Estey Lake, it is evident that the valley of the Northwest Miramichi River remained blocked by ice to the south. The lower reaches of the Big Sevogle River are flanked by remnants of an immense glaciofluvially-fed delta, which exhibits a typically deltaic sediment sequence of gravel at the surface, grading downwards through sand into fine sediments at depth. The surface unit of the delta grades from coarse gravel through finer gravel towards the east, and into

pebbly sand east of Shaddick Lake, a variation that is again typical of the conditions of deposition.

A fresh river-cut in the fine sediments forming the lower unit of the sequence, located on the Sevogle about 2 km (1.3 mi.) above its confluence with the Northwest Miramichi, exposes about 4.3 m (14 ft.) of varved silt and clay (Gauthier, 1978). The upper portion of the sequence has been eroded by fluvial downcutting, which has left a cap-unit of ancient alluvial gravel over the fine sediments.

E.W. Shaw first recognized the stratifications in this exposure as varves (Shaw, 1936), after Chalmers had mapped the deposits as marine (Chalmers, 1889). Because the Sevogle exposure is the type-section of sediments that define the deposits of the Northwest Miramichi and Sevogle valleys as lacustrine, it is here proposed that the proglacial lake that occupied this valley system be formally referred to as glacial Lake Sevogle.

Part of the sediment mass of the Sevogle paleodelta was contributed by meltwaters flowing from the ice margin in the vicinity of Estey Lake. It appears, however, that a great volume of detritus was carried down the Sevogle South Branch from the westward extension of this ice margin, and also down the Sevogle North Branch, possibly originating largely from a separate ice mass west of the map-area. Remnants of a wide system of glaciofluvial outwash are evident, particularly from just above the Square Forks of the Sevogle, downstream about 3.2 km (2 mi.) to where it progrades into the deltaic deposits. The outwash facies of the system exhibits a distinctly channelized surface, with channel relief of up to about 3.6 m (12 ft.), indicating a

subaerial depositional environment at least in the upper strata. There is a striking break to the flat surface of the deltaic facies, in keeping with the subaqueous depositional environment. The upper limit of the delta surface occurs just above the 250 ft. topographic contour on the map, at a present elevation estimated at between 260 and 265 ft. a.s.l., and thus defines the local surface level of Lake Sevogle at this elevation. For practical purposes, this corresponds precisely to the previously-cited elevation of the lake's outlet at the head of McKay Brook, and indicates no postglacial crustal tilting over the 29 km (18 mi.) between Square Forks and the outlet.

Little Sevogle River Phase

The final significant ice-marginal position in the map-area is marked by a small end-moraine segment with relief of about 9-10 m (30-35 ft.), located just north of the Little Sevogle River, opposite the mouth of McNeal Brook. Adjacent to this deposit are two glaciofluvial delta remnants, the one at P4-18 exhibiting a relatively flat to erosion-cut surface at just over 250 ft. elevation, and having the deltaic sediment sequence exposed at the sample location. The deposit at P4-22 has no deep cuts to expose fine sediments, and is not specifically recognizable as a delta remnant, but the positioning of much of the deposit below or close to 250 ft. elevation dictates deposition within the bounds of Lake Sevogle. The deposit may grade upstream (southwestward) into glaciofluvial outwash.

Deltaic or lacustrine deposits flanking Little Wildcat Brook, near Exmoor, probably were formed at about the same time

as the McNeal Brook deposits, as the ice-margin was retreating to the south. The surface unit is largely sand or pebbly sand, indicating a distal phase of deltaic deposition. This unit is presumed to overlie fine sediments, as a road-cut just west of P4-2 exposes stratified clay and silt, likely of lacustrine origin, lying beneath younger fluvial gravel of the ancient alluvial unit. This exposure is relatively poor compared to the Sevogle River section.

Probable Spillway near Sunny Corner

Continued recession of the ice-margin would have had no effect on the surface level of glacial Lake Sevogle until it reached a position nearly 5 km (3 mi.) south of the boundary of Sevogle map-area. At this position, an eastward-flowing spillway must have been opened between the ice-margin and the north bank of the valley of the main Northwest Miramichi River, near Sunny Corner. No field work was done in this area, so this concept is based on topographic considerations only.

Further recession of the ice-margin from the position of original opening of the spillway would have established new, lower base-levels for the Northwest Miramichi drainage system, causing incision of the rivers into the soft sediments to form the various levels of ancient alluvial terraces that are evident along the Northwest Miramichi and the Sevogle. A small amount of water may for a short time have drained through a gap near the head of Wildcat Brook, just inside the Sevogle map-area, but this channel, if used, would not have appreciably changed the lake because of its elevation.

GRANULAR AGGREGATE RESOURCES

Field and Laboratory Methods:

Information used in the determination of deposit boundaries and thicknesses, was obtained by the examination of gravel pit faces and all other natural and man-made exposures that were encountered. Some exposures were made or improved by the use of shovels and hand-augering equipment, and a hand-held power auger was used at a few locations. Heavy duty power equipment was not available for use, so observation of granular deposits at depth was accomplished only in pit excavations and a few natural cuts, limiting the accuracy of material thickness estimates.

Average material depths used for volume calculations were usually arrived at by the projection of depths observed in pit excavations to areas beyond the pit boundaries, with the aid of geologic and topographic observations on the ground and from aerial photographs. Airphotos at a nominal scale of 1:20,000 (1 inch to 1666 feet) were used both in the field and for later interpretations in the laboratory. Hammer seismic profiles were used on several deposits to aid in determining material thickness.

Samples of granular materials were collected from the best exposures available, with a sample site distribution designed to provide a reasonably reliable assessment of material qualities in the major deposits. Care was taken to obtain samples that were as representative of the actual material characteristics as possible. However, the sample size of about 5 kg. (10 pounds) of material may not be truly representative,

especially in the size analysis tests.

Factors Affecting Reserve Calculations

Where adequate evidence is available to ascertain a deposit's boundaries with reasonable certainty, 'approximate boundaries' are assigned to that deposit, or portions of it. On deposits where detailed geological boundary observations are lacking or topographic indicators are indefinite, 'inferred boundaries' are assigned, largely by interpretation of aerial photographs. In a case where all or a substantial part of a deposit's boundaries are inferred, the reserve calculations based on this information must be regarded with a lesser level of confidence than if boundaries are approximate.

Similarly, confidence in reserve figures is also affected by the reliability of material thickness data. If substantially definitive material thickness indicators are available, then reserve figures are stated with greater certainty than is possible when subsurface observations are lacking and a thickness figure is assumed from less reliable indicators. In general, the figures used for both deposit area and material thickness have been kept conservative in making reserve calculations, to a degree in keeping with the varying levels of confidence inspired by the data on different deposits.

In no case can reserve figures be absolutely definitive. Traditional exploration methods including detailed test-pitting or drilling with power equipment are always required for accurate evaluation of reserves. The cost of an operation on this scale limits it to sites of intended development.

Quality Limitations

In assessing the quality of granular deposits, there are several factors that are important in determining the uses for which the material might be suitable. The major factors applicable to deposits in the Sevogle map-area are discussed here.

Fine Particles:

A high content of fine particles, smaller than 200 mesh in size, is detrimental to use of granular materials for applications such as granular base and concrete. This condition is a characteristic of deposits in the east half of the Sevogle area, which overlie the Pennsylvanian sandstone. The condition is not a problem in most deposits in the west half of the area, which are derived from harder bedrock units. In cases where other material characteristics are suitable for a proposed use, the content of fines can be lowered by washing.

Clast Lithotypes:

For use as high-specification aggregate, granular material should contain a high percentage of clasts that do not break down readily. Certain lithotypes are in general more resistant to breakdown than others, and the charts of lithologic analysis for each sample, recorded in Appendix 'A', divide the lithologic components into two groups according to whether they are regarded as being sound or unsound. The test is qualitative, being based on the determination of the lithotype of each clast in the sample, and should not be confused with quantitative soundness tests employing sodium or magnesium sulfate.

In general, deposits in the east half of Sevogle map-area contain a high percentage of unsound lithotypes, mainly sandstone. Soundness in the west half of the area is much better, many deposits being suitable for high-specification uses. Some of the deposits contain somewhat elevated percentages of a lithotype group designated 'schist and friable clasts', generally regarded as having poor soundness.

Alkali-reactivity:

Certain lithotypes are known to react with the alkalis in portland cement, resulting in expansion and cracking of the concrete in which the reactive condition occurs. Lithotypes that are potentially reactive include felsic extrusives, quartzite and chert, all of which are present in the local deposits, the content of felsic extrusives and quartzite being substantial in some cases.

While alkali-reactivity has not been documented by testing in this area, the use of aggregate having high concentrations of potentially reactive lithotypes in the making of concrete is cautioned. Testing for such reactions would be necessary for total safety. In cases of suspected reactivity, the use of low-alkali portland cement or the partial substitution of fly-ash in place of portland cement, serves as a solution to the problem (E.G. Swenson, 1973).

The Granular Deposits as Aggregate Sources

Granular aggregate sources in the Sevogle area comprise deposits of five separate genetic classifications. The characteristics and mode of occurrence of each of these

classifications will be described, and general comments made as to their suitability for the production of aggregate. More specific information on the test sample locations and the areas surrounding them is recorded in Appendix 'A'. This Appendix, which includes details of test results, is designed as a complement to the granular aggregate resource map.

Ablation Till:

Ablation till consists of poorly sorted to largely unsorted material, usually containing, in significant percentages, component particles from the entire range of clast sizes from clay through boulders. It is moderately to poorly compacted, the compaction factor normally being less than that of lodgement till, but may include pockets of better sorted ice-contact stratified material.

The few areas of ablation till represented on the granular aggregate resource map are in the form of morainic ridges, which because of their topographic uniqueness are easy to delimit and depict. In addition to these, substantial portions of the map-area are covered by a veneer of ablation till for which it is impossible to develop boundaries without doing widespread intensive ground work. This is especially true in the eastern half of the area where disintegration of a largely static ice mass has occurred. Because ablation till has only very low potential for use as aggregate, no attempt was made to map this unit.

Aggregate Production Potential

The quality of ablation till as a potential aggregate

is limited by its very high content of fine particles, and in some cases by an abundance of unsound clasts that remain in the deposit because the material has not been abraded by water transport. It is usable as fill in its pit-run state, and should be employed for this purpose whenever possible as a measure to conserve high-quality granular deposits. The quality of ablation till might in some cases be increased significantly by the use of beneficiation techniques such as crushing and washing. Detailed exploration of ablation till areas might outline reserves of higher-quality sorted material.

Ice-contact Stratified Drift:

As the name implies, these are deposits formed in contact with glacial ice, either totally confined by it or against the ice front. The deposits characteristically comprise well- to poorly-stratified sand and gravel that may include varying amounts of silt and clay. Abrupt changes in grain size and degree of sorting of the material are often noticed. Ice-dropped boulders are common in these deposits.

Stratification of ice-contact deposits is commonly faulted and contorted. This can be attributed to slump structures that are formed when supporting walls of ice melt, resulting in the collapse of the unsupported granular materials, or to compressional stresses caused by moving ice.

Aggregate Production Potential

Ice-contact stratified deposits are composed of water-transported material. The action of moving water purges the material of some of its content of fine particles, and also

causes abrasion of the clasts, resulting in the elimination of the softer rock fragments. These deposits, then, exhibit quality characteristics that make them more suitable for use as aggregate than is ablation till. In general, though, the distance of water transport of these materials is not great, so that excess fines and unsound clasts are still a problem in many of these deposits.

The ice-contact stratified deposits in the east half of the area are flooded with sandstone clasts from the local bedrock, and some also contain high percentages of fines. All of these deposits are of poor quality, with none probably being suitable for uses higher than fill.

In the west half, clast lithotypes in the ice-contact deposits again reflect the local bedrock, which is of much better quality overall than the Pennsylvanian sandstone. Many of the deposits exhibit moderately good lithologic characteristics in the clasts, and most are probably suitable for use as sub-base aggregate. This applies to the end moraines, which appear to be composed almost entirely of gravel. Test results at a few locations, notably P4-43 and P4-44, north of the North Branch Big Sevogle River, indicate possible potential for uses as high as granular base aggregate.

Glaciofluvial Outwash:

This unit comprises granular materials deposited subaerially beyond the limits of glacial ice, from the bed-load carried by glaciogenic streams. The material typically is fairly well stratified medium-pebble to small-cobble gravel, but may

range from sandy gravel to coarse-cobble gravel. The content of fine particles is usually low in outwash deposits, as the meltwater from which the coarse material is deposited tends to carry the fines farther downstream.

Outwash deposits occur, mainly in the western half of the map-area, in association with former ice-margin positions, and within the confines of meltwater courses extending from the ice-margins. The appearance of the deposits may be channelized, terraced, or flat-surfaced over limited areas. Widespread flat surfaces on granular deposits usually mark subaqueous deposition in deltaic conditions.

Aggregate Production Potential

In general, outwash materials have undergone longer water transport and a higher degree of abrasion than the ice-contact stratified materials discussed previously, and thus commonly have a lower content of fine particles and unsound clasts. The quality of aggregate from outwash deposits is on the average better than that of ice-contact stratified deposits. Many appear to be suitable for use as base aggregate, and portions of some deposits may be usable for high-specification asphalt or concrete aggregate. The downstream portions of deposits P4-21a, and the outwash unit of P4-36a, both near the Square Forks of the Sevogle River, are particularly worthy of close examination for potential as high-specification aggregate sources.

Glaciofluvial Deltaic Deposits:

Deltaic deposits have been formed in the western half of Sevogle map-area at locations where glacial meltwater flowed

into the standing water of glacial Lake Sevogle. As the streams entered the lake, their sediment-carrying competence was diminished, causing the sediment load to be dropped. The major system of these deposits flanks the lower reaches of the Big Sevogle River. The deltaic unit grades westward into the glaciofluvial outwash of the main meltwater stream that fed the delta.

At the best-exposed locations, the deposits exhibit a classic deltaic sequence beginning with stratified and in some cases varved clay and silt at the base of the section, and grading upward through fine to medium sand into pebbly medium sand and finally a surficial unit of gravel in the near-source facies. The surface granular unit ranges from pebbly medium sand to small-cobble gravel, the coarser material being encountered closer to the sediment source. The gravel phase of the unit generally has a very low content of fine particles, while the distal-facies sand phase has a higher percentage of fines, as at location P4-53, near Smoker Brook.

Aggregate Production Potential

The surface unit of this delta system, and of smaller deltaic remnants at other locations in the valley of the Northwest Miramichi and its tributaries, represents a large volume of high-quality granular aggregate material. Relatively long water transport before deposition has abraded the clasts to a point where most of the unsound lithologic components have broken down, leaving a good, hard, resistant gravel. The material at several tested locations in the Sevogle paleodelta appears to be suitable

for use as high-specification asphalt and concrete aggregate, a condition which likely persists throughout this unit whenever the percentage stone content is great enough for these uses.

Ancient alluvium:

Draining of glacial Lake Sevogle resulted in the establishment of progressively lower base-levels for the Northwest Miramichi drainage system, which allowed the rivers to erode portions of the earlier deposits in their valleys. A series of fluvial terraces were established, that are veneered with a gravel unit referred to as ancient alluvium. These deposits are characterized by terrace surfaces lying above the present river flood level. These terraces are abundant along the Northwest Miramichi from the mouth of the Tomogonops downstream, and along the lower part of the Big Sevogle River. The highest ancient alluvial terraces occur at the latter locality, being downcut surfaces in the deltaic deposits, capped by fluvial gravel. Southwest of Shaddick Lake, at least four levels of ancient alluvial terraces are recognized.

Typical material of the ancient alluvial genetic type is medium-pebble to small-cobble gravel, but the deposits may range from extremes of sandy fine to medium-pebble gravel, to coarse-cobble and small-boulder gravel. The coarsest material encountered was in the highest fluvial terrace on the Sevogle, at location P4-31, indicating a high-energy environment. Gravel in the finer range is found at P4-1 and P4-2, near Exmoor. Much of the component material of the ancient alluvial unit is assumed to be reworked from the earlier granular deposits, and consequently

exhibits relatively high sedimentary maturity. The content of fine particles and of clasts composed of unsound lithotypes is low, and the rounding factor of the clasts is high.

Aggregate Production Potential

Reserves encompassed by this unit in the west half of the map-area are very large. The quality characteristics of the ancient alluvial material indicate that a large proportion of it is probably suitable for use as high-specification asphalt and concrete aggregate. Any deposits not suitable for these uses would almost certainly be of adequate quality for use as granular base. The material should generally be quite uniform laterally within individual deposits. Because ancient alluvium is usually deposited as a capping unit, the workable depth is commonly limited by underlying residual deltaic fine sediments, or by bedrock. A high water table is sometimes a problem, especially in the lower-level terraces. Pit development designs planned to facilitate drainage can often control this problem.

Granular Aggregate Reserves

Reserves of granular aggregate are heavily weighted towards the west half of the Sevogle map-area. Out of a total of 58,173,000 m^3 (76,550,000 yd^3) of reserves calculated for the area as a whole, the west half contains 57,356,000 m^3 (75,480,000 A breakdown of this total reserve figure on the basis of individu deposits or areas surrounding individual sample locations, can be found in Appendix 'A'. The Appendix also contains other information pertinent to the deposits.

The reserve figures are regarded as being conservative, as the material depths used in calculations were held to the minimum figure that could be assumed with reasonable certainty. Deposit areas used in calculations were limited to portions of the deposits where the presence of economically recoverable reserves was again judged to be reasonably certain. Marginal areas with uncertain boundaries or minimal material thickness were excluded from the calculations. The reserve figures, then, should represent the minimum reserves recoverable if site development is conducted efficiently, and actual recovery might be markedly higher in some cases.

GRANULAR AGGREGATE RESOURCE MANAGEMENT

While many of the deposits immediately bordering the Northwest Miramichi River are privately owned and thus are susceptible to piecemeal development, most of the important deposit areas lying west of the river occur on Crown land. This situation provides an opportunity for planned management of aggregate extraction activities in an area possessing a rarely-encountered combination of immense reserves with excellent quality characteristics.

Because there are few property boundaries within deposits, large areas can be worked continuously, minimizing material wastage along property lines. Stockpiles of stripped topsoil can be located judiciously so as not to interfere with extraction, and depleted pit areas can be re-vegetated after replacement of the topsoil. Present vegetation on most of the

granular deposits is woodland, and these well-drained areas in general are not condusive to rapid growth of trees. Properly rehabilitated pit areas would probably not be significantly less productive of forest products than the same areas were before excavation, and the loss of agricultural land would obviously be minimal.

In areas such as the glaciofluvial delta and the adjacent ancient alluvial terraces of the Sevogle, the entire upper unit could be removed, and with minimal rehabilitation, the original landscape could be virtually duplicated at a level 3 to 6 m (10 to 20 ft.) lower. After this process, it is unlikely that even the groundwater recharge characteristics of the area would be materially altered, as a sand unit underlying the surficial gravel over much of the area would likely not be removed. This permeable unit would remain to entrap surface water and maintain a groundwater regime similar to that of the original system.

The Crown-held granular deposit areas are virtually uninhabited, and thus are immune to the sociological problems of dust, noise, and visual pollution that are common when the extractive industry vies for space with residential development. This factor, in combination with the other advantages of the deposits in the Sevogle area, dictates that the conscientious management of these valuable resources be of high priority.

It has been observed that much of the granular aggregate in this area is of very high quality, many of the deposits being suitable for use as granular base, or for even higher uses. Certain deposits, however, are of lesser quality, and thus are

restricted to less specialized uses. Proper management of the Crown land resources should attempt to regulate the usage of the high-quality deposits for purposes requiring high-specification aggregates, such as base, asphalt and concrete, and to steer users of non-specification materials to the lower-quality deposits. More than adequate reserves of both low and high-quality aggregate are available to supply local requirements within the map-area and in the Newcastle-Chatham urban area. Reserves of high-quality material are large enough to provide potential for long-term exporting of specification aggregates.

Considering the location of the Sevogle map-area directly on the boundary of the Maritime Plain, which represents a vast area of Pennsylvanian sandstone covering the entire Northumberland Strait-Gulf of St. Lawrence coast from Moncton north to Bathurst, the resources of Sevogle area become extremely important. Aggregate deposits overlying the sandstone are too poor for use as specification aggregate, and Sevogle area is the closest and possibly the best source from which much of the Maritime Plain area can draw high-quality aggregate. Upgrading of transportation corridors in the coastal area will likely require large quantities of high-specification aggregate in the future.

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APPENDIX A

Figures indicating deposit subdivision areas used in calculating reserves, and seismic profile locations.

FIGURE 2

LEGEND FOR FIGURES 3 TO 6

——·····—·— Geological boundary (approximate, inferred, gradational)

▬▬▬▬ Deposit subdivision boundary (for reserve calculation).

▲ 2.5 Seismic profile location, indicating granular material thickness (metres).

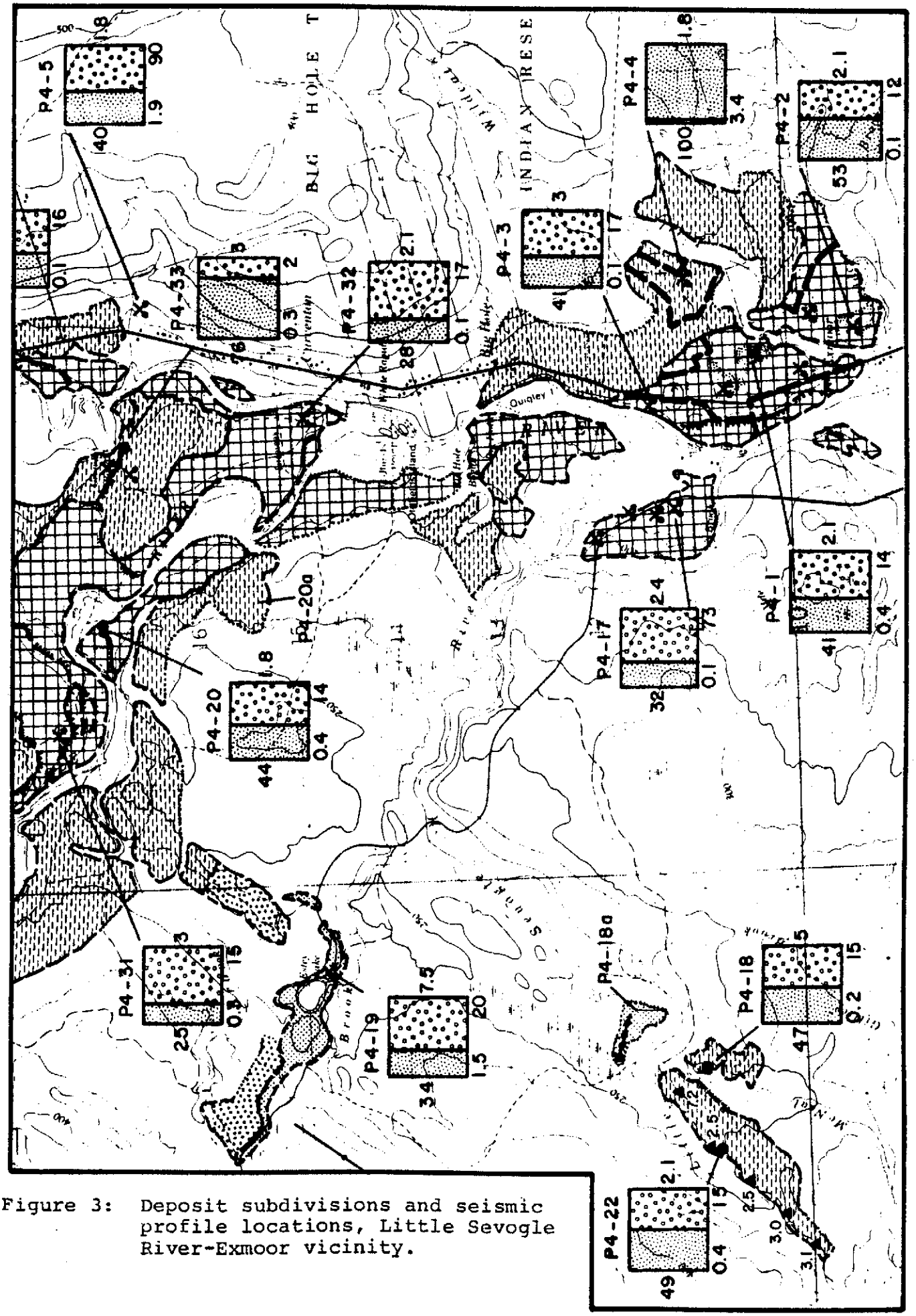

Figure 3: Deposit subdivisions and seismic profile locations, Little Sevogle River-Exmoor vicinity.

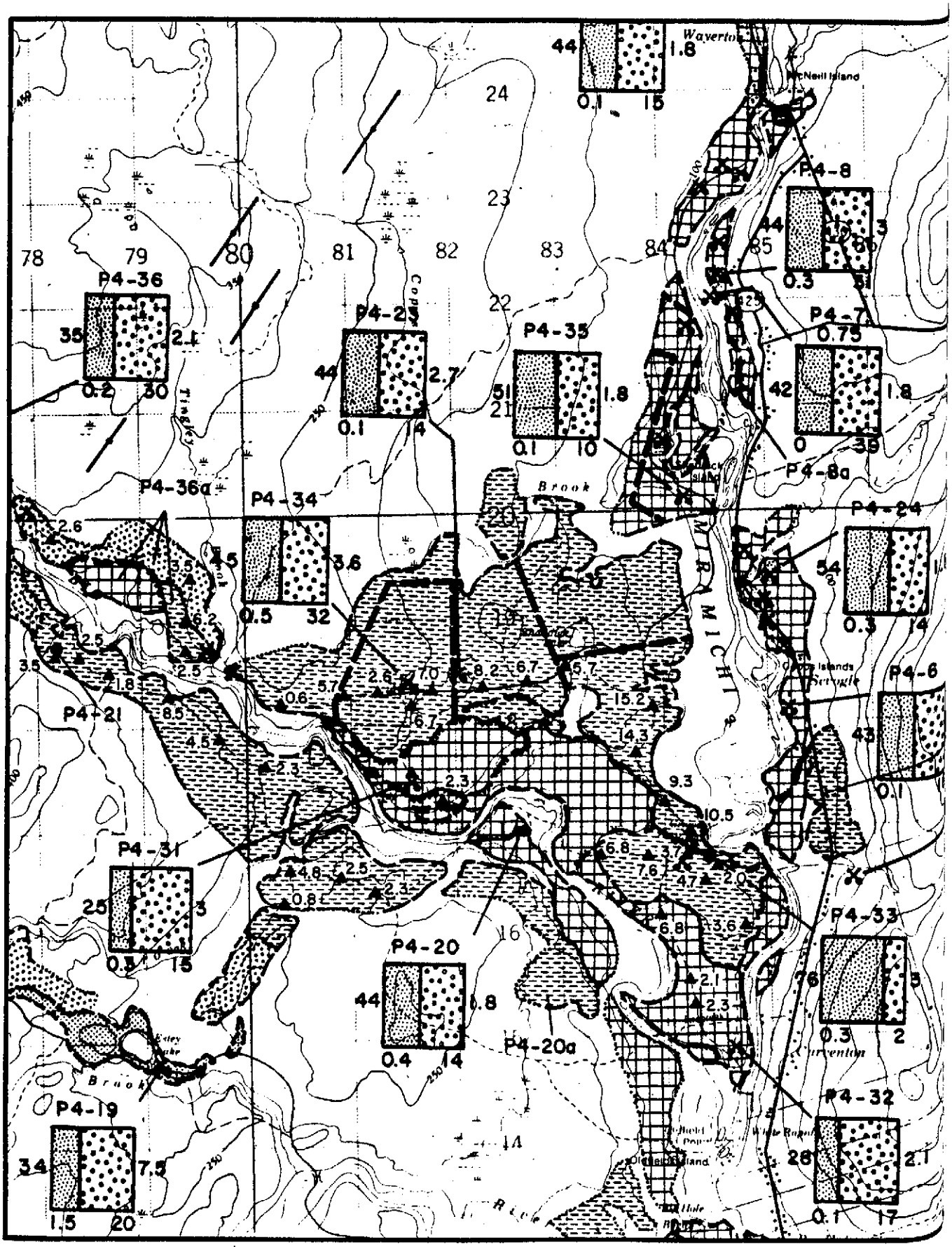

Figure 4: Deposit subdivisions and seismic profile locations, Sevogle Delta vicinity.

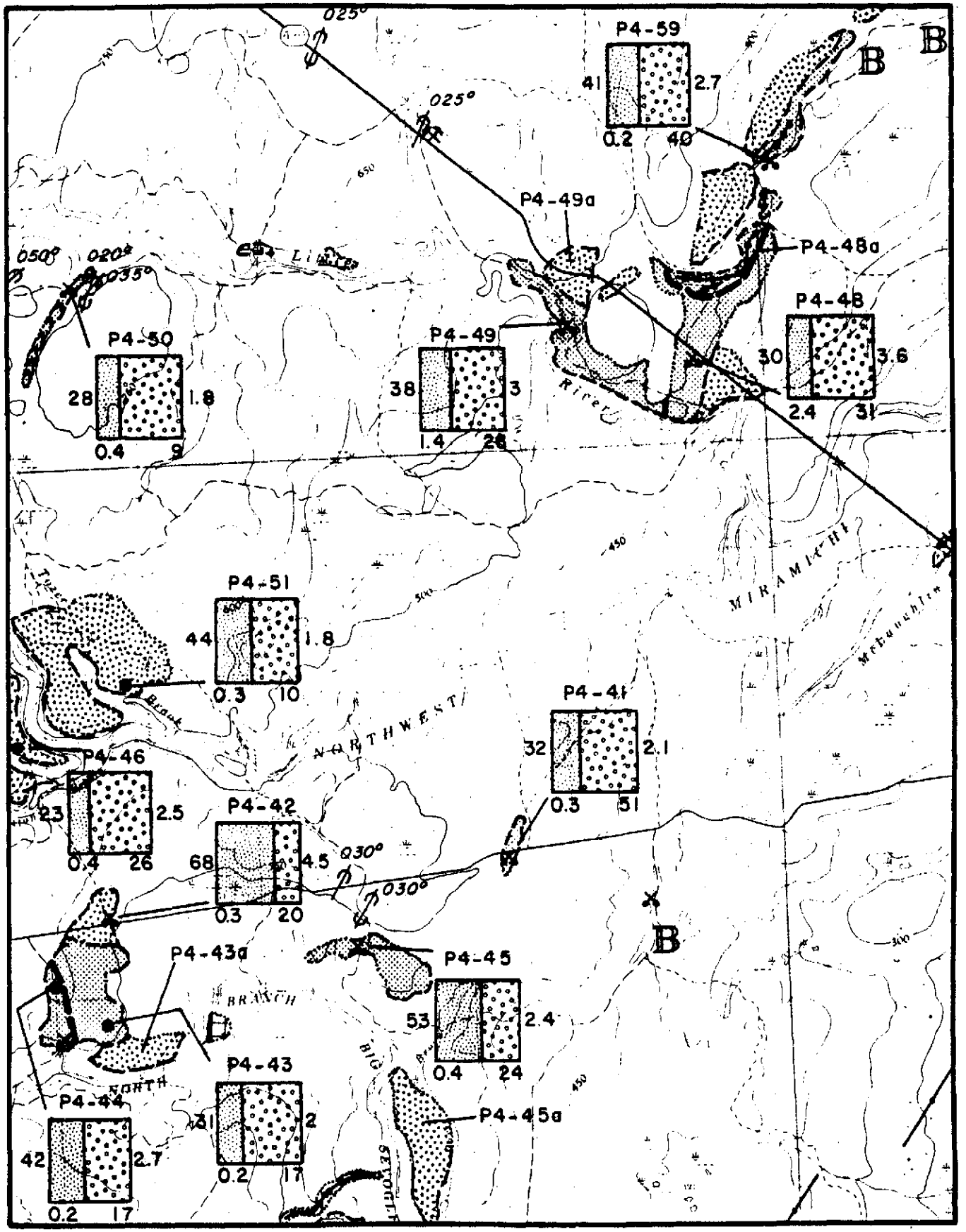

Figure 5: Deposit subdivisions, Sevogle North Branch and Little River vicinity.

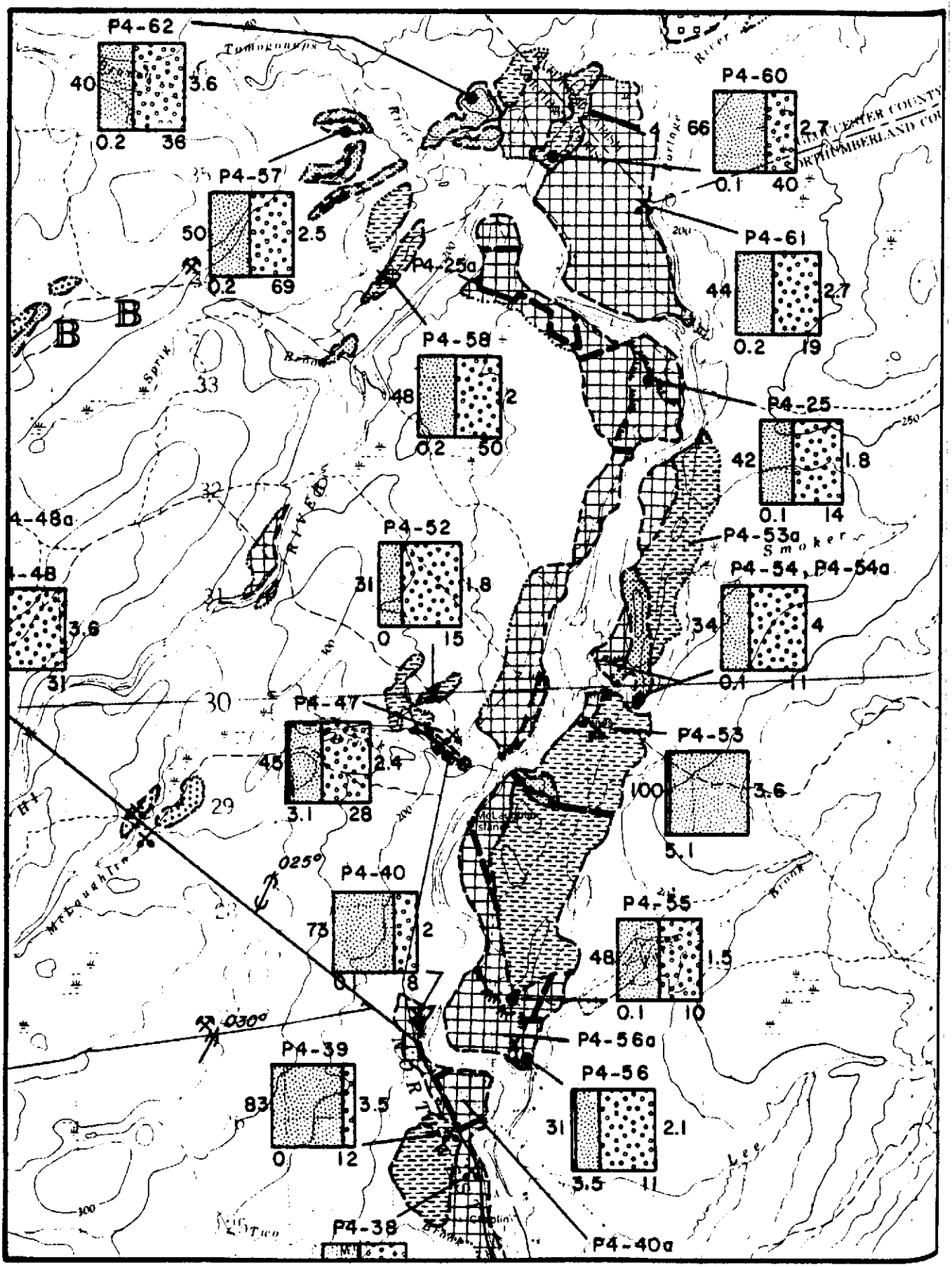

Figure 6: Deposit subdivisions, Mouth of Tomogonops-Wayerton vicinity.

APPENDIX B

Description of samples and sample locations.

Location #	P4-1	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	849 103

Section Description & Comments:

Faces ranging in height from 2 to 2.4 m (6-8 ft.) expose sandy gravel to fine-pebble gravel, with clasts mainly subrounded. Bulldozed testholes in the pit floor reveal coarser material, exhibiting medium to coarse pebbles, from which the test sample was taken.

In general, the upper beds of the deposit have a lower stone content than the roughly 60% in the test sample. Maximum clast size encountered has about 10 cm (0.3 ft.). The pit was been used as a source of crushing material in the past. Quality of the material appears to be at least suitable for use as granular subbase. For area used in reserve calculations, see Figure 3.

As at location P4-2, it is expected that material depth is limited by underlying fine sediments.

Sodium sulfate soundness loss on 1/2" minus material: Coarse fraction 1.2%; Fine fraction 2.1%.

Mechanical Analysis:

sieve			1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		86.8	77.9	57.2	41.2	30.6	23.2	9.0	2.2	0.8	0.4
	b											
	c											

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 6; sandstone, siltstone 3; soft-weathered clasts 5	felsic extrusive 5; felsic intrusive 33; vein quartz 19; quartzite 5; metavolcanic, medasediment 23

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	50 hectares (124 acres)	1.8 metres (2 yards)	910,000 m^3 (1,200,000 yds^3)

Location #	P4-2	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	854 094

Section Description & Comments:

Pit faces up to 2.4 m (8 ft.) expose clean, sandy medium-pebble gravel with clasts mainly subrounded. The depth of excavation is limited by the groundwater table, and thus material recovery might be improved if drainage could be accomplished.

The deposit forms the upper flat surface of a river terrace with approximately 12.5 m (40 ft.) relief. On the side slope of the terrace, fine sand was encountered at about 3 m (10 ft.) depth, and stratified silty clay at 4.5 m (15 ft.) and below.

For area used in reserve calculations, see Figure 3.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	94.5	86.4	65.4	52.7	40.7	30.4	9.7	0.3	0.2	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 7; sandstone, siltstone 3; soft-weathered clasts 2	felsic extrusive 12; mafic extrusive 1; felsic intrusive 31; mafic intrusive 1; vein quartz 20; quartzite 5; metavolcanic, metasediment 17

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	33 hectares (83 acres)	1.8 metres (2 yards)	610,000 m^3 (800,000 yds^3)

Location #	P4-3	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	846 114

Section Description & Comments:

Pit faces from 2.4 to 3.7 m (8-12 ft.) in height expose clean, well-stratified medium- to coarse-pebble gravel with some cobbles locally evident. Clast shapes are subrounded to rounded. Maximum clast size is about 13 cm (0.4 ft.).

The economic deposit is the cap unit of a flat-topped river terrace standing about 15 m (50 ft.) above the N.W. Miramichi River. A river cut adjacent to the pit exposes about 3.7 m (12 ft.) of gravel grading downwards into progressively finer sand, which rests on glacial till at a depth of about 7.5 m (25 ft.).

For area used in reserve calculations, see Figure 3.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	81.8	75.8	55.0	41.4	31.6	25.2	8.9	0.8	0.2	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 7; sandstone, siltstone 7; soft-weathered clasts 3	felsic extrusive 9; felsic intrusive 21; mafic intrusive 1; vein quartz 21; quartzite 3; crystal tuff 4; chert 1; metavolcanic, metasediment 24

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	17 hectares (43 acres)	2.4 metres (2.5 yards)	405,000 m^3 (535,000 yds^3)

Location #	P4-4	County:	Northumberland
Type of Deposit:	Glaciofluvial delta (lacustrine)	Parish:	Northesk
Exposure Type:	Sand pit	NTS:	21P/4
Status:	Active on demand	UTM:	862 117

Section Description & Comments:

Excavated faces up to 1.8 m (6 ft.) high in a small wayside pit on a logging access road, expose about 1.5 m (5 ft.) of stratified fine to medium sand which is pebbly in some strata. Auger sampling below the pit floor indicates that the material grades downward into silty very fine sand at a depth of 2.3 m (7.5 ft.). The finer sediments below maintain the groundwater table at a level corresponding to the pit floor.

Reserves are calculated only for a limited area around the pit (Figure 3), to a depth assumed to comprise material that is relatively low in content of fine sizes. It is expected that the remainder of the deposit comprises large resources of fill-grade material and blending sand besides the calculated reserves.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a										
	b										
	c										

Lithologic Analysis: no pebbles in sample

Unsound Lithotypes %	Sound Lithotypes %

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	22 hectares (54 acres)	1.4 metres (1.5 yards)	295,000 m^3 (390,000 yds^3)

Location #	P4-5	County:	Northumberland
Type of Deposit:	Alluvial fan	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Abandoned	UTM:	858 165

Section Description & Comments:

Dirty, medium- to coarse-pebble gravel is exposed in faces up to about 2 m (7 ft.) in height. As the lithologic analysis indicates, the content of unsound clasts is extremely high, dictating only low-quality uses. Reserves are very small.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	67.8	59.0	47.2	40.2	34.8	30.9	21.4	10.8	4.5	1.9
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
sandstone, siltstone 78; soft-weathered clasts 12	felsic extrusive 1; felsic intrusive 3; vein quartz 4; metavolcanic, metasediment 1

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
No significant reserves			

Location #	P4-6	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	852 181

Section Description & Comments:

A pit face exposes 1.8 to 2.7 m (6-9 ft.) of fine- to medium-pebble gravel, coarsening to medium-pebble gravel below 1.8 m (6 ft.). Clasts are subrounded to rounded in shape, with a maximum size of 10 cm (0.3 foot).

The area used for reserve calculations is broken by residential development, both old and new, and extends mainly southward from the pit site. Continuing housing construction could render an increasing proportion of the deposit unexploitable.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	77.9	70.2	54.2	43.2	32.9	26.2	13.6	1.5	0.2	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 10; sandstone, siltstone 4; soft-weathered clasts 2	felsic extrusive 13; mafic extrusive 1; felsic intrusive 17; vein quartz 23; quartzite 10; metavolcanic, metasediment 20

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	23 hectares (58 acres)	1.6 metres (1.8 yards)	370,000 m^3 (485,000 yds^3)

Location #	P4-7	County:	Northumberland
Type of Deposit:	Recent alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	845 220

Section Description & Comments:

Faces approximately 2 m (6-7 ft.) in height expose gravel comprising material largely of coarse pebble to medium cobble sizes, in the lowest alluvial terrace of the N.W. Miramichi River. Maximum clast size is about 20 cm (0.6 ft.). The deposit is veneered by about 0.75 m (2.5 ft.) of alluvial sand and silt.

A large portion of the deposit has already been exploited, leaving only minor reserves of fair- to good-quality material, probably suitable for use as granular base aggregate.

Testing results as follows:

Size	Soundness loss % Coarse	Fine	Abrasion loss %
1 1/2" minus	1.9	1.0	23.9
3/4"-3/8"	3.6		
Pit Run?	4.7	3.5	27.4

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	74.2	68.1	52.4	41.8	32.3	23.4	4.8	0.1	0	0
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 17; sandstone, siltstone 11; soft-weathered clasts 11	felsic extrusive 11; mafic extrusive 4; felsic intrusive 4; mafic intrusive 2; vein quartz 15; quartzite 7; tuff 4; metavolcanic, metasediment 15

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	2.4 hectares (6 acres)	1.4 metres (1.5 yards)	33,000 m^3 (40,000 yds^3)

Location #	P4-8	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	845 223

Section Description & Comments:

Faces 2.4 to 3.6 m (8-12 ft.) in height expose clean, well-stratified medium-pebble to medium-cobble gravel in this high fluvial terrace. Clasts are subrounded to rounded, with a general maximum size of 20 cm (0.6 ft.), and a few boulders up to 1.2 m (4 ft.).

Reserve calculations are based on a limited area north of the present pit, and on a lower ancient alluvial terrace to the south, designated P4-8a.

Test results as follows:

Size	Soundness loss % Coarse	Fine	Abrasion loss %
Pit Run?	1.8	1.7	25.1

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	69.3	63.6	52.4	43.6	35.9	27.4	10.1	2.5	0.8	0.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 18; sandstone, siltstone 9; soft-weathered clasts 4	felsic extrusive 12; felsic intrusive 19; mafic intrusive 2; vein quartz 14; quartzite 4; metavolcanic, metasediment 19

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-8	1.8 hectares (4.5 acres)	2.7 metres (3 yards)	50,000 m^3 (65,000 yds^3)
P4-8a	5.6 hectares (14 acres)	1.4 metres (1.5 yards)	75,000 m^3 (100,000 yds^3)

Location #	P4-9	County:	Northumberland
Type of Deposit:	Esker	Parish:	Newcastle
Exposure Type:	Borrow pit	NTS:	21P/4
Status:	Abandoned	UTM:	025 261

Section Description & Comments:

Faces ranging from 2.4 to 3.6 m (8-12 ft.) display a variable assemblage of sediments, from dirty, silty medium- to coarse-pebble gravel in the east face, to a 3 m (10 ft.) unit of silty fine sand overlain by about 1.5 m (5 ft.) of glacial ablation till in the western portion of the pit. The content of soft sandstone clasts is high, and many of these are subrounded to rounded. Heavy coatings of red silt and clay are common on the clasts.

The material is suitable only for low quality uses.

Mechanical Analysis:

sieve			1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		62.4	58.4	46.9	37.6	29.5	25.8	22.1	15.5	11.0	8.9
	b											
	c											

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 3; sandstone, siltstone 43; soft-weathered clasts 14	felsic extrusive 1; intermediate extrusive 1; felsic intrusive 6; mafic intrusive 1; vein quartz 13; quartzite 3; metavolcanic, metasediments 15

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	8 hectares (20 acres)	1.7 metres (1.8 yards)	133,000 m^3 (175,000 yds^3)

Location #	P4-10	County:	Northumberland
Type of Deposit:	Ice-contact stratified	Parish:	Newcastle
Exposure Type:	Borrow pit	NTS:	21P/4
Status:	Inactive	UTM:	016 339

Section Description & Comments:

A pit face about 1.5 m (5 ft.) in height exposes 1 m (3 ft.) of silty ice-contact or ablation gravel, overlying silty fine sand. This relationship is evident also in several other nearby exposures. Content of sandstone and other deleterious materials is high, limiting usage to fill and similar uses. Maximum clast size is about 20 cm (0.6 ft.).

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	63.7	59.4	53.7	49.8	47.3	45.8	43.1	35.2	17.4	9.4
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 6; sandstone, siltstone 62; soft-weathered clasts 12	felsic extrusive 3; felsic intrusive 3; vein quartz 6; chert 1; metavolcanic, metasediment 6

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	13 hectares (32 acres)	1.4 metres (1.5 yards)	175,000 m^3 (230,000 yds^3)

Location #	P4-11	County:	Northumberland
Type of Deposit:	Glaciofluvial outwash	Parish:	Newcastle
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	048 342

Section Description & Comments:

A 1.2 m (4 ft.) exposure in a road cut displays coarse-pebble to medium-cobble gravel. At other locations, pebbly fine to medium sand was encountered below a depth of about 1.5 m (5 ft.). An excess of fine particles is noted in the mechanical analysis, which in combination with a high content of soft sandstone dictates low-quality uses.

The adjacent end morainic ridge comprises bouldery, loose ablation till, and is not included in the reserve calculation. This material may be usable as borrow.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	67.4	64.9	58.9	55.0	51.5	47.9	38.6	21.0	8.4	5.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 1; sandstone, siltstone 68; soft-weathered clasts 7	felsic intrusive 9; vein quartz 4; quartzite 4; metavolcanic, metasediment 6

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	6.4 hectares (16 acres)	1.8 metres (2 yards)	117,000 m^3 (150,000 yds^3)

Location #	P4-12	County:	Northumberland
Type of Deposit:	Ablation gravel	Parish:	Newcastle
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	077 354

Section Description & Comments:

A road cut exposes 1 m (3 ft.) of dirty, coarse-pebble to medium-cobble ice-contact or ablation gravel on the flank of a topographic high with 2-3 m (6-10 ft.) relief. Clasts up to 30 cm (1 ft.) in size are nearly all sandstone, resulting in very poor quality.

Another ice-contact deposit 1200 m to the east of this location requires testing with power equipment for evaluation, and is not included in the reserve calculations.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	59.6	55.8	49.5	45.8	43.6	42.5	38.8	28.4	15.1	8.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 2; sandstone, siltstone 94; soft-weathered clasts 2	felsic extrusive 2

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	7 hectares (17 acres)	1.8 metres (2 yards)	125,000 m^3 (165,000 yds^3)

Location #	P4-13	County:	Northumberland
Type of Deposit:	Esker	Parish:	Newcastle
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	047 332

Section Description & Comments:

A road cut 1.2 m (4 ft.) deep exposes medium-pebble to small-cobble gravel with a preponderance of subrounded to rounded sandstone clasts. This characteristic severely limits material quality, although the water-transported nature of this deposit probably results in somewhat better abrasion resistance in the clasts than would be expected in most nearby ice-contact or ablationary granular deposits.

Topographic relief of the esker is up to 3.7 m (12 ft.) on the west side, and about 1.8 m (6 ft.) on the east side, giving an average material depth of 1.8 m (6 ft.).

The reserve calculations for P4-13 include the adjacent outwash deposit. Reserves for an esker segment to the south, designated P4-13a, are listed separately.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	69.4	65.8	57.2	50.2	41.9	34.3	16.8	9.0	5.3	2.4
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist 1; sandstone, siltstone 76; soft-weathered clasts 1	mafic extrusive 1; felsic intrusive 7; vein quartz 2; quartzite 1; metavolcanic, metasediment 10

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-13	5 hectares (12 acres)	1.8 metres (2 yards)	88,000 m^3 (115,000 yds^3)
P4-13a	4 hectares (10 acres)	1.4 metres (1.5 yards)	143,000 m^3 (185,000 yds^3)

Location #	P4-14	County:	Northumberland
Type of Deposit:	Kame	Parish:	Newcastle
Exposure Type:	Road-cut, test pits	NTS:	21P/4
Status:	Undeveloped	UTM:	075 321

Section Description & Comments:

A logging road cut on the flank of this kame exposes 1.2 m (4 ft.) of sandy medium- to coarse-pebble gravel. Test pits near the crest of the kame expose coarser material with some boulders to 0.6 m (2 ft.) diameter. Sandstone dominates the clast lithotypes, resulting in very poor quality.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	68.5	68.1	64.9	61.7	59.2	56.5	46.7	18.0	2.0	0.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
sandstone, siltstone 93	felsic intrusive 7

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	1 hectare (2.5 acres)	3.6 metres (4 yards)	36,000 m^3 (50,000 yds^3)

Location #	P4-15	County:	Northumberland
Type of Deposit:	Kame complex	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	759 220

Section Description & Comments:

A woods road cut in an area of hummocky ice-contact stratified material exposes 0.7 m (2.5 ft.) of poorly-sorted but loose-textured pebbly sand. Maximum clast size is about 3 cm (1.25 inch).

Mechanical Analysis:

sieve			1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		98.7	98.7	96.9	92.3	81.9	69.7	40.8	19.2	10.6	4.4
	b											
	c											

Lithologic Analysis: Insufficient number of pebbles

Unsound Lithotypes %	Sound Lithotypes %

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	28 hectares (69 acres)	2.7 metres (3 yards)	760,000 m^3 (1,000,000 yds^3)

Location #	P4-16	County:	Northumberland
Type of Deposit:	End moraine	Parish:	Northesk
Exposure Type:	Shovel excavation	NTS:	21P/4
Status:	Undeveloped	UTM:	756 228

Section Description & Comments:

A shovel excavation at the crest of this prominent end-moraine ridge revealed 0.6 m (2 ft.) of medium-pebbly sand and sandy gravel, low in fine particle content but not uniformly graded. Clasts up to about 13 cm (0.4 ft.) in diameter, are predominantly subangular, with some subrounded.

Because of lack of exposure, the internal material characteristics of the ridge are unknown. The core of the ridge might be more till-like than the test sample indicates.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	87.2	85.3	79.0	72.9	61.3	47.3	14.4	1.8	0.6	0.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 27; sandstone, siltstone 3	felsic extrusive 8; felsic intrusive 24; vein quartz 19; metavolcanic, metasediment 19

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	21 hectares (52 acres)	7.3 metres (8 yards)	1,530,000 m^3 (2,010,000 yds^3)

Location #	P4-17	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active	UTM:	836 111

Section Description & Comments:

Fresh pit faces 2.1 to 2.7 m (7-9 ft.) in height give good exposure of clean, well-stratified medium-pebble to small-cobble gravel of fluvial deposition. Component clasts, which are mainly subrounded to rounded in shape, are of excellent quality, yielding a durable crushed product that is well suited to use in concrete and asphalt. This deposit should be reserved for use as high-specification aggregate only. During 1977, asphaltic aggregate was being crushed at a property in the southern portion of the deposit.

The southeastern extremity of the deposit is bounded by an erosional terrace about 6 m (20 ft.) high. At the northern extent of the deposit, an exposure reveals about 2 m (7 ft.) of gravel overlying silty clay. This relationship probably exists over the entire deposit area.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	59.4	53.8	40.4	31.9	23.9	18.2	6.7	0.9	0.3	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 5; sandstone, siltstone 3; soft-weathered clasts 5	felsic extrusive 8; mafic extrusive 9; felsic intrusive 27; vein quartz 16; quartzite 8; metavolcanic, metasediment 19

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	34 hectares (84 acres)	1.8 metres (2 yards)	618,000 m^3 (810,000 yds^3)

Location #	P4-18	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	River cut	NTS:	21P/4
Status:	Undeveloped	UTM:	779 109

Section Description & Comments:

A river cut exposes 6 m (20 ft.) of sediments, comprising about 2.4 m (8 ft.) of clean, sandy medium- to coarse-pebble gravel overlying medium to coarse sand which grades downward into very fine sand at the base of the exposure. Fine sediments are expected below. The gravel clasts are subangular to subrounded, with a maximum diameter of about 13 cm (0.4 ft.).

Reserves designated P4-18 are for the deltaic deposit only. Reserves for the ice-contact stratified deposit immediately north of the nearby Little Sevogle River are designated P4-18a. This deposit was not sampled, and probably is of lower quality. Confidence in the accuracy of the volume figure for P4-18a is relatively low.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	84.6	78.7	59.7	47.1	34.0	24.1	8.6	2.2	0.6	0.2
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 7; sandstone, siltstone 7; soft-weathered clasts 1	felsic extrusive 10; mafic extrusive 3; felsic intrusive 18; vein quartz 7; quartzite 14; chert 1; metavolcanic, metasediment 31

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-18	11 hectares (27 acres)	1.8 metres (2 yards)	200,000 m^3 (260,000 yds^3)
P4-18a	10 hectares (24 acres)	2.7 metres (3 yards)	265,000 m^3 (345,000 yds^3)

Location #	P4-19	County:	Northumberland
Type of Deposit:	End moraine	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	791 148

Section Description & Comments:

Pit faces expose 4.5 to 10.5 m (15-35 ft.) of variable stratified material ranging from fine and pebbly sand to large cobble gravel. Clasts are mainly subrounded, exhibiting a general maximum size of 25 cm (0.9 ft.), with a few boulders as large as 0.6 m (2 ft.). The excavation extends into the interior of the ridge, indicating the entire ridge mass to be composed of granular material.

Material has presently been excavated to a level about 7.5 m (25 ft.) below the surface level of Estey Lake, and to a position about 30 m (100 ft.) away from the lake shore. Further excavation adjacent to the lake must be strictly avoided, as this might result in total draining of the lake. A setback or reserve area of 120 m (400 ft.) around the lakeshore is recommended. This setback has been excluded from reserve calculations.

Mechanical Analysis: wet-sieved

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	49.4	46.9	40.6	33.7	23.3	13.2	3.7	2.1	1.7	1.5
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 16; sandstone, siltstone 2; soft-weathered clasts 2	felsic extrusive 4; felsic intrusive 33; mafic intrusive 4; vein quartz 24; quartzite 4; metavolcanic, metasediment 10

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-19	18 hectares (45 acres)	5.2 metres (5.6 yards)	937,000 m^3 (1,230,000 yds^3)
P4-19a	26 hectares (66 acres)	1.4 metres (1.5 yards)	364,000 m^3 (480,000 yds^3)

Location #	P4-20	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	825 170

Section Description & Comments:

A road cut on this 2.1 m (7 foot) terrace exposes about 1 m (3.5 ft.) of coarse-cobble gravel with clasts subrounded to rounded. Maximum clast size is about 25 cm (0.9 ft.). The material should be suitable for sub-base and possibly base aggregate applications.

Confidence is low in the figures used in reserve calculations for area P4-20a, a deltaic deposit south of P4-20, because of poor accessibility. The data derived from test sample P4-20 may not reflect the material in deposit P4-20a.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	66.8	63.1	52.8	43.8	31.2	21.3	6.3	1.5	0.8	0.4
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 10; sandstone, siltstone 2; soft-weathered clasts 2	felsic extrusive 7; mafic extrusive 3; felsic intrusive 17; mafic intrusive 2; vein quartz 17; quartzite 15; chert 2; metavolcanic, metasediment 24

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-20	38 hectares (94 acres)	1.6 metres (1.8 yards)	620,000 m^3 (810,000 yds^3)
P4-20a	55 hectares (137 acres)	1.8 metres (2 yards)	1,005,000 m^3 (1,325,000 yds^3)

Location #	P4-21	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Test pit	NTS:	21P/4
Status:	Undeveloped	UTM:	782 188

Section Description & Comments:

Several test pits in the vicinity expose up to 2.4 m (8 ft.) of clean, coarse-pebble to coarse-cobble gravel with clasts subrounded to rounded. In general, the material becomes finer towards the southeast (downstream in terms of glacial meltwater flow), and coarser towards the northwest.

The reserves for P4-21 include the entire deposit in which the sample site occurs, plus the adjacent glaciofluvial deltaic mass lying south of Whitney Brook. Seismic profile locations indicating the thickness of granular material, are depicted on Figure 4. The reserves designated P4-21a comprise the glaciofluvial outwash deposit adjoining P4-21 on its western boundary. Confidence in the figures for P4-21a is somewhat lower than for the remainder of the area.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	53.1	50.7	42.3	37.1	30.5	23.4	5.2	0.6	0.2	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 10, sandstone, siltstone 2; soft-weathered clasts 3	felsic extrusive 6; mafic extrusive 3; felsic intrusive 21; mafic intrusive 2; vein quartz 14; quartzite 10; metavolcanic, metasediment 19

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-21	176 hectares (440 acres)	2.7 metres (3.0 yards)	4,855,000 m^3 (6,375,000 yds^3)
P4-21a	52 hectares (131 acres)	1.8 metres (2 yards)	965,000 m^3 (1,265,000 yds^3)

Location #	P4-22	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	770 109

Section Description & Comments:

A road cut at the top of a 4.5 m (15 ft.) terrace exposes about 1.2 m (4 ft.) of medium- to coarse-pebble gravel with a few cobbles up to a diameter of 20 cm (0.7 ft.). The clasts are subangular to subrounded. Soundness of the clasts based on lithologic analysis appears moderately good, and the material should be suitable at least for sub-base purposes.

Seismic profile locations indicating the thickness of granular material, are depicted on Figure 3.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	70.6	65.2	55.4	49.0	41.6	32.4	9.6	1.5	0.7	0.4
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 10; sandstone, siltstone 3; soft-weathered clasts 2	felsic extrusive 10; mafic extrusive 3; felsic intrusive 19; mafic intrusive 3; vein quartz 5; quartzite 16; chert 2; metavolcanic, metasediment 26

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	59 hectares (147 acres)	1.8 metres (2 yards)	1,080,000 m^3 (1,420,000 yds^3)

Location #	P4-23	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active	UTM:	819 185

Section Description & Comments:

A freshly-worked face exposes up to 2.7 m (9 ft.) of coarse-pebble gravel, fining to gravelly coarse sand at the base. Clasts are subrounded to rounded, with a maximum size of 13 cm (0.4 ft.). Clast lithotypes are very good, and the material is clean and appears suitable for high-specification uses such as asphalt and concrete aggregate.

The area used in calculating reserves, as well as seismic profile locations with granular material thickness figures, are depicted on Figure 4.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	65.8	60.1	51.0	44.1	38.0	31.9	12.7	0.9	0.2	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 11; sandstone, siltstone 1; soft-weathered clasts 2	felsic extrusive 3; felsic intrusive 17; mafic intrusive 2; vein quartz 22; quartzite 23; chert 1; metavolcanic, metasediment 18

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	92 hectares (229 acres)	4.5 metres (4.9 yards)	4,100,000 m^3 (5,395,000 yds^3)

Location #	P4-24	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	850 193

Section Description & Comments:

Medium-pebbly gravel is exposed in disused faces up to 1.8 m (6 ft.) in height. Clasts up to a maximum size of 10 cm (0.3 ft.) are subrounded to rounded, and the component lithotypes are good. The material is probably usable for applications demanding quality characteristics as high as base aggregate.

Groundwater accumulations on the pit floor in spring and autumn indicate an impervious layer closely underlying the deposit. About 30% of the reserves lie north of Trout Brook.

Test results as follows:

Size	Soundness loss %	
	Coarse	Fine
1" minus	0.4	1.8

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	88.6	83.2	64.5	53.8	42.4	36.4	23.4	4.4	1.4	0.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 7; sandstone, siltstone 3; soft-weathered clasts 4	felsic extrusive 9; felsic intrusive 27; vein quartz 20; quartzite 17; metavolcanic, metasediment 13

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	24 hectares (59 acres)	1.4 metres (1.5 yards)	325,000 m^3 (425,000 yds^3)

Location #	P4-25	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	867 329

Section Description & Comments:

A road cut at the top of a 2.1 m (7 ft.) terrace exposes about 1 m (3 ft.) of medium-pebble to medium-cobble gravel in a clean matrix of medium sand. A higher terrace with about 2.1 m (7 ft.) relief occurs to the west. Clasts are subrounded to rounded, and appear to be of excellent quality. The deposit is probably suitable for use as base aggregate, and possibly for concrete and asphalt.

The areas used in reserve calculations for both P4-25 and P4-25a are illustrated on Figure 6. Additional small areas of workable material, for which reserves were not calculated, might be found on knolls in the southward extension of the deposit, between the southern limit of area P4-25, and location P4-47.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	59.5	56.7	46.9	41.6	37.1	33.2	17.4	1.6	0.3	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 10; sandstone, siltstone 4	felsic extrusive 8; felsic intrusive 22; vein quartz 23; quartzite 18; metavolcanic, metasediment 15

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-25	58 hectares (146 acres)	1.8 metres (2 yards)	1,075,000 m^3 (1,410,000 yds^3)
P4-25a	23 hectares (58 acres)	1.4 metres (1.5 yards)	320,000 m^3 (420,000 yds^3)

Location #	P4-31	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active	UTM:	814 174

Section Description & Comments:

Faces ranging in height from 2.4 m (8 ft.) to 3.5 m (11 ft.) expose clean, medium-pebble to coarse-cobble gravel, with numerous boulders up to 0.7 m (2.5 ft.). Clasts are subrounded to rounded, and quality of the lithotypes is very good, with the material being suitable for use as concrete and asphalt aggregate.

The material becomes somewhat finer at the bottom of the face, and probably grades downward rapidly into sand. An impervious layer close beneath the pit floor, probably clay, maintains the water table close to the base of the pit.

The area used in calculating reserves includes all terrace areas surrounding the sample location and lying above the lowest ancient alluvial surface. Locations of seismic profiles, with granular material thicknesses, are depicted on Figure 4.

Test results as follows:

Size	Soundness loss % Coarse	Fine	Abrasion loss %
3/4" stone	0.9		23.7
blending sand		1.6	

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	47.0	43.4	31.9	24.7	19.8	15.4	6.3	2.1	0.8	0.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 10; sandstone, siltstone 1; soft-weathered clasts 4	felsic extrusive 4; felsic intrusive 24; vein quartz 7; quartzite 18; chert 3; metavolcanic, metasediment 28

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	63 hectares (157 acres)	2.6 metres (2.8 yards)	1,630,000 m^3 (2,140,000 yds^3)

Location #	P4-32	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	846 148

Section Description & Comments:

A pit face 2.4 m (8 ft.) high exposes clean, coarse-pebble gravel, with clasts subrounded to rounded. Clast lithotypes are of very good quality, and the material should be suitable for use as granular base and possibly as concrete or asphalt aggregate.

Fine sediments are to be expected at a depth of about 3.0 to 3.7 m (10-12 ft.), as indicated by the water table at the base of the pit.

Locations of seismic profiles, with granular material thicknesses, are depicted on Figure 4.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	49.9	46.1	36.0	28.2	20.7	13.5	3.1	0.6	0.3	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 11; sandstone, siltstone 4; soft-weathered clasts 2	felsic extrusive 2; felsic intrusive 13; mafic intrusive 4; vein quartz 19; quartzite 28; chert 2; metavolcanic, metasediment 15

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	59 hectares (148 acres)	1.8 metres (2 yards)	1,090,000 m^3 (1,430,000 yds^3)

Location #	P4-33	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	845 168

Section Description & Comments:

A road cut exposes about 4.6 m (15 ft.) of sediments at the edge of a large terrace 15 to 21 m (50 to 70 ft.) high. Fine- to medium-pebble gravel in the upper 1.5 m (5 ft.), grades downward through pebbly coarse sand into medium sand below the 3.7 m (12 ft.) depth. At about 4.6 m (15 ft.) depth, massive silty clay is encountered. Maximum clast size in the gravel is about 6 cm (0.2 ft.)

The area used in calculating reserves, and the locations of seismic profiles indicating granular material thickness, are depicted on Figure 4.

Quality of the clast lithotypes is excellent, but the low stone content limits usefulness of the nearby material. A small roadside pit about 250 m (300 yd.) west of this location exposes 3 m (10 ft.) or more of medium- to coarse-pebble gravel with a much higher stone content.

Test results as follows:

Size	Soundness loss % Coarse	Fine	Abrasion loss %
Pit Run	0.4	0.9	28.2

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	99.3	95.4	86.1	75.6	58.7	42.0	17.0	2.6	0.6	0.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 2	felsic extrusive 8; mafic extrusive 2; felsic intrusive 30; vein quartz 26; quartzite 24; metavolcanic, metasediment 8

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	173 hectares (432 acres)	4.6 metres (5.0 yards)	7,916,000 m^3 (10,410,000 yds^3)

Location #	P4-34	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	815 185

Section Description & Comments:

Faces from 3.0 to 4.6 m (10-15 ft.) in height expose clean, well-stratified medium-pebble to small-cobble gravel with clasts mainly subrounded. The material appears to be finer near the 4.6 m (15 ft.) depth. Clast quality is very good, and the material is probably suitable for use as granular base, and possibly for high-specification aggregate.

The area used in calculating reserves, and the locations of seismic profiles indicating granular material thickness, are depicted on Figure 4.

Test results as follows:

Size	Soundness loss % Coarse	Fine	Abrasion loss %
1 1/4"	0.9	2.4	26.7
3/4" stone	0.9		
1/2" minus	1.5		
sand		1.1	

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	66.6	59.2	50.9	45.0	40.1	34.3	14.7	2.2	0.6	0.5
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 16; sandstone, siltstone 3; soft-weathered clasts 13	felsic intrusive 30; vein quartz 16; quartzite 16; metavolcanic, metasediment 6

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	99 hectares (248 acres)	4.5 metres (5 yards)	4,560,000 m^3 (6,000,000 yds^3)

Location #	P4-35	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	841 201

Section Description & Comments:

A pit face about 1.8 m (6 ft.) in height exposes clean, medium- to coarse-pebble fluvial gravel with sandy interbeds. Clasts are largely rounded, and the component lithotypes are of excellent quality. The material should be suitable for use as specification concrete and asphalt aggregate. Maximum clast size is about 10 cm (0.3 ft.).

Groundwater in the pit indicates an impervious layer closely underlying the pit floor. Figure 4 illustrates the area used in calculating reserves.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	81.1	75.9	60.6	50.8	43.2	38.0	21.1	1.8	0.2	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 5; sandstone, siltstone 5	felsic extrusive 5; felsic intrusive 13; vein quartz 25; quartzite 16; chert 2; metavolcanic, metasediment 30

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	46 hectares (114 acres)	1.4 metres (1.5 yards)	630,000 m^3 (825,000 yds^3)

Location #	P4-36	County:	Northumberland
Type of Deposit:	Glaciofluvial outwash	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Abandoned	UTM:	774 209

Section Description & Comments:

A partly overgrown face in this small pit exposes about 2.4 m (8 ft.) of coarse-pebble to coarse-cobble gravel with subrounded clasts. Maximum clast diameter is about 20 cm (0.7 ft.).

Quality of the sampled material is somewhat limited by a high content of friable clasts that may be susceptible to abrasion. Quality might be better in some portions of area P4-36a, southeast of the sample location.

Locations of seismic profiles in deposit P4-36a, indicating thickness of granular material, are depicted on Figure 4.

Mechanical Analysis:

sieve		I"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	62.6	55.1	43.4	35.1	26.4	19.9	7.6	1.9	0.5	0.2
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, slate, friable clasts 25; sandstone, siltstone 4; soft-weathered clasts 1	felsic extrusive 1; felsic intrusive 13; vein quartz 22; quartzite 16; metavolcanic, metasediment 16

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-36	2 hectares (5 acres)	1.4 metres (1.5 yards)	27,000 m^3 (35,000 yds^3)
P4-36a	82 hectares (206 acres)	1.6 metres (1.8 yards)	1,350,000 m^3 (1,770,000 yds^3)

Location #	P4-37	County:	Northumberland
Type of Deposit:	Glaciofluvial outwash	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Abandoned	UTM:	769 208

Section Description & Comments:

A pit face 2.4 m (8 ft.) in height exposes sandy fine- to medium-pebble gravel in the upper 1 m (3 ft.). The remainder of the face is covered with slumped material. Clasts are subrounded in shape, with a maximum size of about 13 cm (0.4 ft.). Material quality appears to be good, with only a moderate content of deleterious clasts.

Groundwater on the pit floor indicates impervious fine sediment at shallow depth.

The portion of the deposit lying west of the Square Forks of the Sevogle, designated P4-37a, is thought to contain large reserves. However, confidence is relatively low in both the area and depth figures, because of poor access and exposure.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	82.9	76.5	58.6	43.4	29.6	20.3	7.2	1.3	0.3	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 13; sandstone, siltstone 2	felsic extrusive 6; felsic intrusive 17; vein quartz 22; quartzite 19; metavolcanic, metasediment 22

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-37	8 hectares (20 acres)	1.8 metres (2 yards)	145,000 m^3 (190,000 yds^3)
P4-37a	52 hectares (131 acres)	1.8 metres (2 yards)	965,000 m^3 (1,250,000 yds^3)

Location # P4-38 County: Northumberland

Type of Deposit: Ancient alluvium Parish: Northesk

Exposure Type: Gravel pit NTS: 21P/4

Status: Inactive UTM: 847 255

Section Description & Comments:

Pit faces expose up to 2 m (6.5 ft.) of medium-pebble fluvial gravel, with clasts subrounded to rounded. The general maximum size is about 8 cm (0.25 ft.), with occasional boulders to 1 m (3 ft.) diameter.

Clast lithotypes are of very good quality, and the material should be useful for applications at least as high as base aggregate.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	85.9	76.1	57.1	43.6	34.1	25.8	8.4	0.9	0.3	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 4; sandstone, siltstone 7; soft-weathered clasts 4	felsic extrusive 8; mafic extrusive 3; felsic intrusive 8; vein quartz 29; quartzite 16; chert 3; metavolcanic, metasediment 20

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	8.4 hectares (21 acres)	1.4 metres (1.5 yards)	115,000 m^3 (150,000 yds^3)

Location # P4-39 County: Northumberland

Type of Deposit: Glaciofluvial delta Parish: Northesk

Exposure Type: Sand pit NTS: 21P/4

Status: Inactive UTM: 845 258

Section Description & Comments:

Faces up to 4.5 m (15 ft.) in height expose pebbly medium to coarse sand in the upper 1.5 m (5 ft.), grading downwards into fine sand near the base of the section. Test pits about 200 m (600 ft.) to the west indicate a similar surface material. Maximum size of the subrounded clasts is 4 cm (1.5 inch).

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	100	99.0	92.3	83.3	66.5	52.2	23.6	4.5	0.3	0
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 4; sandstone, siltstone 4; soft-weathered clasts 4	felsic intrusive 4; mafic intrusive 4; vein quartz 38; quartzite 29; metavolcanic, metasediment 13

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	31 hectares (78 acres)	2.7 metres (3 yards)	430,000 m^3 (565,000 yds^3)

Location #	P4-40	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	843 269

Section Description & Comments:

Fresh faces 1.8 to 2.5 m (6 to 8 ft.) in height expose fine-pebble gravel and gravelly medium to coarse sand, clean and well-stratified. Clasts up to 4 cm (1.5 inch) in diameter are mainly subrounded. Component lithotypes are of good quality, although the stone content is low, averaging only about 15-20%.

Reserves at the pit site are virtually nil. The calculated reserves illustrated below are for area P4-40a, located south of the pit site and east of Highway 430 (see Figure 6). It is expected that the material here is similar to the tested sample.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	99.2	97.8	85.9	72.7	54.5	40.5	17.8	3.0	0.4	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 6; sandstone, siltstone 2	felsic extrusive 2; felsic intrusive 24; mafic intrusive 2; vein quartz 24; quartzite 24; metavolcanic, metasediment 14

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-40a	13 hectares (32 acres)	1.4 metres (1.5 yards)	175,000 m^3 (230,000 yds^3)

Location #	P4-41	County:	Northumberland
Type of Deposit:	Ice-contact stratified	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	773 262

Section Description & Comments:

A face up to 2.4 m (8 ft.) high, in a small wayside pit, exposes coarse-pebble to coarse-cobble gravel, and includes a few small boulders up to 0.4 m (1.3 ft.) in size. Content of fine particles is moderate, with some clay-silt coatings on clasts.

The fines content and poor clast quality dictate low-quality uses.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	64.3	56.5	40.8	31.8	24.6	19.4	9.0	3.4	1.4	0.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 21; sandstone, siltstone 27; soft-weathered clasts 3	felsic intrusive 4; vein quartz 17; quartzite 20; tuff 3; metavolcanic, metasediment 6

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	2 hectares (5 acres)	1.4 metres (1.5 yards)	27,000 m^3 (35,000 yds^3)

Location #	P4-42	County:	Northumberland
Type of Deposit:	Glaciofluvial outwash	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	736 257

Section Description & Comments:

A face about 4.5 to 5 m (14-16 ft.) in height exposes sandy fine- to medium-pebble gravel and gravelly sand in the upper 2 m (6 ft.), grading downwards into sandier material. Clast quality seems reasonably good, although stone content is low. Maximum clast size is about 8 cm (0.25 ft.).

The reserve calculation below is for the area designated as glaciofluvial outwash, minus a strip about 60 m (200 ft.) wide along the road (Figure 5).

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	87.5	83.5	75.5	67.7	59.6	49.6	17.5	2.0	0.5	0.3
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 15; sandstone, siltstone 2; soft-weathered clasts 3	felsic extrusive 5; mafic extrusive 2; felsic intrusive 15; vein quartz 34; quartzite 7; metavolcanic, metasediment 18

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	6.4 hectares (16 acres)	2.7 metres (3 yards)	170,000 m^3 (230,000 yds^3)

Location #	P4-43	County:	Northumberland
Type of Deposit:	Ice-contact stratified	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	734 248

Section Description & Comments:

Medium-pebble to medium-cobble gravel is exposed in a road cut about 0.9 m (3 ft.) in height, and also in another low exposure near the summit of this 7.5 m (25 ft.) kame. Maximum clast size is about 20 cm (0.6 ft.). Lithologic analysis reveals a somewhat elevated content of friable clasts, which may hamper use of the material for applications higher than base aggregate.

Reserves designated P4-43 include that portion of the ice-contact deposit lying east of the north-south trending woods road (see Figure 5).

Reserves designated P4-43a comprise the glaciofluvial outwash deposit south of P4-43.

Confidence in both reserve figures is only moderate, because of limited exposure.

Mechanical Analysis:

sieve			1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		59.1	54.0	42.0	31.3	18.9	9.9	2.3	0.5	0.3	0.2
	b											
	c											

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 15; soft-weathered clasts 4	felsic extrusive 8; mafic extrusive 1; felsic intrusive 14; vein quartz 20; quartzite 11; metavolcanic, metasediments 28

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-43	45 hectares (113 acres)	1.8 metres (2 yards)	810,000 m^3 (1,090,000 yds^3)
P4-43a	17 hectares (42 acres)	1.4 metres (1.5 yards)	230,000 m^3 (305,000 yds^3)

Location #	P4-44	County:	Northumberland
Type of Deposit:	Ice-contact stratified	Parish:	Northesk
Exposure Type:	Test pit	NTS:	21P/4
Status:	Undeveloped	UTM:	728 251

Section Description & Comments:

Two test pits on a 4.5 m (15 ft.) high ridge of ice-contact material, expose a composite section of about 2.5 m (8 ft.) of clean medium-pebble to medium-cobble gravel. Subangular to subrounded clasts up to 20 cm (0.6 ft.) in size reflect lithotypes of moderately good quality. The material is probably suitable for uses at least up to the granular base aggregate level.

The area used in the reserve calculation lies west of the north-south trending woods road, as depicted on Figure 5.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	69.6	61.0	48.7	42.0	36.0	28.6	9.6	2.4	0.6	0.2
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 11; sandstone, siltstone 3; soft-weathered clasts 4	felsic extrusive 4; felsic intrusive 17; mafic intrusive 3; vein quartz 17; quartzite 12; metavolcanic, metasediment 30

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	9 hectares (23 acres)	2.7 metres (3 yards)	255,000 m^3 (330,000 yds^3)

Location #	P4-45	County:	Northumberland
Type of Deposit:	Kame terrace	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	759 253

Section Description & Comments:

An old, slumped pit face 3 to 3.5 m (10-12 ft.) high exposes fine-pebble to small-cobble gravel in the upper 1.2 m (4 ft.). The remainder of the cut is talus-covered. The material is moderately clean, but there is a substantial content of potentially unsound lithotypes among the subangular to subrounded clasts. Maximum clast size is about 15 cm (0.5 ft.).

A glaciofluvial outwash deposit lying about 1.6 km (1 mi) south of the sample location, is designated P4-45a in the estimate of reserves. This deposit is untested, and confidence in the reserve figue is relatively low because of poor accessibility.

Mechanical Analysis:

sieve			1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		79.7	73.7	62.3	53.4	37.3	23.9	8.5	1.6	0.6	0.4
	b											
	c											

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 20; sandstone, siltstone 4	felsic extrusive 2; mafic extrusive 2; felsic intrusive 11; vein quartz 20; quartzite 24; metavolcanic, metasediment 17

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-45	20 hectares (51 acres)	1.8 metres (2 yards)	375,000 m^3 (490,000 yds^3)
P4-45a	36 hectares (90 acres)	1.4 metres (1.5 yards)	495,000 m^3 (650,000 yds^3)

Location #	P4-46	County:	Northumberland
Type of Deposit:	Glaciofluvial outwash	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	728 274

Section Description & Comments:

A cut on a logging access road exposes about 1.8 m (6 ft.) of medium-pebble to medium-cobble gravel, with clasts up to about 22 cm (0.7 ft.) in diameter showing predominantly subrounded shapes. Quality is limited by a high percentage of friable clasts, reflecting the character of the local schist and slate bedrock.

The reserve calculations include the adjacent deposit to the south.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	59.5	52.9	36.0	23.4	12.6	7.3	2.7	0.9	0.5	0.4
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 24; sandstone, siltstone 1; soft-weathered clasts 1	felsic intrusive 3; vein quartz 34; quartzite 24; metavolcanic, metasediment 11

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	11 hectares (27 acres)	2.7 metres (3 yards)	298,000 m^3 (390,000 yds^3)

Location #	P4-47	County:	Northumberland
Type of Deposit:	End moraine	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	846 296

Section Description & Comments:

Faces ranging in height from 1.8 to 3 m (6-10 ft.) expose variable stratified ice-contact sediments, including gravel and sand. Numerous boulders up to about 1 m (3 ft.) in diameter have been left in the pit. Quality of the material is only poor to fair, with a substantial content both of fine particles and of unsound lithotypes.

Mechanical Analysis:

sieve			1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		72.2	66.4	55.5	44.7	31.8	23.6	16.0	10.0	5.0	3.1
	b											
	c											

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 9; sandstone, siltstone 14; soft-weathered clasts 5	felsic extrusive 2; felsic intrusive 21; vein quartz 9; quartzite 27; metavolcanic, metasediment 13

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	0.6 hectares (1.5 acres)	1.8 metres (2 yards)	11,000 m^3 (15,000 yds^3)

Location #	P4-48	County:	Northumberland
Type of Deposit:	Kame terrace	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	793 308

Section Description & Comments:

In the upper 1.5 m (5 ft.) of a 4.3 m (14 ft.) pit face, somewhat silty, coarse-pebble to boulder gravel is exposed. The remainder of the face is talus-covered. The clasts are subrounded, ranging in size up to boulders of 0.75 m (2.5 ft.) diameter. Coatings of fine particles were noted on some clasts, and general clast quality is only fair.

The reserve figure designated P4-48a includes material in the large morainic ridge, the limits of which are illustrated on Figure 5. Reserves designated P4-48 include the remainder of the ice-contact deposit south to the narrowest point of the deposit on the north side of Little River (see also Figure 5).

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	60.4	55.5	41.6	30.2	20.8	14.0	6.9	3.7	2.8	2.4
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 15; sandstone, siltstone 5; soft-weathered clasts 11	felsic extrusive 3; felsic intrusive 11; mafic intrusive 1; vein quartz 7; quartzite 27; metavolcanic, metasediment 21

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-48	36 hectares (89 acres)	4.5 metres (5 yards)	1,635,000 m^3 (2,150,000 yds^3)
P4-48a	4.4 hectares (11 acres)	7.3 metres (8 yards)	324,000 m^3 (425,000 yds^3)

Location #	P4-49	County:	Northumberland
Type of Deposit:	Ice-contact stratified	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	782 313

Section Description & Comments:

Faces from 1.8 to 4.5 m (6-15 ft.) in height expose materials ranging from medium sand to small boulder gravel. Clasts range in size up to 1.2 m (4 ft.) boulders in the south end of the pit, and most clasts are subrounded in shape. Content of undesirable lithotypes is somewhat high, but the material is probably suitable for use as sub-base, and possibly as base aggregate.

Reserves designated P4-49 are in the area of ice-contact material extending east to the narrowest point of the deposit north of the Little River (Figure 5). Reserves designated P4-49a are confined to the glaciofluvial outwash north of location P4-49.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	63.8	60.9	47.9	37.5	25.7	20.4	14.3	10.0	4.4	1.4
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 16; sandstone, siltstone 10	felsic extrusive 4; felsic intrusive 12; vein quartz 16; quartzite 31; metavolcanic, metasediment 12

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-49	26 hectares (66 acres)	1.8 metres (2 yards)	485,000 m^3 (640,000 yds^3)
P4-49a	5.6 hectares (14 acres)	1.4 metres (1.5 yards)	77,000 m^3 (100,000 yds^3)

Location #	P4-50	County:	Northumberland
Type of Deposit:	Esker	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	274 316

Section Description & Comments:

The excavated face of a small wayside pit exposes about 1.8 m (6 ft.) of largely massive, fine- to coarse-pebble gravel. Clasts are subangular to subrounded, with a maximum size of about 12 cm (0.4 ft.). Coatings of fine particles were noted on some clasts. Quality of the clasts is moderately good, but reserves are small.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	78.9	67.6	46.5	28.1	14.8	7.5	2.3	0.8	0.5	0.4
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 7; sandstone, siltstone 2	felsic extrusive 1; felsic intrusive 7; vein quartz 26; quartzite 35; metavolcanic, metasediment 22

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	1.6 hectares (4 acres)	1.8 metres (2 yards)	30,000 m^3 (40,000 yds^3)

Location #	P4-51	County:	Northumberland
Type of Deposit:	Glaciofluvial outwash	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	741 278

Section Description & Comments:

A road cut exposes 1 m (3 ft.) of medium- to coarse-pebble gravel partway down a 4.5 m (15 ft.) terrace. Maximum clast size is about 12 cm (0.4 ft.). There is some content of friable clasts, which may affect quality.

Poor exposure leaves both the area of the deposit and the material thickness uncertain, limiting confidence in the reserve figure. Local relief of about 4.5 m (15 ft.) on the irregular surface of the deposit may be indicative of material depth.

Mechanical Analysis:

sieve			1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		80.5	76.7	60.9	43.8	28.2	16.9	2.2	0.5	0.4	0.3
	b											
	c											

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 8; soft-weathered clasts 2	felsic extrusive 2; felsic intrusive 8; vein quartz 27; quartzite 31; metavolcanic, metasediment 22

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	48 hectares (120 acres)	1.8 metres (2 yards)	880,000 m^3 (1,160,000 yds^3)

Location #	P4-52	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	842 302

Section Description & Comments:

Disused pit faces expose up to 2.1 m (7 ft.) of clean medium-pebble gravel with clasts mainly subrounded. Maximum clast size is about 10 cm (0.3 ft.).

Reserve calculations include the area of deltaic material west of the pit site.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	88.1	84.6	57.7	30.6	12.6	7.0	2.7	0.6	0.1	0
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 2; sandstone, siltstone 10; soft-weathered clasts 3	felsic intrusive 19; mafic intrusive 2; vein quartz 21; quartzite 26; tuff 5; metavolcanic, metasediment 13

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	7 hectares (17 acres)	1.4 metres (1.5 yards)	94,000 m^3 (125,000 yds^3)

Location #	P4-53	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Sand pit	NTS:	21P/4
Status:	Active	UTM:	861 296

Section Description & Comments:

Fresh faces 1.8-4.3 m (6-14 ft.) in height expose medium and fine to medium sand, sometimes pebbly, in the upper beds, with some fine to very fine sand beds lower in the face. Relief of the deposit in this locality is about 6 m (20 ft.).

Reserves for P4-53 are calculated for an area extending south to a line roughly continuous with the crest of the morainic ridge about 700 m (2300 ft.) southwest of the pit (Figure 6). South of this line, the material is finer.

Reserves designated P4-53a represent the deltaic unit north of Smoker Brook.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a				100	99.2	98.3	93.2	64.8	21.1	5.1
	b										
	c										

Lithologic Analysis: No pebbles in sample

Unsound Lithotypes %	Sound Lithotypes %

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-53	39 hectares (98 acres)	2.7 metres (3 yards)	1,080,000 m^3 (1,420,000 yds^3)
P4-53a	32 hectares (81 acres)	2.3 metres (2.5 yards)	745,000 m^3 (980,000 yds^3)

Location #	P4-54	County:	Northumberland
Type of Deposit:	Ice-contact stratified	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	865 299

Section Description & Comments:

A partly overgrown 4.5 m (15 ft.) road cut exposes about 1.5 m (5 ft.) of medium-pebble to small-cobble gravel at the top of the section. Clasts are mainly subrounded, with a maximum size of 20 cm (0.6 ft.). Material quality appears to be moderately good.

Reserves designated P4-54 include the morainic ridge about 1050 m (3500 ft.) to the southwest. Reserves designated P4-54a are for the higher terrace of the ancient alluvial deposits northwest of the sample location.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	77.2	70.3	50.0	34.0	23.9	18.8	6.3	1.4	0.5	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 1; sandstone, siltstone 10	felsic extrusive 5; felsic intrusive 19; vein quartz 39; quartzite 11; chert 3; metavolcanic, metasediment 11

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-54	22 hectares (55 acres)	4.5 metres (5 yards)	962,000 m^3 (1,315,000 yds^3)
P4-54a	2.4 hectares (6 acres)	1.8 metres (2 yards)	44,000 m^3 (55,000 yds^3)

Location #	P4-55	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	851 271

Section Description & Comments:

A road cut exposes about 1 m (3.5 ft.) of fine- to medium-pebble gravel at the top of a 3 m (10 ft.) ancient river terrace. Subrounded to rounded clasts with a maximum size of 6 cm (0.2 ft.) comprise moderately good lithotypes.

The reserve calculations include all workable portions of the higher ancient alluvial terrace lying west of the main north-south access road (see Figure 6).

Mechanical Analysis:

sieve			1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		96.8	89.3	64.4	47.8	37.3	29.1	11.3	1.4	0.1	0.1
	b											
	c											

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 4; sandstone, siltstone 6	felsic extrusive 4; felsic intrusive 21; mafic intrusive 1; vein quartz 28; quartzite 16; chert 1; metavolcanic, metasediment 16

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	26 hectares (66 acres)	1.4 metres (1.5 yards)	365,000 m^3 (480,000 yds^3)

Location #	P4-56	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	853 265

Section Description & Comments:

A road cut exposes about 2 m (6 ft.) of medium- to coarse-pebble gravel with occasional cobbles, at the top of a 7.5 m (25 ft.) terrace. Clasts up to about 20 cm (0.7 ft.) are subrounded to rounded in shape, and have minor coatings of fine particles. Fines content is slightly elevated, but clast lithotypes exhibit good quality.

Reserves at P4-56 comprise the southward-extending lobe of the upper terrace around the sample site. Reserves designated P4-56a comprise the lower ancient alluvial terrace west of the sample location (see Figure 6).

Mechanical Analysis:

sieve			I"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a		79.9	68.3	42.3	31.3	22.0	17.2	12.2	10.0	3.9	3.5
	b											
	c											

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 4; sandstone, siltstone 5; soft-weathered clasts 2	felsic extrusive 6; felsic intrusive 15; mafic intrusive 3; vein quartz 39; quartzite 15; chert 1; tuff 1; metavolcanic, metasediment 9

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
P4-56	2.4 hectares (6 acres)	2.7 metres (3 yards)	66,000 m^3 (85,000 yds^3)
P4-56a	30 hectares (74 acres)	1.8 metres (2 yards)	543,000 m^3 (715,000 yds^3)

Location #	P4-57	County:	Northumberland
Type of Deposit:	End moraine	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	840 354

Section Description & Comments:

A woods road cut exposes 0.9 m (3 ft.) of medium- to coarse-pebble gravel with occasional cobbles near the base of this morainic ridge. The subrounded clasts have a maximum size of about 20 cm (0.7 ft.). Minor coatings of fine particles were noted on the clasts, and material quality is further limited by a high content of unsound lithotypes, particularly friable, schistose clasts.

The reserve figures include workable portions of the two ice-contact deposits immediately south of the sample location.

Mechanical Analysis:

sieve		I"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	70.1	65.5	57.2	49.5	41.2	31.6	14.7	2.5	0.4	0.2
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 54; sandstone, siltstone 9; soft-weathered clasts 6	felsic extrusive 1; mafic extrusive 1; felsic intrusive 16; quartzite 6; tuff 2; metavolcanic, metasediment 5

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	18 hectares (46 acres)	2.7 metres (3 yards)	508,000 m^3 (670,000 yds^3)

Location #	P4-58	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	842 340

Section Description & Comments:

A small gravel pit exposes up to 1.8 m (6 ft.) of medium- to coarse-pebble gravel with a few cobbles up to a diameter of about 25 cm (0.8 ft.). The material is clean, but a high content of potentially unsound lithotypes limits quality. There is no groundwater in the pit, and it is expected that maximum material depth is somewhat greater than the exposed faces indicate.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	64.2	61.1	53.6	47.5	44.1	39.0	17.4	1.6	0.4	0.2
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 32; sandstone, siltstone 14; soft-weathered clasts 4	felsic extrusive 4; mafic extrusive 3; felsic intrusive 18; mafic intrusive 1; vein quartz 9; quartzite 6; metavolcanic, metasediment 10

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	8.4 hectares (21 acres)	1.8 metres (2 yards)	155,000 m^3 (200,000 yds^3)

Location #	P4-59	County:	Northumberland
Type of Deposit:	End moraine	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Active on demand	UTM:	802 328

Section Description & Comments:

Faces in a small gravel pit expose a composite section totalling about 5.5 m (18 ft.) of clean, medium-pebble to small-cobble gravel. Subangular to subrounded clasts are up to about 18 cm (0.6 ft.) in size. The content of unsound lithotypes is relatively high, adversely affecting material quality.

Nearly half of the calculated reserves lie in a separate glaciofluvial outwash unit southwest of the sample location.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	65.0	60.6	49.3	40.7	31.3	23.4	8.0	1.5	0.4	0.2
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 27; sandstone, siltstone 6; soft-weathered clasts 7	felsic extrusive 7; felsic intrusive 7; vein quartz 14; quartzite 10; metavolcanic, metasediment 21

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	38 hectares (96 acres)	2.7 metres (3 yards)	1,060,000 m^3 (1,390,000 yds^3)

Location #	P4-60	County:	Northumberland
Type of Deposit:	Glaciofluvial delta	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	858 351

Section Description & Comments:

A logging road cut at the top of a 15 m (50 ft.) terrace exposes about 2 m (7 ft.) of gravelly coarse sand to sandy gravel. The clasts, with a maximum size of about 10 cm (0.3 ft.), are subangular to subrounded, indicating relatively short water transport. A high percentage of unsound clasts was noted.

True depth of the granular material is unknown because of poor exposure, thus the depth figure below is only an estimate. The material becomes finer with depth.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	84.7	81.8	74.3	65.6	51.9	38.5	14.9	2.1	0.3	0.1
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 20; sandstone, siltstone 14; soft-weathered clasts 6	felsic extrusive 4; felsic intrusive 16; mafic intrusive 2; vein quartz 16; quartzite 16; metavolcanic, metasediment 8

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	9 hectares (22 acres)	3.6 metres (4 yards)	325,000 m^3 (425,000 yds^3)

Location #	P4-61	County:	Northumberland
Type of Deposit:	Ancient alluvium	Parish:	Northesk
Exposure Type:	Gravel pit	NTS:	21P/4
Status:	Inactive	UTM:	867 346

Section Description & Comments:

Medium-pebble to medium-cobble fluvial gravel is exposed in the upper 1 m (3 ft.) of talus-covered pit faces up to 3 m (10 ft.) high. The well-rounded clasts, up to 20 cm (0.7 ft.) in diameter, exhibit good lithotypes, which in combination with the clean nature of the material should make it suitable for uses at least as high as base aggregate. Suitability as concrete or asphalt aggregate would be subject to varification by sulfate soundness and abrasion testing. The area of the deposit used in calculating reserves is indicated on Figure 6.

A second area of ancient alluvium, west of P4-60, exhibits gravelly material at surface, but material depth may not be sufficient to warrant development.

Mechanical Analysis:

sieve		I"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	70.7	62.7	50.4	43.8	38.2	33.8	18.6	3.5	0.5	0.2
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 12; sandstone, siltstone 7	felsic extrusive 15; intermediate extrusive 4; felsic intrusive 12; mafic intrusive 1; vein quartz 16; quartzite 11; metavolcanic, metasediment 23

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	144 hectares (360 acres)	2.7 metres (3 yards)	3,970,000 m^3 (5,225,000 yds^3)

Location #	P4-62	County:	Northumberland
Type of Deposit:	End moraine	Parish:	Northesk
Exposure Type:	Road cut	NTS:	21P/4
Status:	Undeveloped	UTM:	851 357

Section Description & Comments:

A logging road cut near the top of this moraine complex exposes about 0.6 m (2 ft.) of medium-pebble to medium-cobble gravel with moderate to low fines content. Clasts are subangular to subrounded, with a maximum diameter of about 25 cm (0.8 ft.). Quality of the material is limited by a high content of clasts of unsound lithotypes.

The reserve figures include a smaller ice-contact deposit lying south of the main deposit.

Mechanical Analysis:

sieve		1"	3/4"	3/8"	#4	8	14	30	50	100	200
% passing	a	62.3	58.1	46.8	40.0	32.2	23.6	7.9	1.6	0.5	0.2
	b										
	c										

Lithologic Analysis:

Unsound Lithotypes %	Sound Lithotypes %
schist, friable clasts 23; sandstone, siltstone 10; soft-weathered clasts 3	felsic extrusive 5; felsic intrusive 15; vein quartz 13; quartzite 11; metavolcanic, metasediment 21

Estimation of Reserves:

total deposit area (acres)	area workable (acres)	average thickness (feet)	recoverable reserves (yd^3) probable
	16 hectares (39 acres)	3.6 metres (4 yards)	573,000 m^3 (755,000 yds^3)