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Sand and Gravel Assessment for the United Counties of Stormont, Dundas and Glengarry.

by

G.A. Gorrell and T.W. Fletcher

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E.G. Pye, Director
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FOREWORD

This report presents an inventory of sand and gravel resources in the United Counties of Stormont, Dundas and Glengarry. Sand and gravel, and particularly aggregate for high-specification uses, are in limited supply in the United Counties. The maps accompanying this report delineate the areas of the best sand and gravel reserves. This information is presented so that land use planning strategies will allow the fullest use of these valuable resources.

E.G. Pye, Director
Ontario Geological Survey

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SUMMARY

There are approximately 90,200,000 cubic metres of available sand and gravel within the United Counties of Stormont, Dundas and Glengarry. The material is not distributed throughout the United Counties, but concentrated within a few areas; notably Mountain and Winchester Townships. The larger deposits located within these townships have material which will pass the specifications required for Class 2 and Class 3 material, but little, if any, Class 1 material is available without processing. The high reserves calculated for these deposits are reflections of the deposits' large areal expanse and the amount of material below the water table.

The deposits with Class 1 material are small ancient beach ridges located in the northeast portion of Stormont County and the northwest segment of Glengarry County. There are only limited amounts of material available within these ridges and any large construction projects could easily deplete the reserves.

SAND AND GRAVEL AGGREGATE ASSESSMENT

FOR THE

UNITED COUNTIES OF

STORMONT, DUNDAS AND GLENGARRY

BY

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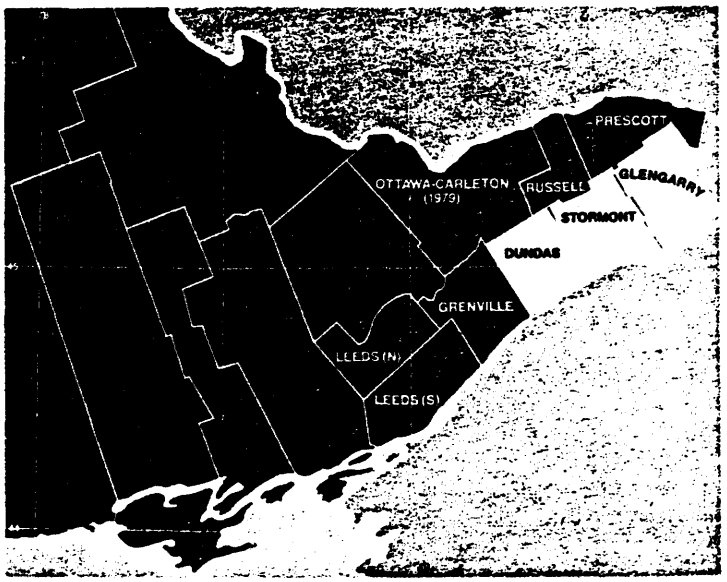

Figure 1 - Location Map

INTRODUCTION

In the strictest sense, a resource is any supply that will meet a need. Natural resources, such as aggregates are representatives of the actual and potential wealth of an area. Within any area, there are discrepancies between the perceived, actual, and potential resources. These should be recognized before any classification is attempted.

The physical description of a resource is derived and controlled by a set of quality restrictions that are established as construction criteria by Government agencies. These specifications can be altered depending on the material available, but still stay within established requirements.

Beyond the physical description of a resource are intangibles which affect the actual resource classification. Man-made features such as railways, hydro lines, roads, and village locations will alter any resource classification. If the potential resource, aggregates in this case, is under a road or railway line, it cannot, without moving the road or railway, be classified as an actual aggregate resource. The material has become part of the developed landscape and because it can no longer be extracted, it is no longer a viable resource.

The Ministry of Natural Resources, Eastern Region, has assessed the aggregate resources of the United Counties of Stormont, Dundas and Glengarry. The actual physical specifications or usefulness of the aggregate resources are based on requirements established by the Ministry of Transportation and Communications. The report recognizes that an aggregate resource is a manifestation of many variables. Factors such as the sterilization of resources and depletion of the available material are regarded as important variables. The final assessment is designed to illustrate the location of potentially workable aggregate deposits and to assist the United Counties, or municipalities, and industry in planning for aggregate conservation and extraction.

RECOMMENDATIONS

(1) There is a spatial concentration of the sand and gravel reserves within the United Counties of Stormont, Dundas and Glengarry. Mountain and Winchester Townships, between them, account for more than 54 percent of the material available within the United Counties. This percentage can be further divided into two localities, the Loughlin Ridge and the Morewood Esker, which account for more than 71.0 percent of the available material.

The high quality deposits should be allowed to be extracted to their maximum potential.

(2) (a) A significant proportion (46 percent) of the material available in the Loughlin Ridge and the Morewood Esker, is below the watertable. If future demands are to be met, the extraction of the material below the watertable should be recognized as a facet of extraction.

(b) Other ridges, notably the Sandtown Ridge in Osnabruck Township and the ridge two kilometres east of Crysler in Finch Township, also have material below the watertable. Again, if future demands are to be met, the extraction of material below the watertable should be recognized as a facet of extraction.

(3) (a) All areas of sand and gravel designated as Class 1 and Class 2 under the F.K. System should be protected for future use in Extraction Industry Category.

(b) Portions of Class 3 should also be protected after consultation between the County, the Municipality and the Ministry of Natural Resources.

(4) High quality aggregate is in great demand within the study area. This material, especially the high quality sand, should be protected because manufactured sand is very expensive.

(5) There is an abundance of granular fill material in the form of dunes, marine sands, and flaggy limestone beaches within the study area. Not all of these areas have been indicated because local topographic highs and lows have created varied depths. Some areas have been tested and have produced erratic results within one area. Although some areas have been delineated, it should also be recognized that there are other local areas which are suitable for granular fill. Since these are not usually major deposits, but are essential, their extraction should be permitted under the Rural Category.

(6) Some deposits, notably the ancient beach ridges in Stormont County and Glengarry County have been delineated only by geological borders. Segments of these ridges could contain aggregates suitable for fill for the local operator.

GEOLOGICAL SETTING

Previous studies in the area have found no remnants of pre-Wisconsin glacial events. However, two tills, of Wisconsin age, the Malone and the Fort Covington, have been found which indicate the direction of ice movement (Terasmae, 1965; MacClintock, 1958).

The Malone till is the oldest preserved evidence of ice movement during the Wisconsin period. Studies on the compact blue-grey till by Terasmae (1965), MacClintock (1958), and Richard (1975) have found that the ice movement was generally from the northeast.

As the Malone ice retreated, a lake, or series of lakes occupied the area between the ice and the Adirondack Mountains. During this period, a considerable realignment of the ice was taking place. The direction of ice movement during the Fort Covington re-advance is evidence for this. Studies done on the loose, sandy till by Terasmae (1965) and Richard (1975) indicate that the ice advanced from the northwest.

Until the Fort Covington ice retreated, no evidence that the Lower St. Lawrence was ice free has been found (Terasmae, 1965). When the Fort Covington ice margin did retreat northward, the marine waters which had, to that time, been blocked by the ice, inundated the area creating the Champlain Sea. The drainage of fresh water from the Lake Ontario basin and from the Pembroke area, plus the uplift of the land limited the westward extension of the Champlain Sea. Continued drainage and uplift gradually transferred the marine environment to a freshwater environment. Continued uplift eventually caused the recession of the Champlain Sea leaving the St. Lawrence River in its present location.

Concerning sand and gravel deposits, the most important glacial or post glacial event was the submergence of the area by the Champlain Sea. The lack of classical glacial features is evidence for this.

The drumlins and glaciofluvial features which are present have been altered in various degrees by wave/wash processes. Ancient beach ridges are the most predominate sand and gravel formations within the area. These beaches range in elevation from 91 to 114 metres and are generally derived from the underlying till. These beaches are commonly found on the northwest side of the till ridges. Two large ridges however, do not totally exhibit internal beach grading, the Loughlin Ridge in Mountain Township, and the ridge immediately west of the Village of Morewood in Winchester Township.

The Loughlin Ridge trends south and southwest, and is located four kilometres east of Kemptville. The ridge could be an extension of the glaciofluvial ridge in the Regional Municipality of Ottawa-Carleton. Investigation has found that only one portion, at the south to southwest transition point, exhibits internal ice contact gradation. The remainder exhibits beach and, in some locations, deltaic characteristics, reflecting wave/wash alteration. The source of the material is probably glaciofluvial.

The ridge west of Morewood is probably another wave altered glaciofluvial ridge. Surficially, the ridge does exhibit wave alteration. Internally, the beach features grade into slumped layers, characterized by many ice contact features. Testing indicates that at least 10 metres of usable material is below the water table. Earlier workers concluded that the ridge might be an esker, however this ridge could be an extension of the glaciofluvial ridge south of Sarsfield.

FIELD PROGRAM

A six stage field program was carried out in 1978, 1979 and 1980. The initial step, in 1978, was the reconnaissance of the area where all the pits and quarries were found, described, sketched and mapped. The information obtained was used to estimate the amount of material removed. This information provided a firm base for the final assessment.

An intensive field program was carried out in 1979 and 1980. A literature search of previous work on the surficial geology was carried out. Studies by Richard (1970-75), Owen (1951), Terasmae (1965), Chapman and Putnam (1966), MacClintock (1958), Charron (1978), Gwyn and Thibault (1975), Gwyn and Girard (1975), Gwyn and Lohse (1973), Wagner (1970) and Proctor and Redfern (1975) were studied and the pertinent data was transferred to 1:50,000 scale topographic maps.

Black and white aerial photographs with approximate scales of 1:50,000, 1:37,000, and 1:15,000 (taken from flights flown in 1971, 1976, and 1978 respectively) were examined and features with sand and gravel potential were also transferred to the 1:50,000 topographic maps. General depths were established from Ontario Ministry of the Environment (MOE) well log records and marked on the corresponding deposits. Detailed field checks followed and the suitability and the extent of each deposit was established.

The field investigations were extensive and interrelated with previous work. As each deposit and/or pit was checked, the aerial photographs were re-examined to find trends. This continuous re-evaluation established tentative cut-offs or economical limits of each deposit. The investigations noted the sand/gravel ratio; grain size of the sands present; silt and clay content; the amount of deleterious material (shale, siltstone, etc.); the extent of the sterilization and the depletion of the material. The information gathered was the basis for the adjustment of the dimensions of the deposits which had been established from previous work. Vertical and horizontal

dimensions were determined by seismograph, EM-31 terrain conductivity unit, and by truck mounted power augers. From these data, tentative economic boundaries of the deposits were established.

Deposits which were less than one metre deep, unless they were of great areal extent, and aggregate resources 10 metres below the water table and deeper were considered as uneconomical and discounted as a regional resource. Some of the shallow deposits, however, have been noted as possible resources for local use only.

F.K. AGGREGATE CLASSIFICATION SYSTEM

COARSE (a)	FINE (b)
1. Asphalt & Concrete	Asphalt & Concrete
2. Granular A, 16 MM Crushed	Blending Sands
3. Granular B and C	Granular B and C
4. Granular Fill	

The F.K. Aggregate Classification System, developed by Eastern Region of the Ministry of Natural Resources, groups granular deposits into two gradational categories, coarse and fine aggregate, and four quality categories (1-4), based on the standards of the Ministry of Transportation and Communications (MTC). The percent of material retained on the #4 sieve, determines the coarse aggregate content.

Classification '1a' is coarse aggregate, '1b' is fine aggregate, that is generally acceptable for asphalt and/or concrete uses, (MTC Form 1002, 1003). This is the highest quality aggregate, and should be protected for these purposes.

Classification '2a' includes gravel that, when processed, can meet the quality and gradational standards of the MTC for Granular A and 16 MM Crushed A, B. (MTC Form 1010). A deposit is considered a Granular A source, if it contains a minimum of 35% in coarse aggregate (greater than 5 MM sieve), and a minimum of 20% larger than 25 MM sieve. Minor quality problems prohibit its use for asphalt or concrete uses.

This material is used as a base for asphalt or concrete pavements, as the traffic surface for secondary (gravel) roads or as crushed aggregate for the shoulders of the highway.

Classification '2b' are sands that are blended in small quantities with other sands or quarry screenings (dust), to produce a product that meets the gradational specifications for asphalt or concrete.

Classification '3a', '3b' includes aggregate commonly known as "pit run", which is normally unprocessed sands and gravels. This material is used to build the road base to grade level in preparation for the application of Granular A, (MTC Form 1010).

Classification '4' includes material located within the boundaries of an aggregate deposit, that is suitable for granular fill only. This material is still granular in nature, however, it does not generally meet the above granular specifications.

LIMITATIONS OF STUDY

(1) This classification is based on the ultimate usage of the material. Therefore, economic boundaries have been delineated, not the geological boundaries.
(2) The deposits are classified by the largest proportion of material present.
(3) Some material however, could be beneficiated to meet higher specifications. In this way, more high quality material would be available.
(4) Small pockets of good material, which may occur in areas of inferior material, have not been mapped because of scale.
(5) Quantities reported are probable reserves, not proven reserves, and hence are subject to detailed site specific testing.

RESERVE CALCULATIONS

The estimation of the useable aggregate within the United Counties of Stormont, Dundas, and Glengarry was obtained by using the F.K. Classification System. The classification involves the analysis of M.T.C. data, the examination of air photographs and previous reports and an extensive field program for ground truth. This does not provide a guaranteed reserve figure but is realistic, taking into account the local changes in the quality and quantity (i.e. the sterilization and the depletion of the aggregate) of the material. The resultant document is a valuable asset for planners as it provides a realistic interpretation of the area studied.

The total reserves of the United Counties of Stormont, Dundas, and Glengarry are given in TABLE 1. The basic F.K. Aggregate Classification System is shown below TABLE 1 to aid in a rapid determination of the types of gravel given in the table.

The reserve figures are derived from the field work. Samples taken from representative areas and later tested were correlated with the field work. The reserve figures are derived from those results.

TABLE 1

CLASSIFIED AGGREGATE - SAND AND GRAVEL PROBABLE RESERVES

(million cubic metres)

TOWNSHIP	'1a'	'1b'	'2a'	'2b'	'3a'	'3b'	TOTAL
STORMONT CO.							
1. Cornwall	-	-	4.1	-	1.0	1.0	6.1
2. Finch	-	-	0.5	-	0.4	0.5	1.4
3. Osnabruck	-	-	1.2	-	0.8	1.2	3.2
4. Roxborough	-	-	3.6	1.6	1.2	7.0	13.4
DUNDAS CO.							
1. Matilda	-	-	-	-	-	0.2	0.2
2. Mountain	-	-	4.4	5.2	7.3	9.2	26.1
3. Williamsburgh	-	-	0.1	-	0.3	0.1	0.5
4. Winchester	-	-	2.9	0.2	18.1	1.5	22.7
GLENGARRY CO.							
1. Charlottenburgh	0.3	-	1.1	-	1.1	0.2	2.7
2. Kenyon	0.8	0.7	4.3	-	2.5	1.0	9.3
3. Lancaster	0.1	-	0.3	-	0.5	0.2	1.1
4. Lochiel	0.1	-	1.4	-	1.8	0.2	3.5
TOTAL	1.3	0.7	23.9	7.0	35.0	22.3	90.2

F.K. AGGREGATE CLASSIFICATION SYSTEM

Coarse (a)	Fine (b)
1 Asphalt & concrete	Asphalt & concrete
2 Granular A 16 mm crushed	Blending sands
3 Granular B and Granular C	Granular B and Granular C

STORMONT COUNTY

Table 2

Cornwall Township	6,100,000 cubic metres
Finch Township	1,400,000 cubic metres
Osnabruck Township	3,200,000 cubic metres
Roxborough Township	13,400,000 cubic metres

The sand and gravel that is available for extraction within Stormont County is concentrated within Roxborough Township and Cornwall Township. The deposits, which were formed by wave/wash agencies are clean and will generally pass the specifications required for high quality aggregate. The material is spatially distributed and can provide the material necessary for local construction needs.

Finch Township and Osnabruck Township have only limited amounts of material available. The quality is restrictive and the material has only limited uses. Any large scale, or major construction projects will have to utilize Paleozoic (bedrock) sources or material from outside the townships.

Table 3 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	-	-	Asphalt & Concrete
2 Granular A & 16mm crushed	4.1	-	Blending Sands
3 Granular B and Granular C	1.0	1.0	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

The only significant sand and gravel reserves in the township are located within the ancient beach ridge, spit and bar assemblages found in the northern portion of the township. The southern ridges, because of the high demand, have been depleted.

There are three significant beach, bar and spit assemblages within Cornwall Township. The largest assemblage is the ridge located between McMillans Corners and Northfield. The ridge has been excavated extensively but has been only minimally sterilized. Testing indicates that 1,900,000 cubic metres of material remain.

The second major assemblage is found on Concession 8, Lot 25, under the hydro lines. Excavation has been extensive, but there is still a considerable amount of material left. Testing indicates that 1,200,000 cubic metres of material remain.

The third major ridge is found between Northfield Station and the Avonmore Road. Although much of the material has been excavated, significant reserves remain. Testing has indicated that 1,300,000 cubic metres of material remain.

There are other small ridges found throughout the township. Excavation and development over them has utilized much of the material. The testing that was done indicates that 1,740,000 cubic metres of usable material remain in these deposits.

Table 4 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	-	-	Asphalt & Concrete
2 Granular A & 16mm crushed	0.5	-	Blending Sands
3 Granular B and Granular C	0.4	0.5	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

Finch Township has only minor amounts of sand and gravel available for extraction. The reserves are located within ancient beach ridges and bars. The deposits are small and will only supply local needs.

The largest deposit is the ridge east of Crysler. There are coarse sections which remain above the water table, but they are insignificant. Testing has indicated that the material within the coarse sections extends 6.1 metres below the water table. If the material is excavated below the water table, it will pass Class '2a' specifications. There are 570,000 cubic metres of material remaining within the ridge.

There are other ridges within Finch Township but only small amounts remain. Testing has indicated that 780,000 cubic metres of material remain.

Table 5 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	-	-	Asphalt & Concrete
2 Granular A & 16mm crushed	1.2	-	Blending Sands
3 Granular B and Granular C	0.8	1.2	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

There are only minor amounts of usable sand and gravel remaining in Osnabruck Township. The deposits, ancient beach ridges and bars, are scattered throughout the township and will only supply local needs.

The deposits in the vicinity of Highway 401 have, because of the development and extraction activities which have taken place upon them, been depleted. The largest reserves are in the northern portion of the township. The largest, the modified ice contact ridge near Sandtown, has had most of the sand and gravel above the water table extracted. Testing has indicated that 1,400,000 cubic metres of usable material remains below the water table.

The only other deposits are the five beach ridges northeast of Newington. Testing indicates that 500,000 cubic metres of usable material remain.

There are 3,200,000 cubic metres of usable sand and gravel remaining in Osnabruck Township.

Table 6 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	-	-	Asphalt & Concrete
2 Granular A & 16mm crushed	3.6	1.6	Blending Sands
3 Granular B and Granular C	1.2	7.0	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

There are large sand and gravel reserves within Roxborough Township. These reserves are found within assemblages of ancient beach ridges, bars, and spits. Although extraction activities have removed large quantities, sufficient material still remain

The beach, sand dune, and spit assemblage around Warina is the largest deposit within the township. Testing indicates that 5,900,000 cubic metres of Class '2' and Class '3' material remain.

The only other significant ridge is the beach ridge on the border between Roxborough Township and Finch Township, Concession 5, Lot 30 of Roxborough Township. Excavation has removed much of the material. Testing indicates that 2,400,000 cubic metres of usable material remain.

The remaining sand and gravel reserves are distributed throughout the township. Although excavation has removed much of the material, testing indicates the 5,100,000 cubic metres of material remain.

DUNDAS COUNTY

Table 7

Matilda Township	200,000 cubic metres
Mountain Township	26,100,000 cubic metres
Williamsburgh Township	500,000 cubic metres
Winchester Township	22,700,000 cubic metres

Only two townships, Mountain and Winchester, have appreciable sand and gravel reserves available for extraction. Winchester Township, although it has large reserves, has quality problems (i.e. high shale content) which restrict the possible uses. The one deposit, Maple Ridge, which has high quality material, has limited potential because development has sterilized much of the remaining material.

The Loughlin Ridge in Mountain Township, has the greatest potential of all the deposits in Dundas County. The material does have some quality problems but it can be processed to meet the specifications for high quality aggregate. The location of the ridge on the Dundas County and Regional Municipality of Ottawa-Carleton boundary will have important ramifications. As the demand for aggregates, particularly sand, in the Ottawa area increases, the Loughlin Ridge could provide the necessary material.

Matilda Township and Williamsburgh Township have negligible sand and gravel reserves. There is, however, sufficient fill material available, but any high quality aggregate has to be obtained either from outside the townships or from Paleozoic (bedrock) sources.

Table 8 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	-	-	Asphalt & Concrete
2 Granular A & 16mm crushed	-	-	Blending Sands
3 Granular B and Granular C	-	0.2	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

The sand and gravel deposits in Matilda Township are negligible. The deposits that remain are generally small beach ridges and sand dunes which, if they are not sterilized, could be used only as Granular C or fill. Any high quality aggregate has to be hauled into the township or produced from Paleozoic (bedrock) sources.

The total probable reserves are 200,000 cubic metres.

Table 9 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	-	-	Asphalt & Concrete
2 Granular A & 16mm crushed	4.4	5.2	Blending Sands
3 Granular B and Granular C	7.3	9.2	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

There are extensive sand and gravel reserves in Mountain Township. These reserves, however, are mainly found in one location - the Loughlin Ridge.

The Loughlin Ridge, a modified glaciofluvial deposit, is the largest deposit within the township. The deposit, although generally only a sand source, has extensive coarse sections passing Class '2a' specifications. The sands, although used as Class '2b' material, have to be processed to meet the specifications required for higher quality aggregate. Testing on the ridge indicates that extensive reserves remain above and below the water table. There are 21,700,000 cubic metres of material remaining.

The other deposits within the township are small ancient beach ridges. These deposits, because they are located throughout the township have been used extensively for local construction. The stone quality is generally poor and will not pass Class '2a' specifications. These deposits will provide Granular C and fill material meeting local needs. There are 4,400,000 cubic metres of material remaining within these ridges.

Table 10 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	-	-	Asphalt & Concrete
2 Granular A & 16mm crushed	0.1	-	Blending Sands
3 Granular B and Granular C	0.3	0.1	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

The sand and gravel reserves in Williamsburgh Township are found within ancient beach ridges. Local development and post extraction activities, however, have limited future use of the material. The material that is left will only pass Class '2a', Class '3a' and Class '3b' requirements.

Total reserves are 500,000 cubic metres.

Table 11 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1. Asphalt and Concrete	-	-	Asphalt & Concrete
2 Granular A & 16mm crushed	2.9	0.2	Blending Sands
3 Granular B and Granular C	18.1	1.5	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

Winchester Township, next to Mountain Township, has the largest sand and gravel reserves in Dundas County. The material is concentrated in two locations and has distinct quality problems (i.e. high shale content).

The largest deposit is the large sinuous ridge west of Morewood. Drilling by the Ministry of the Environment (1979) and the testing for this report found that the ridge is a wave altered esker. Testing on the ridge for quality indicated that much of the material will pass only Class '3a' and Class '3b' specifications, being largely derived from the shales north of the township in Russell Township. The southern portion of the ridge, where the greatest wave alteration occurred will pass Class '2a' specifications. This area, however, has extensive development on it and much of the material from above the water table has been excavated. Drilling has found that the ridge extends 3.1 metres below the water table throughout the whole deposit. Including the material below the water table, it was found that 20,179,000 cubic metres of material remain.

The only other large deposit in Winchester Township is Maple Ridge, which is a wave altered glaciofluvial ridge located between Winchester and Chesterville on Highway 43. Two schools, two cemeteries, and numerous farmsteads have been built upon the deposit.

Much of the available material has been excavated leaving only small segments that can be extracted. Testing the material has found that while the stone is unacceptable for any granular uses except for Granular C, the sands will pass Class '3b' specifications, if processed. There are 1,640,000 cubic metres of material remaining in the ridge.

The rest of the deposits in the township are small ancient beach ridges. The material has limited uses, usually passing Class '3a' and '3b' specifications. These ridges will provide material necessary for local use. There are 881,000 cubic metres of usable material within these deposits.

GLENGARRY COUNTY

Table 12

Charlottenburgh Township	2,700,000 cubic metres
Lancaster Township	1,100,000 cubic metres
Lochiel Township	3,500,000 cubic metres
Kenyon Township	9,300,000 cubic metres

The sand and gravel reserves of Glengarry County are found within the ancient beach ridge, spit, and bar assemblages located throughout the area. The deposits are generally of small areal extent with limited depths, no more than 5.5 metres. The material, because it has been deposited by wave/wash processes, is generally good and passes the specifications for high quality aggregate. Development and extraction activities, however, have limited the amount of available material.

Kenyon Township and Lochiel Township have the greatest reserves. The deposits, ancient beach ridges, bars, and spits, are located throughout the township. This is an advantage for any small scale construction works because there is always a deposit within the immediate vicinity. Large scale construction activities will have to draw from more than one source, as there are only limited amounts of material available in any one deposit.

Charlottenburgh Township and Lancaster Township have only limited amounts of available material. Unlike Kenyon and Lochiel townships, the resources are not spatially distributed throughout the area, but concentrated in the northern parts of the townships. The distribution is partially because of natural factors and is partially man-induced. The man-induced factors include the high degree of development, notably around Cornwall, which has utilized much of the available material. The natural factors deal with the formation of the deposits; the area was not conducive to beach development. Any future development in the southern segments will either have to use Paleozoic (bedrock) reserves, or haul the material in from other areas.

Table 13 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	0.3	-	Asphalt & Concrete
2 Granular A & 16mm crushed	1.1	-	Blending Sands
3 Granular B and Granular C	1.1	0.2	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

The majority of the available sand and gravel in Charlottenburgh Township is located in the northern portion of the township. The material, if not already excavated, is shallow, generally no deeper than 4.6 metres. Testing has indicated 2,700,000 cubic metres of material remain.

Table 14 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	0.8	0.7	Asphalt & Concrete
2 Granular A & 16mm crushed	4.3	-	Blending Sands
3 Granular B and Granular C	2.5	1.0	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

There are no large deposits within Kenyon Township. The available material is areally distributed in small beach ridges, bars, and spits throughout the township. Local demands can be easily met as there is generally a deposit within the immediate area. Large demands though, such as the construction of a major highway, will have to utilize more than one source because of the small reserves available in any one deposit. There are three source areas, however, which provide the majority of the available material.

The largest single source is the beach ridge, one-half kilometre south of Maxville. Excavation has occurred periodically, but there is still material remaining. Testing has indicated there are 2,254,000 cubic metres of usable material remaining.

In terms of the quantity of high quality aggregate available, an important deposit (beach-spit complex) in Kenyon Township is located two kilometres south of Fairview, Concession 4, Lot 11. Although this deposit has been excavated extensively, there are reserves remaining. The testing that has been done indicates that there are 479,000 Class '1a', Class '2a', and Class '3b' material remaining.

A third major ridge is found north of Alexandria, 1.5 kilometres north of Fassifern. Some material has been excavated, but relatively large amounts of material remain. Studies indicate that 998,000 cubic metres of material remain in the ground.

There are no other significant ridges remaining. There are, however, assemblages that can provide material. The beach assemblages for example, northeast of Greenfield, Concession 5, Lots 17 to 24, after being tested have probable reserves of 817,000 cubic metres of Class '2a', Class '3a', and Class '3b' material. These and other assemblages, provide the bulk of the 9,300,000 cubic metres of material that is available in Kenyon Township.

Table 15 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	0.1	-	Asphalt & Concrete
2 Granular A & 16mm crushed	0.3	-	Blending Sands
3 Granular B and Granular C	0.5	0.2	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

Lancaster Township has the smallest amount of available sand and gravel in Glengarry County. The deposits, small ancient beach ridges, are found in the northern portions of the township. Development and extraction activities, however, have removed much of the material.

Testing indicates that 1,100,000 cubic metres of sand and gravel remain.

Table 16 - Classified Aggregate

CLASSIFICATION	(a) Coarse	(b) Fine	CLASSIFICATION
1 Asphalt and Concrete	0.1	-	Asphalt & Concrete
2 Granular A & 16mm crushed	1.4	-	Blending Sands
3 Granular B and Granular C	1.8	0.2	Granular B & C
4 Granular Fill			Granular Fill

Quantities in cubic metres X 10^6

Next to Kenyon Township, Lochiel has the largest sand and gravel reserves in Glengarry County. Unlike Kenyon Township, there are no significant ridges, only assemblages of beaches.

A significant assemblage of beaches is near Breadalbane, Concession 8 and 9, Lots 6 to 13. The construction of Highway 417 has utilized some material, but testing indicates there are 1,975,000 cubic metres of Class '1a', Class '2a' and Class '3b' material remaining.

The Breadalbane assemblage of beaches accounts for more than one-half the material available in Lochiel Township. The other beaches are spatially distributed but generally small. Testing indicates that 1,525,000 cubic metres of usable material remain.

Ministry of Natural Resources Abbreviations

MATERIAL ABBREVIATIONS

Top Soil	tpsl
Clay	clay
Silt	silt
Medium Sand	msnd
Fine Sand	fsnd
Coarse Sand	csnd
Gravel	grvl
Stones	stns
Boulders	bldr
Till	till
Bedrock	bdrk
Watertable	wt
Refusal	rfsl

STORMONT, DUNDAS, GLENGARRY COUNTIES

BORE HOLE NUMBER	MATERIAL
BH # 1	tpsl 0.6, fsnd silt 2.3, msnd 3.7, msnd wt 4.8, mfsnd 7.6.
BH # 2	tpsl 0.6, silt 0.9, silty fsnd 7.6
BH # 3	tpsl 0.6, clay 4.6
BH # 4	csnd grvl wt 0.6, msnd grvl 4.6
BH # 5	csnd grvl wt 0.6, msnd grvl 7.6
BH # 6	msnd grvl 1.1, msnd 3.7, msnd wt 4.3, msnd 6.2
BH # 7	tpsl 0.3, fsnd 2.7, fsnd wt 3.2, clay 3.7
BH # 8	tpsl 0.3, fsnd 2.4
BH # 9	grvl wt 0.9, grvl 1.1, fsnd 7.6
BH # 10	tpsl 0.5, msnd grvl 5.5, fsnd 7.6
BH # 11	tpsl 0.3, msnd grvl 2.2, silt fsnd 4.6
BH # 12	tpsl 0.3, bldr 1.2
BH # 13	tpsl 0.3, grvl msnd 3.4, fsnd 6.1
BH # 14	tpsl 0.3, fsnd grvl 0.9, csnd grvl 5.5
BH # 15	tpsl 0.3, mcsnd grvl 4.3
BH # 16	grvl msnd wt 0.9, grvl msnd 7.6
BH # 17	tpsl 0.3, mfsnd 3.7
BH # 18	tpsl 0.3, grvl 4.9
BH # 19	tpsl 0.3, fmsnd 0.6, cmsnd grvl 1.2, till 1.8
BH # 20	mcsnd grvl 4.3

Depths in metres

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A P P E N D I X

Classified Aggregate Deposits for the United Counties

CHARLOTTENBURG TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-2 beaches NE of Martintown	36.89	2.838	-	19.87	2 - 3.5	425,000
Conc. 7 Lot 22 North Half						
-1 beach NW of St. Raphaels	9.80	-	-	6.97	2.5-3.5	85,000
Conc. 7 Lot 12						
-3 beaches E of St. Raphaels	9.55	-	2.58	2.58	3.0	134,000
Conc. 7 Lot 3-6						
-5 beaches N of St. Raphaels	21.16	8.51	2.58	4.90	3.0-4.6	564,000
Conc. 8 Lot 8 - 2						
-6 beaches W of Greenvalley, S of	9.03	4.39	-	-	2.5-3.5	139,000
tracks, Conc. 9 Lot 9-2						
-3 beaches NW of Greenvalley, N	14.71	3.1	-	5.42	2.5-3.5	348,000
of tracks Conc. 9 Lot 10-6						
-3 beaches W - NW of Glenroy	6.97	6.97	-	-	-	-
NOTE: Measurements are in Metric Units						

CHARLOTTENBURGH TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-2 beaches NW of Summerston	15.74	15.74	-	-	-	-
Conc. 1 Lot 15, 16						
-1 beach SE of Tyatown	7.74	7.74	-	-	-	-
Conc. 2 Lot 20						
-1 beach south of Williamstown	7.22	7.22	-	-	-	-
1.5 km N of 401						
-1 beach NW of Williamstown	9.80	-	-	4.64	-	-
south of river						
-1 beach N of Williamstown	3.87	-	-	1.24	2 - 5	52,000
north of river						
-5 beaches east of Martintown	26.83	6.19	1.03	13.42	2 -7.63	464,000
-1 beach NE of MacGillivrays						
Bridge	1.29	-	1.29	-	-	-
-3 beaches SW of St. Raphaels	9.55	-	-	4.64	2.2-4.2	104,000
Conc. 3 Lot 6						
-1 beach SW of brown house	1.55	-	-	-	1.5 - 2	34,000
corner Conc. 4						
-4 beaches NE of Martintown	28.38	-	2.58	17.29	3.5	311,000
Conc. 7 Lot 22 South half						
NOTE: Measurements are in Metric Units						

LOCHIEL TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-beach, Lochiel/Lancaster border	11.35 ha	--	--	7.22 ha	1.8-3.7	113,000
Conc. 1, Lot 34						
-2 beaches, Conc. 1, Lot 27	6.7 ha	--	--	3.61 ha	3-4.5	101,000
-2 beaches, Conc. 1 Lot 16,18	6.45 ha	--	3.35 ha	--	2.5-4.2	100,000
-3 beaches, Conc. 1, Lot 4,12,14	31.48 ha	28.64ha(2.84)	1.29	--	2-4.5	50,000
-Beach W.Glen Robertson, Conc. 2,	2.58 ha	2.58 ha	--	--	--	--
Lot 12						
-beach E. Guaytown, Conc. 3, Lot	3.37 ha	--	1.03 ha	--	3-5.5	116,000
37						
-2 beaches, Conc. 3, Lot 21,25	8.26 ha	2.32 ha	3.1 ha	--	1-2	51,000
-3 beaches, Conc. 4, Lot 37,36,30	18.91 ha	2.14ha(16.77)	2.58 ha	--	1.5-2.8	284,000
-3 beaches by Lochiel, Conc. 4,	7.22 ha	--	5.16 ha	1.29 ha	2-3	20,000
Lots 27, 24, 22						
-3 beaches-Glen Sandfield	8.26 ha	3.35ha(4.91)	4.91 ha	--	--	--
Conc. 4, Lot 9, 8, 3						
-beach on Fassifern Corner	7.22 ha	--	5.42 ha	--	2.75-4.27	58,000
-2 beaches E. of Fassifern, Conc 5	8.77 ha	5.16ha(3.61)	0.77 ha	--	2.5-4	85,000
Lot 35, 33						
-2 beaches, Conc.5, Lots 36,27	7.22 ha	5.16 ha	2.06 ha	--	--	--
NOTE: Measurements are in Metric	Units.					

LOCHIEL TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-2 beaches, Conc. 5, Lots 36, 27	7.22 ha	5.16 ha	2.06 ha	--	--	--
-2 beaches, Conc. 5, Lots 23, 17	13.16 ha	13.16 ha	--	--	--	--
-4 beaches by Brodie, Conc. 5, Lots 11, 9, 5	8.26 ha	8.26 ha	--	--	--	--
-beach on Lochiel/Kenyon border, Conc. 5 Lot 38	10.32 ha	--	--	4.9 ha	2.8-3.7	168,000
-2 beaches on Lochiel/Kenyon Border, Conc. 6, Lot 38	8.5 ha	8.5 ha	--	--	--	--
-6 beaches, SW Kirkhill, Conc. 6, Lot 31-35	20.9 ha	9.29ha(11.6)	4.90 ha	--	2.8-3.7	208,000
-5 beaches SE of Kirkhill, Conc.7 Lots 15-25	14.96 ha	3.77ha(6.19)	2.32 ha	--	2.8-4.5	122,000
-beach, Lochiel/Quebec border Conc. 5, Lot 1	10.32 ha	10.32 ha	--	--	--	--
-3 beaches, Conc. 7, Lot 38-33	27.86 ha	27.86 ha	--	--	--	--
-3 beaches, Conc. 7, Lots 28-30	8.0 ha	8.0 ha	--	--	--	--
-2 beaches near Dalkeith, Conc.7, Lot 7, 5	12.64 ha	2.32 ha	10.32 ha	--	--	--
-beach, Conc. 8, Lot 31	3.35 ha	3.35 ha	--	--	--	--
NOTE: Measurements are in Metric Units						

LOCHIEL TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-Breadalbane, W.side, 4 beaches, Conc. 8, Lot 12, 11, 10, 9	33.02 ha	2.58ha(30.44)	3.1 ha	2.838 ha	4-5.5	877,000
-East side Breadalbane, 3 beaches Conc. 8, Lot 6, 5, 4	7.97 ha	2.838ha(5.13)	2.3 ha	--	1.53	148,000
-3 beaches E. Breadalbane, Conc.8, Lot 3	7.48 ha	2.32ha(6.19)	--	3.35 ha	1.5-3	54,000
-3 beaches NE of Breadalbane, Conc. 9, Lots 6-3	7.74 ha	2.06ha(5.68)	1.03 ha	--	2.5-3.2	140,000
-5 beaches NW Breadalbane, S. of rock, Conc. 9, Lot 7 & 13	23.74 ha	11.10ha(12.64)	1.03 ha	4.64 ha	--	212,000
-4 beaches NW Breadalbane, N. of road, Conc. 9, Lot 7-13	26.83 ha	2.58ha(24.25)	3.61 ha	7.74 ha	--	544,000
-beach by Lochinroy	3.87 ha	3.87 ha	--	--	--	--
-4 beaches NW Corner of Lochiel, Conc. 9	16.25 ha	16.25ha(4.39)	--	--	--	--
NOTE: Measurements are in Metric Units.						

LANCASTER TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-2 beaches, Conc. 9, Lot 35, NW corner	16.0 ha	--	2.84 ha	5.93 ha	2.8-3.2	217,000
-2 beaches near Glen Norman, Conc 9, Lot 24, 25	5.68 ha	5.16 ha	--	--	2-3	15,000
-beach, Lancaster/Lochiel Border Conc. 9, Lot 22	10.32 ha	--	--	7.74 ha	3-3.6	94,000
-beach, Conc.9, Lot 13	2.58 ha	--	1.29 ha	--	3-3.5	39,000
-3 beaches, N. Dalhousie Mills, Conc. 9, Lots 3-8	13.93 ha	--	2.32 ha	5.93 ha	3	170,000
-beach N. Green Valley on 34, Conc. 8, Lots 35-38	18.58 ha	--	10.84 ha	5.16 ha	3-7.6	77,000
-6 beaches, Conc. 8, Lot 25-30 SW Glen Norman	21.16 ha	5.68ha(15.48)	5.42 ha	3.1 ha	--	348,000
-3 beaches W-SW of Glen Nevis, Conc. 7, Lot 17,19, Conc. 6, Lot 19	17.80 ha	17.80 ha	--	--	--	--
-2 beaches E. Green Valley, Conc. 8, Lot 37-35	8.77 ha	--	4.90 ha	3.87 ha	--	--
-beach, Conc. 7, Lot 37	3.87 ha	3.87 ha	--	--	--	--
NOTE: Measurements are in Metric Units						

LANCASTER TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-2 beaches N.ofN.Lancaster, Conc.6, Lots 22-25	16.25 ha	5.93ha(10.32)	0.77 ha	3.61 ha	2-4	178,000
-3 beaches N. of Pine Hill, Conc.6, Lots 24-22	9.03 ha	9.03 ha	--	--	--	--
-2 beaches W. of Pine Hill, Conc.6, Lot 35	6.19 ha	--	6.19 ha	--	--	--
-2 beaches W. of Picnic Grove, Conc. 3, Lot 28	11.09 ha	2.84 ha	8.25 ha	--	--	--
-beach N. of Glengarry Prov. Pk., Conc. 1, Lot 29	4.90 ha	--	--	4.90 ha	--	--
-beach N. of Brownsville, Conc. 1, Lot 16	4.64 ha	1.81 ha	--	2.83 ha	--	--
-beach on Lancaster/Que.border, Conc. 2, Lot 2	2.84 ha	--	--	2.84 ha	--	--
NOTE: Measurements are in Metric Units.						

KENYON TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-Maxville beach ridge	317.34 ha	266.00(51.34)	6.19 ha	1.81 ha	3.6-6	2,254,000
-3 beaches S. of Maxville ridge	20.64 ha	20.64 ha	--	--	--	--
-beach ridge east of Maxville	35.09 ha	--	2.58 ha	23.74 ha	3-4.5	333,000
(2km) west of tracks						
-4 beaches West of Greenfield	30.19 ha	20.90(9.29)	--	9.29 ha	--	--
-4 beaches SW of Baltic Corners,	21.16 ha	10.58(10.58)	--	--	2-3	164,000
Conc. 6, Lots 25-30						
-3 beaches NW of Baltic Corners	9.12 ha	1.90(7.22)	3.10 ha	--	3.6	148,000
-beach south of Dunvegan	37.41 ha	2.84(34.57)	4.9 ha	22.96 ha	3.6-1.8	242,000
-beach West of Stewarts Glen	8.772 ha	--	1.81 ha	5.16 ha	3	54,000
-9 beaches N. of Dunvegan-9th Con	34.31 ha	34.31 ha	--	--	--	--
-8 beaches S. of Fisks Corners	53.92 ha	25.65(28.27)	--	9.29 ha	1.5-3.66	523,000
Conc. 8, Lots 10-22						
-2 beaches, Conc.7, Lotl2; Conc.7	47.79 ha	41.02(16.77)	2.838 ha	2.838 ha	3-4.5	455,000
Lot 20						
-beach SE of Baltic Corners,	8.26 ha	--	8.26 ha	--	--	--
Conc. 6, Lot 21						
-3 beaches NE of Greenfield,	24.77 ha	--	2.838 ha	2.35 ha	--	817,000
Conc. 5, Lot 17-24						
NOTE: Measurements are in Metric	Units.					

KENYON TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-6 beaches, Conc.5, Lots 9-17	16.51 ha	8.77ha(7.79)	--	--	--	232,000
-beach Conc. 6, Lot 12	7.74 ha	--	--	4.64 ha	5.5-3	93,000
-4 beaches, Conc.6, Lot 8, Conc.7	20.12 ha	20.12 ha	--	--	--	--
Lot 1-4						
-beach N. of Fassifern, Conc. 6	29.93 ha	--	1.81 ha	4.64 ha	3-5.5	998,000
Lots 1-8						
-2 beaches W.SW of Fassifern	9.8 ha	--	2.06 ha	2.32 ha	5.5-2.5	298,000
-3 beaches by autowrecker,Conc.5	11.09 ha	--	1.29 ha	4.13 ha	3-5.2	426,000
Lots ?-4						
-beach Conc. 4, Lot 11	20.12 ha	--	--	10.32 ha	3.1-9.2	480,000
-3 beaches, Conc.4, Lots 14-21	8.26 ha	4.39 ha	1.81 ha	.77 ha	3-4.6	41,000
-4 beaches W. of Guaytown, Conc.4	16.0 ha	--	1.81 ha	9.55 ha	3-4	217,000
Lots 3-7						
-9 beaches Conc.3, Lots 13-23	36.38	30.19ha(6.19)	--	3.87 ha	2.5-5.5	183,000
-8 beaches, Conc.2, Lots 7-12	24.77 ha	20.64ha(4.13)	1.27 ha	--	2.5-3.5	85,000
Conc. 3, Lot 10						
-4 beaches, Conc. 2, Lots 1-6	17.29 ha	14.97ha(2.32)	2.32 ha	--	--	--
-5 beaches, Conc. 1, Lots 1-6	20.9 ha	--	3.1 ha	13.67 ha	2.7-3.5	114,000
-2 beaches W.Apple Hill,Conc.12	9.03 ha	9.03 ha	--	--	--	--
Lot 5, Conc. 13, Lot 6						
NOTE: Measurements are in Metric	Units					

KENYON TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-8 beaches E. Apple Hill, Conc.2 Lots 27-35	68.37 ha	11.09ha(57.28)	--	31.73 ha	3-4.5	818,000
-5 beaches Conc.3, Lots 30-35	13.67 ha	8.51ha(5.16)	--	2.58 ha	3.6-2	94,000
-4 beaches SE of Dominionville Conc. 14, Lots 1-13	41.02 ha	30.44ha(10.58)	--	6.45 ha	2.5-3.5	109,000
-3 beaches S. of Loch Gary, Conc. 1, Lot 19-26	30.19 ha	11.35ha(18.84	1.29 ha	14.45 ha	--	93,000
-4 beaches SE of Loch Garry, Conc. 1, Lot	13.16 ha	5.16 ha(8)	--	6.19 ha	2.5-4	56,000
NOTE: Measurements are in Metric Units.						

CORNWALL TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-Northfield St. Beach	234.78 ha	110.68ha(124.)	19.61 ha	38.44 ha	1.5-3.7m	1,311,000
-beach north of Harrisons Corners	74.82 ha	26.83ha(47.99)	.84 ha	14.96 ha	1-3.7	631,000
-beach Conc. 9, McMillans Corners to Northfield	371.52 ha	240.20ha(131.)	13.93 ha	45.92 ha	12.-6.1	1,868,000
-3 beaches,Conc.8 & 9, Lots 22-26	21.67 ha	4.90ha(16.77)	9.29 ha	--	2-3.5	224,000
-beach Conc.8, Lot 25, Hydro lines	159.96ha	82.56ha(77.4)	11.87 ha	33.54 ha	to 912	1,242,000
-3 beaches, Conc.7, lot 22	32.51 ha	--	9.55 ha	20.38 ha	1-4.5	65,000
-3 beaches around Bonville, Conc. 8	92.36 ha	59.34 ha	5.16 ha	17.80 ha	1.5-3.1	241,000
-4 beaches North of St. Andreas	39.73 ha	16.0ha(20.73)	5.93 ha	10.32 ha	1.5-2	131,000
-beach south of St.Andreas Conc. 5	41.28 ha	15.48ha(25.8)	--	18.28 ha	1.5-2.0	128,000
-beach by Northfield	9.80 ha	3.35ha(6.45)	6.45 ha	--	--	--
-beach by Sandfield Mills	5.16 ha	--	--	--	1-2	103,000
-beach north of Long Sault-on border	56.76 ha	30.96ha(25.8)	--	23.22 ha	2-4.1	55,000
-4 beaches E.& N.of Long Sault	47.74 ha	18.06ha(29.67)	5.16 ha	24.51 ha	--	--
-4 beaches NE of Long Sault & Avonmore Road	77.4 ha	53.15ha(24.25)	--	24.25 ha	--	--
NOTE: Measurements are in Metric Units.						

CORNWALL TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-7 beaches East of Avonmore Road	113.26 ha	43.86ha(69.40)	5.16 ha	59.08 ha	1-3	94,000
-2 beaches, one N. one S. of	20.64 ha	12.9ha(7.74)	--	4.64 ha	1-2	47,000
Cornwall central						

FINCH TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-bar east of Crysler	147.06 ha	113.52ha(33.54)	4.64 ha	23.22 ha	7.6-1.2	565,000
-beach on Finch/Roxborough border	59.34 ha	33.54ha(25.80	2.06 ha	14.71 ha	2-5.49	370,000
Conc. 5						
-beach on Finch/Rox.Border,Conc.3	26.06 ha	11.87ha(14.19	--	5.68 ha	1.8-4.6	170,000
-7 beaches, Conc.3-5, Lot 16-22	95.20 ha	75.33ha(19.87	6.19 ha	6.45 ha	1.5-31.	152,000
-3 beaches S.of Finch,Conc.1&2	42.57 ha	27.87ha(14.71	8.26 ha	2.58 ha	1.2-3.7	97,000
Lots 13-20						
-beach Finch/Osnabruck border	21.93 ha	12.64ha(9.29)	--	9.29 ha	2-4	--
-6 beaches,Conc.1-3, Lots 3-9	64.24 ha	29.41ha(34.83	10.32 ha	--	--	--
-beach N. of Finch,Conc.3&4,Lots	14.71 ha	14.71 ha	--	--	--	--
12-13						
-beach W. of Berwick,Conc.5&6,	7.22 ha	--	7.22 ha	--	--	--
Lot 8						
-2 beaches-one by Cannamore &	15.48 ha	15.48 ha	--	--	--	--
Cahors						
NOTE: Measurements are in Metric	Units.					

OSNABRUCK TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-Sandtown	232.2 ha	149.64ha(82.56)	7.22 ha	62.44 ha	1.8-4.6m	1,350,000
-2 beaches NW corner Conc.9, Lots 32-7	44.89 ha	27.09ha(17.80)	14.19 ha	--	1.5-2.8	60,000
-2 beaches SW of Sandtown, Conc.7 and 8	14.19 ha	5.16 ha	--	9.03 ha	--	--
-5 beaches S.of Sandtown,Conc.6, Lot 16-20	52.12 ha	18.58ha(33.54)	11.87 ha	7.74 ha	1.5-3.2	348,000
-2 beaches,Conc.8 Lots 12-15	13.42 ha	--	1.55 ha	--	1.5-3.0	203,000
-6 beaches,Conc.6-7, Lots 11-14	25.80 ha	9.03 ha	3.87 ha	.80 ha	1.5-3.1	194,000
-beach S.of Newington,Conc.7, Lots 7-10	65.79 ha	39.99ha(25.80)	12.38 ha	9.29 ha	2-3.7	101,000
-5 beaches N. of Newington	68.37 ha	14.96ha(53.41)	3.87 ha	18.32 ha	1.5-3.7	505,000
-4 beaches on Osnabruck/Cornwall Twp.line-peat cutting plant	19.87 ha	9.80ha(10.07)	3.10	--	1.5-2	125,000
-2 beaches by Bash Glen	11.87 ha	5.68ha(6.19)	2.58 ha	3.61 ha	--	--
-3 beaches N.of Gallingertown	33.28 ha	17.29ha(16.00)	8.51 ha	4.64 ha	1.2-2.8	47,000
-3 beaches-Pleasant Valley-Bunker Hill	59.86 ha	27.61(32.25)ha	3.35 ha	25.28 ha	1.2-3	101,000
-beach N.of Gallingertown,Conc.4	61.92ha	32.25ha(29.67)	12.9 ha	13.5 ha	1-3.2	93,000
NOTE: Measurements are in Metric Units.						

OSNABRUCK TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-6 beaches East of Lunenburg	47.73ha	16.00ha(31.73)	19.87 ha	6.45 ha	3.6-1.8	114,000
-Long Sault Beach	28.38ha	22.8ha(5.58	--	5.58 ha	--	--
NOTE: Measurements are in Metric Units.						

ROXBOROUGH TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-beach, Roxborough/Finch border	361.2 ha	210.01 ha	37.52 ha	53.406 ha	1.5-5.5	2,365,000
Conc. 5-7						
-beach, West of Moose Creek	17.54 ha	--	5.934	5.16	1.5-3.7	200,000
-beach by Tomies Corners	25.8 ha	14.19 ha	7.224 ha	2.838 ha	2-3.5	54,000
-Warina Ridge	1,242.58ha	988.08 ha	22.19 ha	95.72 ha	2.5-4.6	5,915,000
-Gravel hill beach	9.804 ha	--	9.804 ha	--	--	--
-Ridge between Warina & Tolmies	129 ha	99.85(29.15)	--	15.996 ha	1-3	335,000
Corners						
-Tayside/Sandringham ridge	227.04 ha	134.16(92.88)	24.51 ha	23.74 ha	1.5-5.5	1,225,000
-2 beaches by McDonalds Corners	18.06 ha	9.29(8.77)	--	--	.5-3.8	175,000
-5 beaches NW of Gravel Hill	50.31 ha	47.73(2.58)	--	--	2-3.7	94,000
Conc. 4 & 5						
-beach on Roxborough/Finch border	18.06 ha	--	10.58 ha	--	2-3.5	187,000
Conc. 4						
-3 beaches, Conc.4, Lot 4-25	24.25 ha	5.68 ha	8.77 ha	2.32 ha	3-4.5	299,000
-beach, Conc. 6 lot 26	10.32 ha	10.32 ha	--	--	--	--
-beach Conc. 7-border F/R	16.51 ha	16.51 ha	--	--	--	--
-beach west of Avonmore-Conc.3,	12.9 ha	3.61(7.74)	2.064 ha	--	2.5-4.0	182,000
on hwy 43						
NOTE: Measurements are in Metric Units.						

ROXBOROUGH TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-2 beaches SW of Avonmore on hydro line	27.87 ha	--	--	14.45 ha	1.8-3.7	382,000
-5 beaches on Avonmore Rd.Conc.1&2	49.54 ha	29.41 ha	17.54 ha	2.58 ha	1.8-3.7	--
-5 beaches, Conc.2, Lot 2-5	77.14 ha	38.96(38.18)	17.29 ha	7.22 ha	1.8-3.7	472,000
-8 beaches, East of #138, S of Monkland, Conc. 12, Lot 7-14	108.36 ha	61.15(47.21)	16.77 ha	16.25 ha	1.5-4.5	454,000
-17 beaches, Conc.1-3, Lots 15-22	117.65 ha	39.48(78.17)	33.80 ha	11.87 ha	1.5-4.0	1,024,000
NOTE: Measurements are in Metric Units.						

MATILDA TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-beach on Matilda-Williamsburgh border, Conc. 5	17.03 ha	1.81 ha	5.93 ha	9.29 ha	2-4	--
-beach in Dundela	9.29 ha	--	8.0 ha	1.29 ha	--	--
-2 beaches 1 km east of Brinston	30.96 ha	30.96 ha	--	--	--	--
-2 beaches by Rowena	14.45 ha	--	5.16 ha	2.58 ha	2-3	135,000
-beach north of Mariatown by 401	5.16 ha	--	--	5.16 ha	2	--
-3 beaches south of Dixons Corners	15.74 ha	11.87 ha	--	3.87 ha	2.5	--

NOTE: Measurements are in Metric Units.

MOUNTAIN TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-beach on border	39.99 ha	--	6.19 ha	6.97 ha	3.5 m	939,000
-Loughlin Ridge	670.8 ha	368.9 + ha	12.9 ha	60.63 ha	21 to 7	21,720,000
-Kerrs Ridge	131.6 ha	97.29 ha	--	10.84	3.6-3	859,000
-3 beaches by Mulloys	20.12 ha	4.12 ha	6.708 ha	--	12	184,000
-5 beaches-Harmony:Gloverdale	34.31 ha	26.05 ha	5.16 ha	--	2	62,000
-disintegrated bedrock outwash - Mountain Twp border	221.88 ha	103.716 ha	28.90 ha	--	3.6	500,000
-beach below Mtn.S.Gower dump	79.98 ha	--	18.32 ha	--	3.05	1,881,000
-2 beaches between border & Kerrs ridge	96.49 ha	96.49 ha	--	--	--	--
-9 beaches-S.Mountain to Inkerman	73.53 ha	43.60 ha	26.57 ha	--	--	--
NOTE: Measurements are in Metric Units.						

WINCHESTER TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-Morewood Esker	425.7 ha	208.98 ha	34.1 ha	47 ha	6-15 m	20,179,000
-beach in Morewood	38.7 ha	26.83 ha	6.97 ha	--	3.6	179,000
-Maple Ridge - Kame	239.94 ha	79.98 ha	61.42 ha	62.69 ha	4.5	1,640,000
-6 beaches by the 9th	38.44 ha	28.64 ha	2.58 ha	--	3.7	264,000
-4 beaches by North Winchester	41.28 ha	30.444 ha	2.1 ha	--	3.0	262,000
-5 beaches by Ormond	27.35 ha	24.25 ha	--	--	2.5	78,000
-beach by Winchester	10.32 ha	10.32 ha	--	--	--	--
-beach by Melvil	25.80 ha	20.124 ha	--	--	2	114,000
NOTE: Measurements are in Metric Units.						

WILLIAMSBURGH TOWNSHIP

Nature-Location of Deposit	Area of Deposit	Low Grade Area	Sterilized Area	Extracted Area	Depth	Volume in Cubic Metres
-beach on Williamsburgh-Matilda border Conc. 6	8.772 ha	--	6.966 ha	--	2.5	45,000
-2 beaches north at Glen Becker west of Hwy 31, Conc. 4	27.864 ha	1.548 ha	9.03 ha	13,932 ha	2.0	67,000
-2 beaches by Boucks Hill	27.864 ha	2.58 ha	11.868 ha	9.03 ha	1.5	66,000
-beach NW at Glen Becker Conc. 4	10.32 ha	--	6.192 ha	1.548 ha	2.0	133,000
-beach east of Elma	20.64 ha	7.482 ha	5.676 ha	3.612 ha	2.0	77,000
-7 beaches by Beckstead	51.342 ha	9.288 ha	16.512 ha	20.64 ha	2.5	123,000
-2 beaches by Hoasic & Froatburn	11.61 ha	--	8.772 ha	2.838 ha	2-3	--
-beach west of Froatburn, Conc.14	4.386 ha	--	--	4.386 ha	2-3	--
-2 beaches	5.418 ha	2.58 ha	2.838 ha	--	--	--
NOTE: Measurements are in Metric Units.						

Ministry of Natural Resources
Ontario

D 2506

Sand and Gravel Assessment
Stormont County

P2506

Sand and Gravel Assessment of STORMONT COUNTY

United Counties of Stormont, Dundas and Glengarry

Scale 1:50,000

Metres 1000 0 1 2 3 4 5 6 7 Kilometres

Chains 80 40 0 1 2 3 Miles

FK AGGREGATE CLASSIFICATION
Areas are classified by the dominant aggregate present

	A COARSE AGGREGATE	B FINE AGGREGATE
1	ASPHALT AND CONCRETE*	ASPHALT AND CONCRETE*
2	GRANULAR "A" 5/8" CRUSHED	ASPHALT AND CONCRETE BLENDING SAND
3	GRANULAR "B" GRANULAR "C"	GRANULAR "B" GRANULAR "C"
4	GRANULAR FILL — Generally suitable as fill but pockets may be acceptable for class 2B or 3B uses.	

*Aggregate not classified in the map area.
NOTE
Some processing may be required to obtain the classification shown.
A black bar with a classification code indicates a deposit too narrow to show in colour.

MAP SYMBOLS

- Geological boundary.*
- Depleted area.
- Geophysics line.
- Borehole, with number.**
- Pit.
- Quarry.
- M.T.C. test location.

*Gray areas within a geological boundary not shown as depleted "d" contain uneconomic material.
**See appendix in report.

SOURCES OF INFORMATION

Field study and compilation by G.A. Gorrell, T.W. Fletcher and R.D. Trotter, Ontario Ministry of Natural Resources, Eastern Region, Kemptville, 1978-1980

Aggregate suitability data from the Ontario Ministry of Transport and Communications, Kingston, and selected borehole and geophysical data, Ontario Ministry of Natural Resources, Eastern Region, Kemptville.

M.T.C. test pit locations from the Ministry of Transport and Communications, Kingston.

Geology:
Published reports and maps of the Ontario Geological Survey and the Geological Survey of Canada.

Map base from 1:50,000 sheets of the National Topographic Series.

Issued 1982.

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To accompany report "Sand and Gravel Assessment for the United Counties of Stormont, Dundas and Glengarry."

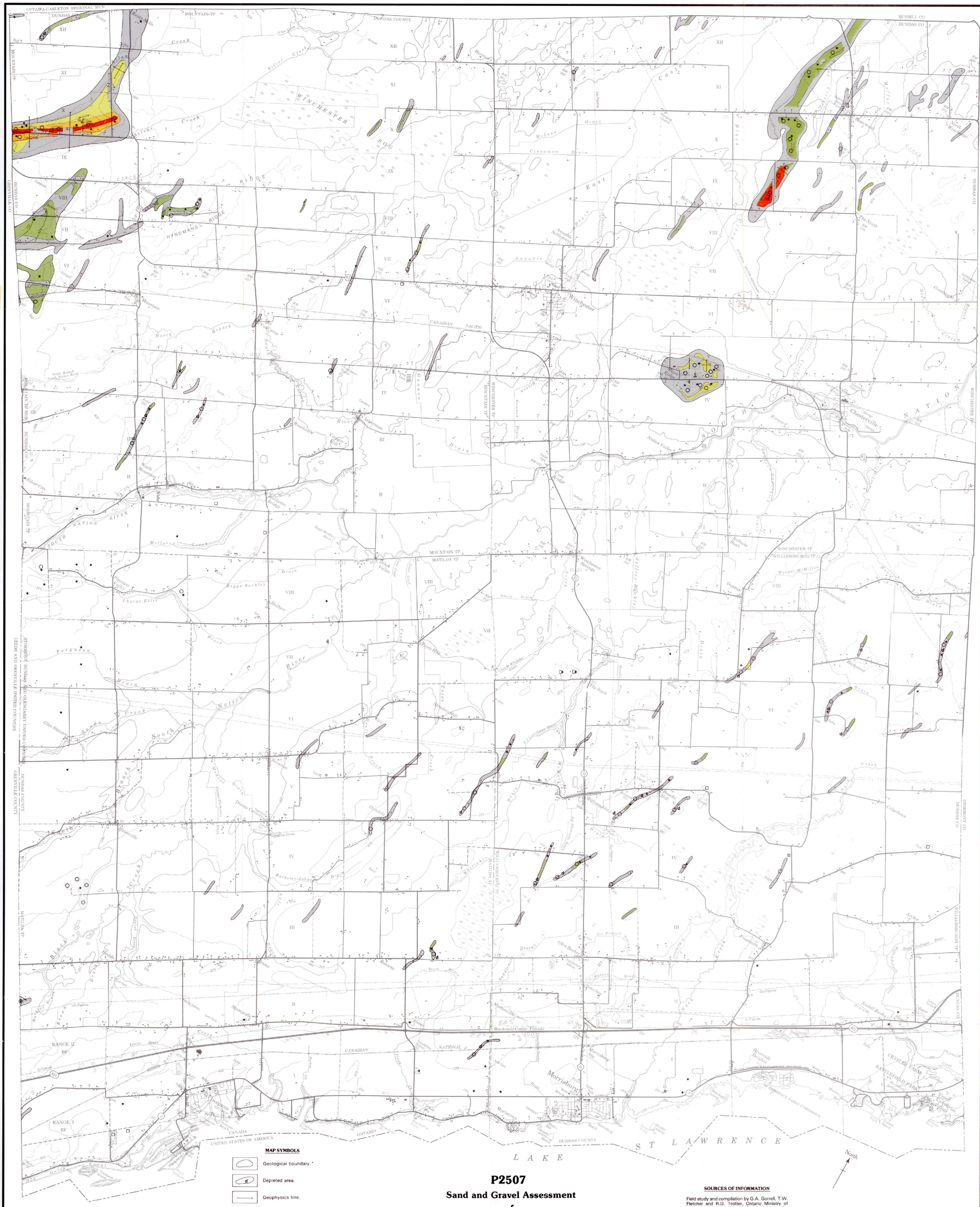
This project was funded equally by the Federal Department of Regional Economic Expansion and the Ontario Ministry of Natural Resources under the Minerals Program of the Eastern Ontario Subsidiary Agreement.

EASTERN ONTARIO AGGREGATE SERIES

Ministry of Natural Resources
Ontario

Sand and Gravel Assessment
Dundas County

P. 2507



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4	GRANULAR FILL — Generally suitable as fill but pockets may be acceptable for class 2B or 3B uses.	

*Aggregate not classified in the map area.
NOTE
Some processing may be required to obtain the classification shown.

MAP SYMBOLS

- Geological boundary.*
- d — Depleted area.
- Geophysics line.
- 46 — Borehole, with number.**
- Pit.
- Quarry.
- M.T.C. test location.

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P2507

Sand and Gravel Assessment of DUNDAS COUNTY

United Counties of Stormont, Dundas and Glengarry

Scale 1:50,000

Metres 1000 0 1 2 3 4 5 6 7 Kilometres

Chains 80 40 0 1 2 3 Miles

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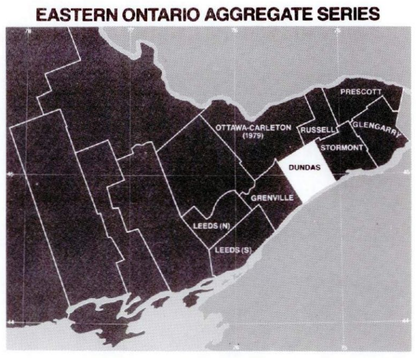
To accompany report "Sand and Gravel Assessment for the United Counties of Stormont, Dundas and Glengarry."

EASTERN ONTARIO AGGREGATE SERIES



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*Aggregate not classified in the map area.
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To accompany report "Sand and Gravel Assessment for the United Counties of Stormont, Dundas and Glengarry."

P2508
Sand and Gravel Assessment of GLENGARRY COUNTY
United Counties of Stormont, Dundas and Glengarry

Scale 1:50,000

Metres 1000 0 1 2 3 4 5 6 7 Kilometres
Chains 80 40 0 1 2 3 Miles

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