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Industrial Mineral Resources of the Markham-Newmarket Area

Ontario and York Counties

By
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Industrial Mineral Report 24

TORONTO
1969

Publications of the Ontario Department of Mines

and pricelist

are obtainable through the

Publications Office, Ontario Department of Mines

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1,000–1190–1969 *rp*

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ABSTRACT

The Markham-Newmarket map is one of a series of 1 inch to 1 mile maps of the Toronto area showing industrial mineral resources, bedrock outcrops, and mineral properties in the area. The area covers Pickering, Uxbridge, Markham, and Whitchurch Townships, and parts of King, Vaughan, Scarborough, and North York Townships.

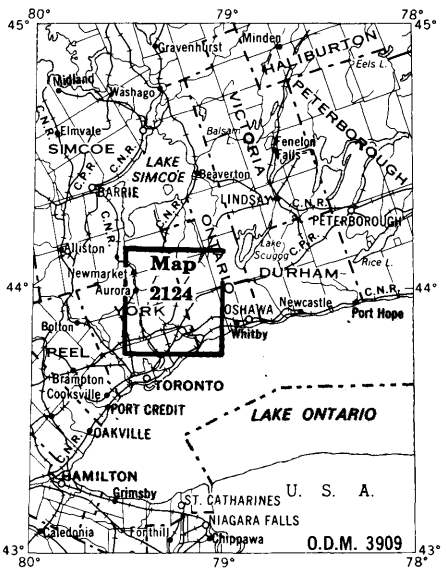

Figure 1—Key map showing location of the Markham-Newmarket area. Scale, 1 inch to 50 miles.

Mineral production in the area is confined to sand and gravel. The two important sand and gravel producing areas are the Lake Iroquois beach and the Oak Ridges kame moraine. Both of these areas are important sources of aggregate and together supply about 25 percent of the sand and gravel used in the Toronto area. One hundred and seventeen sand and gravel pits were visited, of which sixty-one were producing in 1965. Annual production is valued at approximately $7,000,000.

Deposits of clay and shale in the area are of possible economic interest.

The four principal physiographic regions in the map-area are the Oak Ridges kame moraine, the Schomberg Lake plain, the Markham-Pickering till plain, and the Lake Iroquois shoreline.

Industrial Mineral Resources
of the
MARKHAM-NEWMARKET AREA
Ontario and York Counties

by
D. F. Hewitt[1]

INTRODUCTION

The Markham-Newmarket map is one of a series of 1 inch to 1 mile maps showing the industrial mineral resources, bedrock outcrops, and mineral properties in the area. The Markham-Newmarket area comprises the Markham topographic sheets between Latitudes 43°45′N and 44°N, and Longitudes 79°W and 79°30′W, and the portions of Whitchurch and Uxbridge Townships within the Newmarket topographic sheets. The townships of Pickering and Uxbridge, Ontario County, and the townships of Markham and Whitchurch, York County, lie within the area. Included also are portions of Scarborough, North York, Vaughan, and King Townships, York County.

Scarborough and North York Townships lie within the boundaries of Metropolitan Toronto.

Overburden is thick over the entire area; the only bedrock outcrops are in the valley of Duffin Creek in Pickering Township and in the valley of the Rouge River in Scarborough Township. The bedrock exposed is black to grey, fissile, thin-bedded shale of the Collingwood Formation of Upper Ordovician age.

The area is wholly mantled by thick Pleistocene deposits. The abandoned shoreline of Glacial Lake Iroquois crosses the southeastern part of the Markham map-area extending northeast from the village of Highland Creek across Pickering Township south of Brougham and Kinsale.

Northwest of the Lake Iroquois shoreline, in the Markham map-area, is a level to drumlinized till plain, in places lightly covered by a veneer of lake clays, silt, and fine sand.

The Oak Ridges kame moraine forms a hilly upland area of sand and gravel extending in an east-west direction through Uxbridge and Whitchurch Townships, with portions extending into Vaughan, Markham, and King Townships. The Schomberg Lake clay plain occupies the area around Newmarket.

Mineral Production

Mineral production in the area is confined to sand and gravel. Two important sand and gravel producing areas lie within the map-area. These are the deposits along the Lake Iroquois beach in Scarborough and Pickering Townships and the deposits in

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Manuscript accepted for publication by the Director, Geological Branch, 20 February 1967.

the Oak Ridges kame moraine in Whitchurch and Uxbridge Townships. Both these areas are important aggregate sources for the Toronto area, and together supply about 25 percent of the sand and gravel used in the Toronto area.

One hundred and seventeen sand and gravel pits were visited in 1965, of which sixty-one were producing. Production of sand and gravel from these pits amounts to about $7,000,000 annually.

Access and Population

A grid of roads, at about 1 mile intervals, crosses the map-area providing excellent access to the whole area. Provincial Highways 11, 7, 48, 2, 401, 47, and several paved county roads cross the area.

Metropolitan Toronto had a population of 1,874,605 in 1968. The towns of Aurora, Newmarket, and Richmond Hill, and the villages of Markham and Stouffville in York County, and the towns of Ajax and Uxbridge and villages of Pickering, Brougham, and Claremont in Ontario County lie within the map-area. The population of the Markham-Newmarket area, exclusive of Metropolitan Toronto, was approximately 132,000 in 1968.

Topography

The highest elevation in the area is 1,300 feet above sea level in the Oak Ridges kame moraine of southeast Uxbridge Township. This hilly upland area extends across Whitchurch and Uxbridge Townships and ranges in elevation from 1,000 to 1,300 feet. The till plain in Whitchurch and Markham Townships slopes southwards from an elevation of 1,000 feet along the margins of the Oak Ridges kame moraine to 600 feet at Agincourt. In Uxbridge and Pickering Townships the till plain slopes southwards from an elevation of 1,000 feet in southern Uxbridge Township to 300 feet in the vicinity of Pickering. The clay plain around Newmarket has an elevation of 850 to 950 feet.

Drainage

The hilly Oak Ridges kame moraine in Whitchurch and Uxbridge Townships forms the divide between the Lake Simcoe and the Lake Ontario drainage. The south slope from the moraine area is drained by the Don River, Highland Creek, the Rouge River, Duffin Creek, and their tributaries. The northern parts of Whitchurch and Uxbridge Townships drain via the Holland River, Bogart Creek, the headwaters of the Black River, Pefferlaw Brook, Uxbridge Brook, and the Beaverton River into Lake Simcoe. There are many small lakes and ponds in Whitchurch Township along the south slope of the till plain adjacent to the moraine.

Previous Work

The bedrock geology of the area is described by Caley (1940). The Pleistocene geology of parts of the area is described by Coleman (1930; 1936a and b); Watt (1955); and Karrow (1964; 1966). A good general description of the physiography is given by Chapman and Putnam (1951). This latter book includes a generalized map on the scale of approximately 1 inch to 4 miles. Among the most useful publications on the surficial geology of the area are the soil survey reports of York and Ontario Counties: Reports 19 and 23 of the Ontario Soil Survey, Hoffman and Richards (1955) and Olding, Wicklund, and Richards (1956). Sand and gravel deposits are described by Hewitt and Karrow (1963). A further description of sand and gravel deposits in Whitchurch and Uxbridge Townships is given by Turner (1964). Reconnaissance Pleistocene maps of the Markham and Newmarket areas were kindly supplied by P. F. Karrow of the University of Waterloo.

Much information has been taken from water-well records of the Ontario Water Resources Commission.

Field Work

Field work for this report was carried out during part of the summer of 1965 and was brought up-to-date in 1967 and 1968.

Acknowledgments

The writer is indebted to G. R. Guillet, of the Ontario Department of Mines, for providing ceramic data on the clays and shales of the area. H. S. Wilson, of the Department of Energy, Mines and Resources, Ottawa, kindly provided notes on the bloating qualities of the Collingwood Shale.

C. I. Dell, formerly of the Ontario Research Foundation carried out some of the mineralogical analyses for this report and the Laboratory and Research Branch of the Ontario Department of Mines carried out the chemical analyses, the sieve analyses, and some of the mineralogical analyses.

PALEOZOIC GEOLOGY

Table 1 | TABLE OF FORMATIONS

UPPER ORDOVICIAN

DUNDAS FORMATION

Grey shale with minor interbeds of grey limestone and siltstone

COLLINGWOOD FORMATION

Dark brownish grey to black fissile shale, in part bituminous

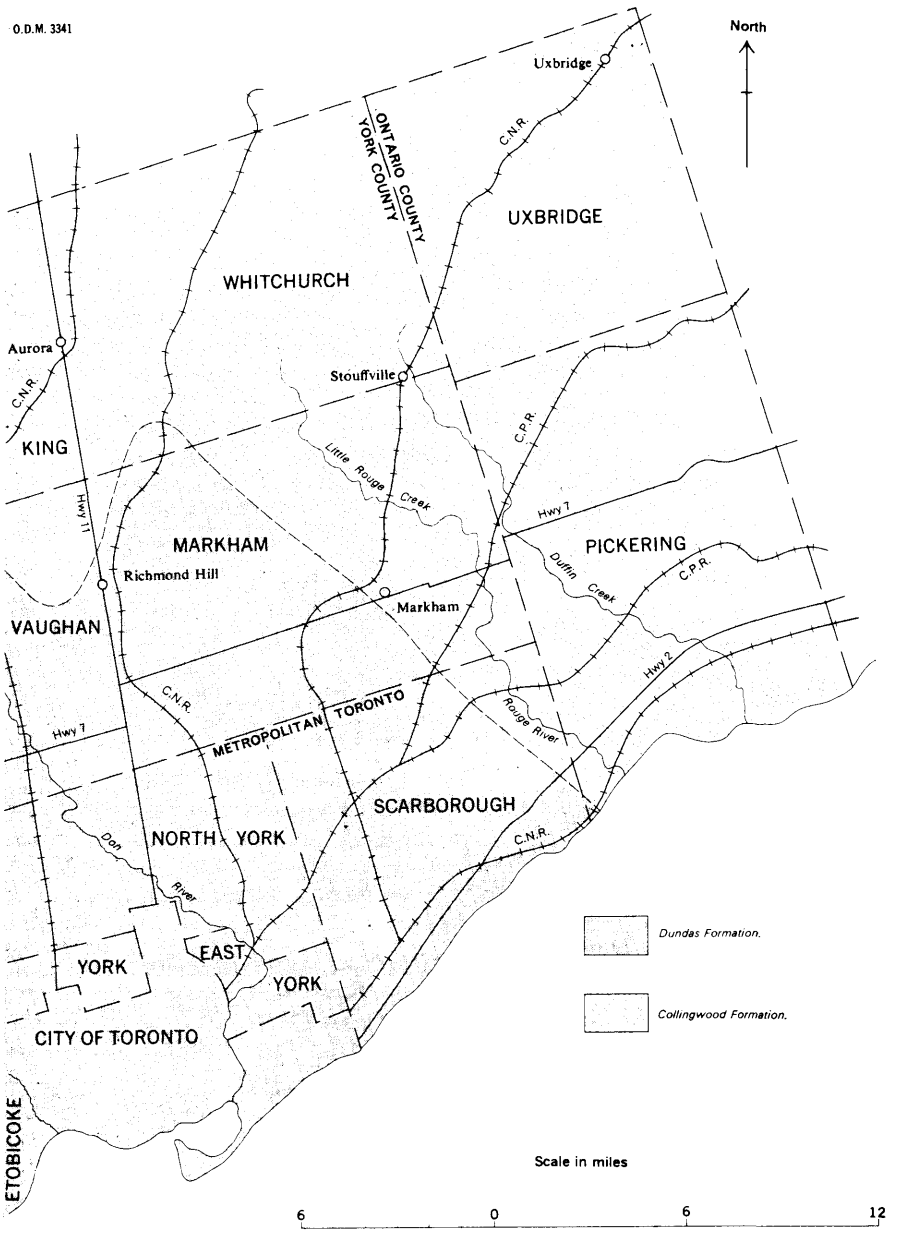

Figure 2–Paleozoic geology of the Markham-Newmarket area.

ORDOVICIAN

Collingwood Formation

Whitchurch, Uxbridge, and Pickering Townships and the northeastern part of Markham Township are underlain by grey and black shale of the Collingwood Formation (see Figure 2). The Collingwood Formation consists of dark brownish grey to black, thin-bedded, fissile shale. Some bituminous beds and pyrite may be present. The formation is reported by Sanford (1961, p. 12) to be about 200 feet thick. It is underlain by Trenton Limestone and overlain by Dundas Shale.

Overburden is thick throughout the area and the only places where the Collingwood Shale can be seen in outcrop is along the Rouge River valley between Twyn Rivers Drive and Highway 2 in Scarborough and Pickering Townships and along the lower reaches of Duffin Creek in Pickering Township. The best outcrops of the Collingwood Shale in the area are along the west bank of the east branch of Duffin Creek in lots 15 and 16, concession III, Pickering Township. The outcrops are 50 feet north of the bridge across Duffin Creek on the third concession line ½ mile east of the Brock Road.

A section of 18 feet of Collingwood Shale is exposed at this locality. It has been measured and described by G. R. Guillet (1965, personal communication) as shown in Table 2.

Table 2 | COLLINGWOOD SHALE AS EXPOSED AT DUFFIN CREEK, PICKERING TOWNSHIP; (AFTER GUILLET 1965, PERSONAL COMMUNICATION)

Datum: creek level equals zero

Footage	
0 - 2.0	Not exposed
2.0- 4.5	Blue-grey, uniform, thin-bedded shale with occasional rusty bedding planes
4.5- 5.0	Very soft, fissile olive-yellow shale
5.0- 6.4	Dark rusty brown, platy, thin-bedded shale
6.4- 7.7	Somewhat harder, brittle, fissile brownish black shale
7.7- 8.2	Very soft, fissile olive-yellow shale
8.2-11.3	Alternating beds of dark rusty brown, platy, thin-bedded shale and olive-yellow soft, fissile shale
11.3-20.0	Uniform, very thin-bedded, platy to fissile medium brown to black and olive-grey shale

The upper part of the section is more thinly bedded than the bottom part of the section. The shale is somewhat weathered. Except along the river valley the overburden would be 20 to 30 feet thick.

Ceramic tests were carried out on two composite shale samples: 2 to 11.3 feet and 11.3 to 20.0 feet. These tests indicate that the shale has little value for structural clay products. Fragments of the shale are hard and brittle and exhibit very low plasticity when ground and moistened. Formed pieces will stand rapid drying without cracking and the lineal drying shrinkage is 2.3 percent. Optimum firing temperature is cone 06 (1840°F), where the body exhibits steel hardness, medium red colour, and a lineal fired shrinkage of 4 percent. Absorption by 24-hour cold water submersion is 5.7 percent; by 5-hour boiling, 8.0 percent. Test briquettes are blistered at all firing temperatures. Fusion point (pyrometric cone equivalent) is about cone 7 (G. R. Guillet 1965, personal communication).

A chemical analysis of a composite sample of the Collingwood Shale from this locality at Duffin Creek is shown in Table 3.

Table 3 | CHEMICAL ANALYSIS OF COLLINGWOOD SHALE TAKEN FROM EXPOSURE ON DUFFIN CREEK, PICKERING TOWNSHIP

	PERCENT
SiO_2	57.14
Al_2O_3	18.2
Fe_2O_3	7.30
CaO	1.69
MgO	2.78
Na_2O	0.44
K_2O	4.22
TiO_2	0.88
CO_2	1.04
H_2O+	4.25
H_2O-	1.49
SO_3	0.55
Total	99.98
Loss on ignition	7.13

Free silica 26% by x-ray spectrometer.
Dolomite, 0.64%; calcite, 1.66% by gasometric analysis.
Illite is abundant and chlorite is present in moderate amounts.

Shale from this locality at Duffin Creek, in Pickering Township, was tested for bloating by the Mineral Processing Division of the Department of Mines and Technical Surveys[1], Ottawa. H. S. Wilson (1965, personal communication) reported that in the stationary kiln the shale bloated moderately over a temperature range of less than 50 degrees, between 2000° and 2050°F.

In the rotary kiln (5 inches by 5 feet), the minus ½ plus ¼ inch shale expanded 90 percent when fired at temperatures between 1990° and 2040°F. Some non-uniformity of bloating was noted. The product was screened, crushed, and recombined to result in the following grading:

75 percent minus ⅜ inch plus 4 mesh
25 percent minus 4 plus 8 mesh.

This graded coarse aggregate had a dry loose unit weight of 40.3 pounds per cubic foot and a crushing strength for 1- and 2-inch compaction of 450

[1]Name changed to Department of Energy, Mines and Resources.

and 1680 psi (pounds per square inch). These tests indicate that the Collingwood Shale has promise of being a suitable raw material for light weight aggregate.

Dundas Formation

The Dundas Shale underlies parts of Markham, Scarborough, York, and Vaughan Townships. It is not exposed within the map-area. The nearest section of Dundas Shale to be seen is at the Don Valley brick plant of Toronto Brick Company Limited where it is quarried for use in the manufacture of brick.

The Dundas Formation consists of greenish grey to medium grey shale with some interbeds of grey siltstone and grey limestone. The interbeds decrease in frequency towards the base of the formation, which has a thickness of approximately 300 feet. The contact with the underlying Collingwood Shale is gradational.

The thickness of the cover of overburden on the Dundas Shale in Markham Township ranges from 70 to 300 feet.

CENOZOIC

PLEISTOCENE GEOLOGY

The following section on "Glacial History" is summarized from Hewitt and Karrow (1963, p. 17-33).

Glacial History

Field work in the Toronto area has indicated that glacial ice sheets spread over southern Ontario twice during Pleistocene times. During the Illinoisan glacial stage, tills were laid down and remnants of these early tills are found at the Don Valley brick yard and in the Toronto subway excavation. The ice that deposited the Illinoisan tills in the Toronto area apparently moved westwards out of the Lake Ontario basin.

Following the Illinoisan Glacial Stage there was a period of warm climate, and beds of stratified clay, sand, and gravel called the Don Beds were laid down. They are found at the Don Valley brick yard and have a maximum thickness of about 30 feet.

After the deposition of the Don Beds, the climate became cooler and about 150 feet of fossiliferous clay and sand called the Scarborough Beds were laid down. These beds are well exposed at the Don Valley brick yard and in the Scarborough bluffs. The Don Beds and Scarborough Beds were laid down during the Sangamonian Interglacial Stage.

The last ice sheet to spread over Ontario was called the Wisconsin ice sheet. Recent work had indicated that the Wisconsin glaciation consisted of two major ice advances separated by a cool interval. The early Wisconsinan till lies beneath the gravel at Markham Sand and Gravel pit (property 41 on Map 2124, back pocket) in Markham Township on Don Mills Road (Woodbine Avenue on Map 2124).

By 27,000 years ago the last major ice advance was underway and by 20,000 years ago the ice had spread to its maximum extent, reaching southern Ohio. As far as is known, all of southern Ontario was covered by glacial ice until about 14,000 years ago when a retreat of the ice fronts began. As the ice retreated one lobe occupied the Lake Ontario basin, and another lobe occupied the Lake Simcoe basin. The two lobes parted along a line from Oak Ridges through Goodwood, and as the lobes retreated, a great area of hilly kame moraine made of sand and gravel outwash from the glacial lobes accumulated to form the Oak Ridges kame moraine. Meltwaters from the ice fronts to the north and south poured out many millions of tons of sand and gravel into this kame moraine, which forms a prominent knobby highland across this part of central Ontario.

After the Lake Ontario lobe retreated to the vicinity of the Whitchurch-Markham township line and gravel accumulated in the southern part of Whitchurch Township, the ice readvanced to cover the southern slope of the Oak Ridges kame moraine with a capping of clay till. This till covers the gravel deposits that extend across lots 8 and 9 in an easterly direction from concession IV to concession VIII, Whitchurch Township. This gravel deposit appears to mark an east-west glacial spillway that flowed westerly along the ice front when it halted at that position.

As the ice lobes retreated, the Lake Ontario lobe held a glacial lake ponded against the Oak Ridges kame moraine. This is called by Chapman and Putnam, the "Peel ponding". At the same time, the Lake Simcoe lobe ponded the water against the Oak Ridges kame moraine hills on the north resulting in

the "Schomberg ponding" evident around Newmarket (Chapman and Putnam 1951). Clays were laid down in these shallow glacial ponds and form a thin veneer over the tills, in Markham Township particularly.

A major ice retreat, associated with a temporary warming of the climate, caused the ice to withdraw from part of the Lake Ontario basin and Glacial Lake Iroquois was formed about 12,000 years ago, with its outlet down the Hudson valley. Glacial Lake Iroquois was somewhat larger than present Lake Ontario and its shoreline is several miles inland from the present shore. This abandoned shoreline of the glacial lake is an important source of gravel in places where bars and spits have been built up.

Physiographic Features

The four principal physiographic features in the map-area are:

(1) The Oak Ridges kame moraine
(2) The Schomberg Lake plain
(3) The Markham-Pickering till plain
(4) The Lake Iroquois shoreline.

OAK RIDGES KAME MORAINE

As mentioned previously, the Oak Ridges kame moraine was formed by an outpouring of glacial meltwater between the Lake Simcoe and Lake Ontario ice lobes, and deposition of sand and gravel. It extends from the Niagara Escarpment in Caledon Township eastwards through King, Whitchurch, and Uxbridge Townships to the vicinity of Trenton. In Uxbridge Township it is 6 miles wide.

In Whitchurch and Uxbridge Townships, the Oak Ridges kame moraine forms a highland area of knobby sand hills ranging in elevation from 975 to 1,300 feet. The south margin is overlapped by the Markham-Pickering till plain, which slopes southwards to Lake Ontario. The north margin is rather irregular and serrate, and lies partially to the north of the map-area. On the northwest end, the moraine is bounded by sands, silts, and clays of the Schomberg Lake plain. Southwest of Vandorf, a narrow tongue of the sandy moraine extends to Wilcocks Lake where it has an elevation of 975 feet. The sand deposits of Baker Sand and Gravel (property 45) are in this tongue at Wilcocks Lake. An inlier of the sandy moraine forms the hills around the Summit Golf Club (on Yonge Street at Jefferson) at an elevation of 975 feet, and a further tongue extends southwest to form the sand and gravel hills at Maple (out of the map-area) with an elevation of 900 to 1,000 feet.

To the east, the sandy moraine passes out of the map-area into Reach Township. In southeastern Uxbridge Township the Dagmar ski hills are part of the Oak Ridges kame moraine.

Although the Oak Ridges kame moraine is mainly composed of fine sand, there are numerous deposits of stratified kame sands and gravels, and at least one possible spillway (see section on "Glacial History"). The Oak Ridges kame moraine area, particularly in Uxbridge Township, offers good possibilities for sand and gravel prospecting.

Much of the Oak Ridges kame moraine area in Whitchurch and Uxbridge Townships consists of fine outwash and dune sands. Sieve analyses of four typical samples of these fine sands are given in Table 4.

Sieve analyses of the coarser outwash and kame sands are given in the section on "Economic Geology" in the individual property descriptions.

SCHOMBERG LAKE PLAIN

The northwest corner of Whitchurch Township from Aurora to Newmarket and east to Cedar Valley forms part of the Schomberg Lake plain. The western part of the area is underlain by silty varved clays with some till. The eastern part of the area bordering the Oak Ridges kame moraine is silt and fine sand. Elevations range from 850 to 950 feet and this part of the lake plain is somewhat irregular in topography.

Table 4 SIEVE ANALYSES OF SAND FROM WHITCHURCH AND UXBRIDGE TOWNSHIPS (VALUES IN WEIGHT PERCENT)

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Sample								
65-72[a]	nil	nil	nil	nil	0.3	18.0	59.0	22.7
65-73[b]	nil	nil	nil	0.5	3.2	61.4	32.1	3.25
65-91[c]	nil	nil	0.05	0.45	14.5	50.45	23.65	10.9
65-120[d]	nil	nil	nil	0.1	5.55	59.4	28.2	6.75

Location of Samples:
[a]lot 18, concession V, Whitchurch Township
[b]lot 17, concession VI, Whitchurch Township
[c]lot 26, concession VI, Whitchurch Township
[d]lot 23, concession VII, Uxbridge Township

MARKHAM-PICKERING TILL PLAIN

The southern margin of Whitchurch and Uxbridge Townships, the whole of Markham Township, and that portion of Pickering Township north of the Lake Iroquois beach consist of bevelled and drumlinized till plain. In Markham Township and part of Pickering Township, the clay loam till is in places overlain by a thin veneer of clay, silt, or fine sand laid down during the period of Peel ponding (Lake Peel).

Drumlins are common in Markham Township: there are drumlins 2 miles east of Langstaff on Highway 7; southeast of Cedar Grove; ½ mile west of Headford; 1½ miles east of Headford; at Heise Hill on Don Mills Road (Woodbine Avenue on Map 2124, back pocket); ½ mile east of Dicksons Hill (central map-area); on 19th Avenue 1 mile south of Stouffville. Prominent drumlins in Pickering Township include two at Greenwood; Highway 7 swings north to skirt the Greenwood drumlin. There are several drumlins on the clay till plain in Pickering Township south of the Lake Iroquois beach. Several other drumlins occur in the area and all are oriented to the north-northwest.

LAKE IROQUOIS SHORELINE

The abandoned shoreline of Glacial Lake Iroquois extends in a northeasterly direction from West Hill in Scarborough Township, across the Rouge Valley south of Finch Avenue, into Pickering Township, paralleling the CPR line. It crosses West Duffin Creek at Dixie, on concession III, and runs northward to Highway 7 a mile east of Brougham. Here there is a northerly embayment that runs up to the 7th concession line. The shoreline then swings south around the Greenwood drumlins and can be traced eastwards in irregular scallops about ½ mile south of Highway 7.

The character of the shoreline, the shorecliffs, and the beach and bar deposits along the shoreline depend on several factors, the more important of which are: (1) the type of material forming the shoreline; (2) the depth of water offshore; (3) the reach of the water; (4) the exposure to prevailing winds; (5) the configuration of the shoreline.

A narrow gravel bar crosses Lawrence Avenue East just south of West Hill. Another gravel bar stretches from Morningside Drive and Military Trail in a northeasterly direction across the Rouge River to the vicinity of Finch Avenue and the Pickering township line. From this point northeast for 2½ miles to West Duffin Creek the shorecliff is cut in clay till and there is a wide boulder strewn terrace with little or no gravel. From West Duffin Creek to the Brock Road there is another gravel bar worked by many gravel pits. This bar terminates at a till promontory in lot 18, concession IV, Pickering Township. Between this promontory and the Greenwood till promontory is another gravel bar worked by Consolidated Sand and Gravel, Miller Paving, and others. The Duffin Creek embayment has considerable sand and gravel as far north as concession VII. Smaller gravel bars are found between shoreline promontories in lots 8 and 9, and lots 4 and 5, concession V, Pickering Township. The relation of gravel bars to embayments between promontories along the shoreline is noteworthy. Extending lakewards from the shoreline are rather extensive sand plains continuing in places for over a mile from the shorecliff. The shorecliff is well developed especially along the till promontories.

Since the waves of Lake Iroquois reworked the till of the shoreline in Pickering Township the gravels are mainly composed of Black River and Trenton Limestones, and Precambrian crystalline rocks, which are the principal rock types carried from the east by the Lake Ontario ice lobe.

Pleistocene Deposits

TILL PLAINS

The principal till plain in the area is the Markham-Pickering till plain, which slopes southward from the 1,000-foot elevation along the south edge of the Oak Ridges kame moraine to the Glacial Lake Iroquois shoreline. The till is composed mainly of bouldery clay loam and clay. It ranges in thickness from a few feet to over 40 feet in thickness. In places, fluting or grooving indicates the direction of ice movement from the southeast. The till plain is composed of a sheet of till or ground moraine of undulating or rolling topography.

DRUMLINS

The Markham-Pickering till plain is drumlinized. These drumlins are oval hills from ¼ to 1 mile in length and usually not more than ¼ mile in width. They stand up 50 to 75 feet above the till plain. Chapman and Putnam (1951, p. 56) pointed out that drumlins consist predominantly of medium-textured boulder clay and that while there is considerable variation in the proportion of sand and clay in these tills, which form the drumlins, heavy clay or light sand is seldom found.

Hills, which resemble drumlins, are sometimes formed where the ice overrides a moulin kame hill of sand and gravel. Such a drumlin-like hill composed of sand and gravel capped by a few feet of clay till occurs in lots 6 and 7, concession IV, Markham Township at the Markham Sand and Gravel pit (property 41) on Don Mills Road (Woodbine Avenue on Map 2124, back pocket). Other overridden kames have been found in the area.

The orientation of the long axes of the drumlin hills indicates ice movement from the southeast.

KAMES

As glacial meltwaters poured off the ice sheet, carrying sand and gravel, deposits of sand and gravel were built-up along the ice margins. These ice contact deposits, which generally take the form of hills or knobs, are called *kames*. Many kames were formed as deltas or alluvial cones where the meltwater streams poured from the ice sheet.

Kames are common in interlobate moraines such as the Oak Ridges moraine that is termed a "kame moraine" due to the high percentages of kames in the interlobate area. Kames are commonly composed of irregularly bedded and crossbedded sand and gravel.

Several kame deposits of sand and gravel were overridden and buried beneath the till sheet of the Markham-Pickering till plain. Buried kame deposits operated for sand and gravel include Markham Sand and Gravel pit (property 41), west half of lots 6 and 7, concession IV, Markham Township; the Headford pit of Warnock and Johnson (property 40) on the east half of lot 20, concession II, Markham Township; Groves pit of Warnock and Johnson (property 42), lot 16, concession VIII, Markham Township; the former Pickering Township pit (property 32) on lot 15, concession V, Pickering Township; Gravand Construction Company pit (property 34) on lot 22, concession V, Pickering Township; Giordano's pit (property 35) on lot 31, concession V, Pickering Township; a small pit on lot 21, concession VI, Pickering Township; and the Pearse pit (property 37) on lot 22, concession VI, Pickering Township.

The upper Wisconsin till is rich in local shale and certain of the kame gravels, particularly those of Markham Sand and Gravel and the Pickering Township pit, contain a noticeable percentage of shale pebbles.

OUTWASH PLAINS

Within the Oak Ridges kame moraine area there are outwash plains of sand having a flat relief. Examples can be seen around Ballantrae, northeast of Goodwood, and from Vandorf to Cedar Valley.

GLACIAL LAKE PLAINS

The shoreline of Glacial Lake Iroquois has already been described. The lake plain south of the abandoned Iroquois shore is composed predominantly of clay and till plains with sand extending for 1 mile to 1½ miles offshore. See also the section on "Schomberg Lake Plain".

A thin veneer of clay was laid down in Markham Township on the till plain by the "Peel ponding" described by Chapman and Putnam (1951, p. 24).

SPILLWAYS

Sand and gravel deposits were laid down along the courses of glacial streams or rivers as glacial spillway deposits. The sand and gravel deposits extending across concessions IV to VIII in lots 8 and 9, Whitchurch Township, probably mark the location of a spillway overridden by the Markham-Pickering till sheet.

Recent Deposits

The recent deposits of the area are mainly composed of alluvial stream deposits of silt, sand, and gravel, and swamp deposits of bog and muck of organic origin. No peat bogs of potential economic interest were observed in the area.

ECONOMIC GEOLOGY

The only industrial mineral deposits in the area being exploited at the present time are sand and gravel. The area also contains deposits of clay and shale.

SHALE

The Collingwood Shale and its economic possibilities are described in the section on "Paleozoic Geology". Due to the depth of overburden in the area, the Duffin Creek outcrops of Collingwood Shale appear to be the only deposits readily available for surface examination.

Depth of Overburden

Owing to the scarcity of wells going down to bedrock in the area, no map indicating bedrock contours has been made. At Newmarket, wells indicate a depth of overburden of 280 to 450 feet. At Aurora, the depth of overburden is 360 to 390 feet. At Jefferson, on Highway 11, overburden is 100 to 150 feet thick. At Richmond Hill, one well indicates a depth of 353 feet to bedrock. From Richvale to Thornhill along Yonge Street, depths of overburden range from 54 to 267 feet. At Unionville and

Markham, the depths of overburden range from 70 to 225 feet. Wells at Markham Sand and Gravel penetrated bedrock shale at depths of 192 and 226 feet. At Victoria Square, in Markham Township, a well reached bedrock shale at 325 feet.

In Pickering Township, south of the Iroquois shoreline, depths of overburden are somewhat less. Wells in lots 14 and 15, concession III, Pickering Township indicated overburden thicknesses of 51 and 75 feet. A well at Ajax reached shale at 70 feet.

CLAY

Newmarket Clay Plain

The Newmarket clay plain (Schomberg Lake plain) extends across concessions I and II, Whitchurch Township, between Newmarket and Aurora. Some thick sections of silty varved clay are available in valley banks.

A 24-foot section is exposed in a roadcut 1 mile east of Aurora on the north bank of the Holland River. The lower 5 feet consist of grey stoneless silty clay, uniformly laminated in layers $\frac{1}{8}$ inch thick. Above this, the clay is oxidized to brown, interstratified with yellow silt. A 3-foot section near the middle of the bank is distinctly varved, the $\frac{1}{2}$-inch varves consisting of equal parts of pale brown clay and buff coloured silt. The top 10 feet consist of finely stratified silt and clayey silt. Chemical and mineral analyses of the section are shown in Tables 5 and 6. The clay and silt have a high carbonate content, and test briquettes are soft, porous, and highly absorptive when fired; it is poorly suited for burned clay products (Guillet 1965, personal communication).

Table 5 CHEMICAL ANALYSIS OF CLAY FROM THE NEWMARKET CLAY PLAIN FROM EXPOSURE ON HOLLAND RIVER, NEAR AURORA

	PERCENT
SiO_2	39.14
Al_2O_3	8.20
Fe_2O_3	3.78
CaO	18.67
MgO	5.05
Na_2O	1.52
K_2O	1.89
TiO_2	0.40
CO_2	17.98
H_2O+	1.17
H_2O-	0.78
SO_3	trace
Total	98.6
Loss on ignition	19.97

Table 6 MINERAL ANALYSIS (BY X-RAY DIFFRACTOMETER) OF CLAY FROM THE NEWMARKET CLAY PLAIN FROM EXPOSURE ON HOLLAND RIVER, NEAR AURORA

	PERCENT
NON-CLAY MINERALS:	
Quartz	26
Calcite	40
Dolomite	6
Soda-lime feldspar	5
Potassic feldspar	2
Amphibole	less than 1
CLAY MINERALS:	
Illite	moderate
Chlorite	minor
Expanding minerals	minor

Rosebank Station

At Rosebank Station, on the east bank of the Rouge River near Lake Ontario, 12 feet of very thin-bedded, brown, stoneless clay overlie Leaside Till. The clay was deposited at the time of Lake Iroquois, and occasional thin black carbonaceous seams are evidence of a warming climate.

The clay is uniformly bedded in $\frac{1}{2}$-inch layers of smooth, tough, dark brown clay, and medium-brown silty clay. In addition to the black organic streaks there are occasional yellow rusty streaks, a few layers of pink-brown plastic clay, and scattered pods of fine yellow sand up to 2 inches thick. Towards the top the bedding is distorted and less distinct; the top few feet consist of massive brown silty clay.

A vertical channel sample from the 12-foot section was tested for its ceramic properties. When tempered with water it was found to have rather low plasticity and to be somewhat flabby. Lineal drying shrinkage was 5 percent. Test briquettes expanded slightly on firing and were only moderately hard. At cone 06 (1840°F measured by optical pyrometer) the briquettes, though porous, were an attractive cream colour; absorption by 24-hour cold water submersion and 5-hour boiling was 21.4 and 27.0 percent respectively. Briquettes fired to cone 03 (1980°F) were yellow-buff in colour; absorptions were 20.0 and 28.2 percent respectively. The fusion point (P.C.E.) of the clay was cone 2-3. The clay could be used with shale in the production of buff brick, but it is too porous after firing to be used alone (Guillet 1965, personal communication).

Scarborough Bluffs at Highland Creek

Scarborough Bed interglacial clay is exposed in the bluffs along the Lake Ontario shore west of Highland Creek. The clay extends below water level and is overlain by a variable thickness of till. Scarborough Bed clay was formerly used for soft-mud brick at plants on Greenwood Avenue and in the Don Valley.

The lake banks are 40 to 50 feet high in the section from Highland Creek to a point ½ mile west. Over much of this area the overlying till varies from 0 to 25 feet in thickness. Scarborough Bed clay was examined and sampled at a point 2,000 feet west of Highland Creek, where stratified clay and sand is exposed from water level to the top of the bank. The lower 10 feet, and a similar thickness near the middle of the bank, consist of medium-bedded or massive, silty, black-brown clay that dries to a pale grey-buff colour. Other sections consist of both massive and stratified, buff-weathering, fine-grained, brown sand. Some sections consist of thinly stratified silty clay and sand, with rusty streaks and thin indurated ("ginger stone") lenses.

Five vertical channel samples were taken to represent the 45-foot face from bottom to top. Except for the very low plasticity of the sandy sections, the ceramic properties of all samples were similar. Lineal drying shrinkage was 4 to 5 percent. On firing, the test briquettes expanded slightly and were of moderate hardness. Briquettes fired to cones 010 and 06 (1660°F and 1840°F measured by optical pyrometer) were pale brown to salmon in colour and had absorptions by 24-hour cold water submersion and 5-hour boiling of 16 and 20 percent respectively. Briquettes fired to cone 03 (1980°F) were pink-brown in colour and had absorptions of 13 and 19 percent respectively. The fusion point (P.C.E.) of the clay was about cone 5. The clay appears similar to that formerly used by six plants on Greenwood Avenue, where soft-mud brick of a rich mahogany colour was popular.

A chemical analysis of a composite of the 5 vertical channel samples is shown in Table 7 and is representative of the 45-foot section (Guillet 1965, personal communication).

Table 7 — A CHEMICAL ANALYSIS OF SCARBOROUGH BED INTERGLACIAL CLAY FROM AN EXPOSURE 2,000 FEET WEST OF HIGHLAND CREEK

	PERCENT
SiO_2	60.7
Al_2O_3	12.3
Fe_2O_3	4.00
CaO	5.95
MgO	2.14
Na_2O	2.08
K_2O	2.55
TiO_2	0.56
CO_2	4.24
H_2O+	3.42
H_2O-	1.44
SO_3	0.27
MnO	0.08
Total	99.7
Loss on ignition	6.87
CARBONATE CONTENT:	
Dolomite	2.22
Calcite	7.24

SAND AND GRAVEL

Two important sand and gravel producing areas lie within the map-area. These are the Lake Iroquois beach deposits of Scarborough and Pickering Townships and the kame and outwash sand and gravel of the Oak Ridges kame moraine in Whitchurch and Uxbridge Townships. These deposits produce about 25 percent of the sand and gravel used in the Toronto area. One hundred and seventeen sand and gravel pits were visited in 1965, of which about sixty were in current production. Annual production of sand and gravel in the area, in 1965, was approximately $7,000,000.

The Lake Iroquois beach deposits in Scarborough Township are largely depleted or built over by housing. The beach deposits in Pickering Township are rapidly becoming depleted and probably few new deposits will be found along the Lake Iroquois shoreline, which has been rather thoroughly prospected in the area. Prospecting for buried kame deposits is difficult as they are hidden beneath a capping of clay till and may give little or no surface manifestation. Geophysical resistivity methods may be useful for the location of buried kames.

Many more gravel deposits can be expected to be found in the Oak Ridges kame moraine area especially at Uxbridge Township. In general, it is difficult to predict their location and prospecting by drilling or Gradall excavation is required.

Classification of Sand and Gravel Deposits

The sand and gravel deposits are classified as to origin in the following five categories: Lake Iroquois shoreline deposits; buried kame deposits; spillway deposits; kame moraine and outwash deposits; interstadial outwash and deltaic sand deposits.

LAKE IROQUOIS SHORELINE DEPOSITS

These consist of beach and bar deposits along the ancient shoreline of Glacial Lake Iroquois in Scarborough and Pickering Townships. The relation between promontories and bars has been pointed out in the previous section on "Lake Iroquois Shoreline" under "Pleistocene Geology", and is graphically illustrated on Map 2124 (back pocket). The principal gravel producing area along the abandoned shoreline is in concessions III, IV, and V, Pickering Township.

BURIED KAME DEPOSITS

Kame deposits that are buried beneath a capping of later Wisconsin till are listed under "Kames" in the section on "Pleistocene Geology". The largest of these is Markham Sand and Gravel pit (property 41) on Don Mills Road (Woodbine Avenue on Map 2124, back pocket).

ODM8156

Photo 1–Kame gravel at the Commercial Sand and Gravel Limited pit, property 67, Stouffville, Ontario.

SPILLWAY DEPOSITS

A buried glacial spillway deposit extends across concessions IV, V, and VI of Whitchurch Township in lots 8 and 9, from ½ mile north of Bethesda to Lemonville. Pits in this spillway deposit, which is capped by clay till, include the Pike (property 51) and Brillinger (property 52) pits in lots 8 and 9, concession IV; the Atkinson (property 54) and Bolender (property 55) pits in lots 8 and 9, concession V; and the Parkway (property 57) and Gormley Sand and Gravel (property 58) pits in lot 9, concession VI.

KAME MORAINE AND OUTWASH DEPOSITS

All other sand and gravel deposits in Whitchurch and Uxbridge Townships are classified as kame and outwash deposits. Part of the kame moraine extends into Vaughan Township in the vicinity of Maple (out of the map-area); the Superior Sand and Gravel (property 44) and Rockmor (property 43) pits lie in this area. Photo 1 shows kame gravel at Commercial Sand and Gravel pit, property 67, near Stouffville.

INTERSTADIAL OUTWASH AND DELTAIC SAND DEPOSITS

Two important sand pits are classified as interstadial outwash and deltaic sand deposits. These are the Miller Paving pit (property 2) in Scarborough Township at Morningside Drive and Military Trail, and the Jas. Sabiston pit (property 39) on lots 3 and 4, concession II, Markham Township near Thornhill.

Mineralogical Composition of Sand in the Markham-Newmarket Area

A mineralogical analysis of 23 samples of sand from pits in the Markham-Newmarket area was carried out by C. I. Dell (formerly of the Ontario Research Foundation). The results of this mineralogical study are tabulated in Table 8. The minus 28 plus 48 mesh fractions were studied in all cases. In most samples 80 to 90 percent of the sand is made up of quartz, feldspar, and Paleozoic limestone. Percentages of shale vary from 0.5 to 10.0 percent.

Description of Deposits

In the following section a listing or description of the sand and gravel deposits in the area is given by township. Many of the deposits have been previously described in "Sand and Gravel in southern Ontario", by Hewitt and Karrow (1963), and the reference is given to this report for descriptions where no new information is available.

Table 8 MINERALOGICAL COMPOSITION OF THE -28+48 MESH FRACTIONS OF SAND IN THE MARKHAM-NEWMARKET AREA (MINERALOGICAL STUDIES CARRIED OUT BY C.I.DELL FORMERLY OF THE ONTARIO RESEARCH FOUNDATION); ALL PERCENTAGES ARE TAKEN TO THE NEAREST 1/2 PERCENT

Property number in this report and on Map 2124 in back pocket	(12)	(14)	(20)	(41)	(42)	(43)	(45)	(47)	(51)	(52)	(52)	(54)	(57)	(58)	(61)	(65)	(67)	(70)	(78)	(87)	(115)	(117)	(58)
Property name	Warnock and Johnson	Highland Creek Sand and Gravel	Highland Creek Sand and Gravel	Markham Sand and Gravel	Warnock and Johnson, Groves pit	Rockmor Products Ltd.	Baker Sand and Gravel	Geo. A. White	Pike pit	Brillinger pit, upper face	Brillinger pit, floor	Atkinson pit	Parkway Sand and Gravel	Gormley Sand and Gravel, upper lift	F.H. Roberts and Sons Ltd.	Lee Sand and Gravel	Commercial Sand and Gravel Ltd.	Consolidated Sand and Gravel	Hall pit	Consolidated Sand and Gravel	Miller Paving Ltd.	Giordano Sand and Gravel	Gormley Sand and Gravel, lower lift
Quartz	30.5	33.0	34.0	36.0	35.0	34.5	43.0	31.0	28.0	25.5	26.5	28.5	24.0	24.0	30.0	23.5	37.0	33.5	27.5	30.5	24.0	35.0	34.0
Feldspar	13.5	11.5	19.0	9.5	15.0	23.5	18.5	17.0	13.0	14.5	7.5	20.0	13.0	12.5	21.5	10.5	13.0	12.0	13.5	11.0	17.5	13.5	10.5
Paleozoic limestone	40.5	49.0	36.0	45.0	44.0	37.0	33.5	41.0	51.5	53.5	56.0	38.5	57.5	57.5	43.5	60.5	37.0	45.0	45.5	49.5	51.5	43.0	48.5
Grey shale and siltstone	0.5	0.5	0.5	1.5	1.0	0.5	0.5	1.0	1.5	1.0	1.0	2.5	0.5	1.5	0.5	1.0	0.5	1.0	2.0	3.0	0.5	2.0	0.5
Red shale and siltstone	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Black shale	5.5	1.0	7.0	2.0	0.5	0.5	0.5	5.0	2.0	1.5	1.5	1.5	0.5	0.5	0.5	1.0	2.0	4.0	5.0	2.0	1.0	1.0	2.0
Quartz sandstone	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dolomite	0.5	0.5	0.5	...	0.5	0.5	0.5	0.5	0.5	0.5	1.0	...	0.5	0.5	0.5	0.5	1.5	0.5	0.5	...	0.5	...	0.5
Precambrian limestone	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Felsic igneous rocks	4.5	2.0	0.5	0.5	1.5	0.5	1.5	1.0	0.5	0.5	2.5	0.5	1.5	1.5	2.0	0.5	5.0	1.5	3.0	1.0	2.0	3.5	0.5
Mafic igneous rocks	2.0	0.5	0.5	0.5	0.5	0.5	0.5	1.5	0.5	0.5	1.5	0.5	1.0	0.5	0.5	1.5	2.0	0.5	1.0	1.5	1.0	0.5	1.5
Hematite - limonite	0.5	...	...	...	...	0.5	...	0.5	0.5	...	0.5	...	0.5	...	...	...	...	...	...	...	...	...	0.5
Biotite	0.5	0.5	0.5	0.5	0.5	...	...	...	...	0.5	0.5	...	0.5	0.5	...	...	0.5	...	0.5	0.5	0.5	0.5	0.5
Muscovite	...	...	...	...	...	...	...	...	0.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hornblende	0.5	0.5	0.5	...	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Pyroxene	0.5	...	...	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	...	...	...	...	0.5	0.5	...	0.5	...	...	0.5
Garnet	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	...	0.5	0.5	0.5	0.5	0.5	0.5	...	0.5	0.5	...
Magnetite	...	0.5	...	...	...	0.5	...	...	...	...	...	...	...	...	...	...	...	0.5	0.5	...	0.5	...	...
Unidentified	...	...	...	0.5	...	...	...	...	...	0.5	...	0.5	...	...	...	...	...	...	...	...	...	...	...
Cemented aggregates	...	...	0.5	3.0	...	...	...	...	...	...	...	5.0	...	...	...	...	...	...	...	...	...	...	...
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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SCARBOROUGH TOWNSHIP, YORK COUNTY

Highland Creek Sand and Gravel Company Limited (1)*

The company, in 1967, operated a pit ¼ mile north of Lawrence Avenue and ½ mile west of Morningside Drive, Scarborough Township. The deposit is a Lake Iroquois beach. A 15-foot face examined consisted of stratified sand and fine gravel. One face examined was composed of about 30 percent stone and 70 percent sand. Maximum size of boulders was 4 inches with 20 percent of the stone exceeding 1 inch in size. The sand and gravel are trucked to the main plant (on Conlins Road at Sheppard Avenue) for processing.

Miller Paving Limited (2)

Location: concession II, Morningside Drive and Military Trail, Scarborough Township.

Type of deposit: interstadial deltaic deposit of fine stratified sand overlain by till; see Hewitt and Karrow (1963, p. 78-79).

J. Blake Sand and Gravel Company Limited (3)

J. Blake Sand and Gravel Company Limited operate (in 1965) a gravel pit on Conlins Road in West Hill, in concession II, Scarborough Township. The pit is in an old beach deposit of Glacial Lake Iroquois.

A 10-foot face examined consists of stratified sand (80 percent) and medium gravel (20 percent). The maximum size of gravel observed was 3 inches; 30 percent exceeded 1 inch.

A pebble count of the gravel from this deposit gave the following assemblage: Black River and Trenton Limestones, 81.1 percent; siltstone, 0.7 percent; black shale, 0.7 percent; sandstone, 3.5 percent; Precambrian felsic igneous rocks, 8.4 percent; Precambrian metamorphic rocks, 5.6 percent. The pebbles are well rounded.

A sieve analysis of sand from the pit is given in Table 10.

Crawford Sand and Gravel Limited (4)

Location: concession II, Conlins Road, Scarborough Township.

Type of deposit: Lake Iroquois beach; see Hewitt and Karrow (1963, p. 78, 80).

This pit has been depleted.

Highland Creek Sand and Gravel Company Limited (5)

A gravel pit is operated intermittently on lots 1 and 2, concession III, Scarborough Township, by Highland Creek Sand and Gravel Company Limited. The deposit is in the beach of Glacial Lake Iroquois.

John B. Regan Company Limited (6)

Location: lot 6, concession IV, Scarborough Township.

Type of deposit: buried kame; see Hewitt and Karrow (1963, p. 80).

Table 9 LIST OF PROPERTIES IN SCARBOROUGH TOWNSHIP, YORK COUNTY, SHOWING PROPERTY NUMBER, LOCATION, AND COMPANY NAME

PROPERTY NUMBER ON MAP 2124, BACK POCKET	LOCATION	NAME
1	Lawrence Avenue and Morningside Drive	Highland Creek Sand and Gravel Co. Ltd.
2	Concession II, Morningside Drive and Military Trail	Miller Paving Ltd.
3	Concession II, Conlins Road	J. Blake Sand and Gravel Co. Ltd.
4	Concession II, Conlins Road	Crawford Sand and Gravel Ltd.
5	Concession III, lots 1 and 2	Highland Creek Sand and Gravel Co. Ltd.
6	Concession IV, lot 6	J. B. Regan Co. Ltd.
7	Concession IV, lot 6	Connor Transport Ltd.

Table 10 SIEVE ANALYSIS OF SAND FROM PIT OF J. BLAKE SAND AND GRAVEL COMPANY LIMITED, PROPERTY 3

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight percent	2.54	5.29	6.60	11.03	30.32	41.44	2.29	0.49

*Number in brackets refers to property number on Map 2124, back pocket.

Connor Transport Limited (7)

Immediately east of the John B. Regan pit, on lot 6, concession IV, Scarborough Township, a gravel pit was operated, in 1965, by Connor Transport Limited. The deposit is part of the buried kame worked by J. B. Regan. There is a 3- to 5-foot till cap. One face examined consisted of poorly sorted fine sand and gravel with some large boulders.

PICKERING TOWNSHIP, ONTARIO COUNTY

Miller Paving Limited (8)

Location: lot 21 S½, concession III, Pickering Township.

Type of deposit: Lake Iroquois beach.

Miller Paving Limited (9)

Location: lot 22, concession III, Pickering Township.

Type of Deposit: Lake Iroquois beach.

Highland Creek Sand and Gravel Company Limited (10)

In 1967, Highland Creek Sand and Gravel Company Limited operated a gravel pit on the Valley Farm Road on lot 22, concession III, Pickering Township. A 10-foot face exposes stratified sand (70 percent) and fine gravel (30 percent). The maximum size of boulders is 6 inches, with 10 percent exceeding 4 inches in size and 30 percent exceeding 1 inch in size.

A sieve analysis of sand from the face is given in Table 12.

A mineralogical analysis of this sand gave the following mineral constituents: quartz, 46 percent; feldspar, 13 percent; Paleozoic limestone, 31.5 percent; grey shale and siltstone, 2.5 percent; black shale and siltstone, 3 percent; garnet, 1.5 percent; hornblende, 0.5 percent; Precambrian limestone, 0.5 percent; felsic igneous rocks, 1.5 percent.

Table 11 LIST OF PROPERTIES IN PICKERING TOWNSHIP, ONTARIO COUNTY, SHOWING PROPERTY NUMBER, LOCATION, AND COMPANY NAME

PROPERTY NUMBER ON MAP 2124, BACK POCKET	LOCATION	NAME
8	Concession III, lot 21 S½	Miller Paving Ltd.
9	Concession III, lot 22	Miller Paving Ltd.
10	Concession III, lot 22	Highland Creek Sand and Gravel Co. Ltd.
11	Concession III, lot 22	Ontario Dept. of Highways pit
12	Concession III, lot 22	Warnock and Johnson pit
13	Concession III, lot 24	K. S. Currey pit
14	Concession IV, lot 12 N½	Highland Creek Sand and Gravel Co. Ltd.
15	Concession IV, lot 13 N½	Miller Paving Ltd.
16	Concession IV, lot 14 N½	A. H. Rowe and McEwen estate
17	Concession IV, lot 15 N½	Forsyth pit
18	Concession IV, lot 16 N½	Consolidated Sand and Gravel Co.
19	Concession IV, lot 18 S½	Gravand Construction Co. Ltd., McKenzie pit
20	Concession IV, lot 19 S½	Highland Creek Sand and Gravel Co. Ltd.
21	Concession IV, lot 19 S½	Gravand Construction Co. Ltd.
22	Concession IV, lot 20 S½	Miller Paving Ltd.
23	Concession IV, lot 20 S½	Highland Creek Sand and Gravel Co. Ltd.
24	Concession IV, lot 21 S½	Highland Creek Sand and Gravel Co. Ltd.
25	Concession IV, lot 22 S½	Miller Paving Ltd.
26	Concession IV, lot 22 S½	Chandler pit
27	Concession V, lots 4 and 5 N½	Barclay Transport Ltd.
28	Concession V, lots 8 and 9	Cooper, Leder, and McLachlan pits
29	Concession V, lots 13 and 14	Highland Creek Sand and Gravel Co. Ltd.
30	Concession V, lot 15	Consolidated Sand and Gravel Co.
31	Concession V, lot 15	John B. Regan Co. Ltd.
32	Concession V, lot 15 N½	Township of Pickering pit
33	Concession V, lot 15 S½	Consolidated Sand and Gravel Co.
34	Concession V, lot 22	Gravand Construction Co. Ltd.
35	Concession V, lot 31	Giordano Sand and Gravel Ltd.
36	Concession VI, lot 21	Concession VI, lot 21
37	Concession VI, lot 22	Pearse pit
38	Concession IX, lot 2	E. R. Schutz pit

Table 12 SIEVE ANALYSIS OF SAND FROM HIGHLAND CREEK SAND AND GRAVEL COMPANY LIMITED PIT, PROPERTY 10

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	nil	2.3	2.2	5.2	23.2	52.0	13.0	2.1

Ontario Department of Highways (11)

Location: lot 22, concession III, Pickering Township.

Type of Deposit: Lake Iroquois beach.

Warnock and Johnson Pit (12)

In 1967, Warnock and Johnson were operating a gravel pit on lot 22, concession III, Pickering Township. The deposit is mainly stratified fine sand; one 25-foot face examined consisted of stratified sand (80 percent) and fine gravel (20 percent).

A sieve analysis of sand from one face is given in Table 13.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 30.5 percent; feldspar, 13.5 percent; Paleozoic limestone, 40.5 percent; black shale, 5.5 percent; felsic igneous rocks, 4.5 percent; mafic igneous rocks, 2.0 percent.

K. S. Currey Pit (13)

Location: lot 24, concession III, Pickering Township.

Type of deposit: Lake Iroquois beach.

Highland Creek Sand and Gravel Company Limited (14)

This pit, operated by Highland Creek Sand and Gravel Company Limited, is located on the north half of lot 12, concession IV, Pickering Township. A 15-foot face, examined in September 1965, consisted of approximately 40 percent stone and 60 percent medium to coarse sand. Maximum size of boulders observed was 10 inches; 20 percent of the stone exceeded 4 inches in size and 50 percent exceeded 1 inch. The pebbles are principally limestone with some Precambrian crystalline rocks.

A sieve analysis of sand from one section of the face is given in Table 14.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 33 percent; feldspar, 11.5 percent; Paleozoic limestone, 49.0 percent; black shale, 1.0 percent; felsic igneous rocks, 2.0 percent.

Miller Paving Limited (15)

Location: lot 13 N½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach; see Hewitt and Karrow (1963, p. 86).

A. H. Rowe and McEwen Estate (16)

Location: lot 14 N½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach.

Forsyth Pit (17)

Location: lot 15 N½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach.

Consolidated Sand and Gravel Company (18)

Location: lot 16 N½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach; see Hewitt and Karrow (1963, p. 85-86).

A pebble count of gravel taken from this pit gave the following assemblage: Black River and Trenton Limestones, 82.4 percent; siltstone, 0.5 percent; sandstone, 0.5 percent; dolomite, 0.5 percent; Precambrian felsic igneous rocks, 8.6 percent; Precambrian mafic igneous rocks, 4.6 percent; Precambrian metamorphic rocks, 2.9 percent.

Gravand Construction Company Limited (19)

McKenzie Pit

Location: lot 18 S½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach.

Highland Creek Sand and Gravel Company Limited (20)

A sand and gravel pit is operated on the south half of lot 19, concession IV, Pickering Township by

Table 13 SIEVE ANALYSIS OF SAND FROM WARNOCK AND JOHNSON PIT, PROPERTY 12

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	4.6	5.45	6.0	7.5	22.75	43.9	7.5	2.3

Table 14 SIEVE ANALYSIS OF SAND FROM HIGHLAND CREEK SAND AND GRAVEL COMPANY LIMITED PIT, PROPERTY 14

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	8.2	7.5	9.1	9.9	31.2	29.05	2.25	2.8

Highland Creek Sand and Gravel Company Limited. An 8-foot face examined consisted of stratified fine to coarse sand and coarse gravel with 40 percent stone and 60 percent sand. The maximum size of boulders is 8 inches, with 20 percent of the stone over 4 inches in size and 50 percent of the stone over 1 inch.

A sieve analysis of sand from one section of the face is given in Table 15.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 34.0 percent; feldspar, 19.0 percent; Paleozoic limestone, 36.0 percent; black shale, 7.0 percent.

Gravand Construction Company Limited (21)

Location: lot 19 S½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach.

Miller Paving Limited (22)

Location: lot 20 S½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach.

Highland Creek Sand and Gravel Company Limited (23)

Location: lot 20 S½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach; see Hewitt and Karrow (1963, p. 85).

A pebble count of a gravel sample from this pit gave the following assemblage: Black River and Trenton Limestones, 74 percent; Precambrian felsic igneous rocks, 14.9 percent; Precambrian metamorphic rocks, 11.1 percent.

Highland Creek Sand and Gravel Company Limited (24)

Location: lot 21 S½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach; see Hewitt and Karrow (1963, p. 85).

Miller Paving Limited (25)

Location: lot 21 S½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach; see Hewitt and Karrow (1963, p. 85.)

Chandler Pit (26)

Location: lot 22 S½, concession IV, Pickering Township.

Type of deposit: Lake Iroquois beach.

Barclay Transport Limited (27)

Kinsale Sand and Gravel

Location: lots 4 and 5 N½, concession V, Pickering Township.

Type of deposit: Lake Iroquois beach; see Hewitt and Karrow (1963, p. 87, Kinsale, Kinsale Sand and Gravel).

Photo 2 shows the Iroquois beach gravel at this pit.

Cooper, Leder, and McLachlan Pits (28)

Location: lots 8 and 9, concession V, Pickering Township.

Type of deposit: Lake Iroquois beach.

Highland Creek Sand and Gravel Company Limited (29)

Location: lots 13 and 14, concession V, Pickering Township.

Type of deposit: Lake Iroquois beach; see Hewitt and Karrow (1963, p. 87).

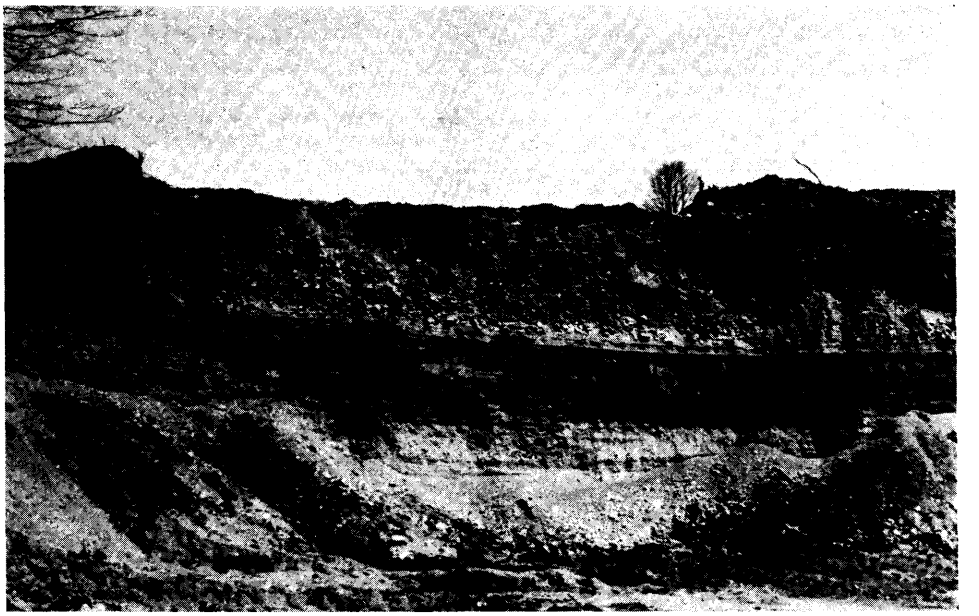
A second pit, being operated on this property in the summer of 1965, was largely in stratified sand.

Table 15 SIEVE ANALYSIS OF SAND FROM HIGHLAND CREEK SAND AND GRAVEL COMPANY LIMITED PIT, PROPERTY 20

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	.75	.6	.75	1.1	18.0	71.5	4.75	2.55

Table 16 SIEVE ANALYSIS OF SAND FROM CONSOLIDATED SAND AND GRAVEL COMPANY PIT, PROPERTY 30

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	3.2	3.3	5.7	10.2	23.4	41.6	9.9	2.7



ODM8157

Photo 2–Lake Iroquois beach gravel at Barclay Transport pit, property 27.

Consolidated Sand and Gravel Company (30)

A sand and gravel pit is operated (in 1965) by Consolidated Sand and Gravel Company on lot 15, concession V, Pickering Township. A 15-foot face consists of stratified sand with some gravel. The deposit is part of the Lake Iroquois beach. The sand and gravel is processed at the Pickering plant of Consolidated Sand and Gravel Company, described by Hewitt and Karrow (1963, p. 85).

A sieve analysis of sand from the pit is given in Table 16.

A mineralogical analysis of the sand gave the following mineral constituents: quartz, 33.5 percent; feldspar, 11.5 percent; Paleozoic limestone, 41 percent; grey shale and siltstone, 7 percent; black shale and siltstone, 5 percent; hornblende, 0.5 percent; pyroxene, 0.5 percent; felsic igneous rocks, 1 percent.

There are 3 to 6 feet of overburden overlying the sand and gravel.

John B. Regan Company Limited (31)

A gravel pit is operated by John B. Regan Company Limited on lot 15, concession V, Pickering Township. A 12-foot face examined consisted of about 30 percent medium gravel and 70 percent stratified sand. Approximately 10 percent of the gravel exceeded 4 inches in size, and 40 percent exceeded 1 inch in size. The gravel is rounded to well rounded, and consists of approximately 60 percent limestone and 40 percent Precambrian crystalline rocks. The deposit is part of the Lake Iroquois beach.

The western part of the pit was examined in 1967 and the 12-foot face consisted of approximately 50 percent stone and 50 percent sand. Maximum size of boulders was 8 inches, with 30 percent of the gravel exceeding 4 inches in size and 50 percent exceeding 1 inch in size. Portable plants were producing crusher run gravel.

In 1968, a gravel pit was opened by John B. Regan Limited on the northern part of this lot.

Township of Pickering Pit (32)

Location: lot 15 N½, concession V, Pickering Township.

Type of deposit: buried kame; see Hewitt and Karrow (1963, p. 86-87).

A pebble count of a sample of gravel from this pit gave the following assemblage: Black River and Trenton Limestones, 76 percent; black shale, 12 percent; siltstone, 2 percent; Precambrian granitic rocks, 3 percent; Precambrian mafic igneous rocks, 1 percent; Precambrian metamorphic rocks, 6 percent. The percentage of Collingwood black shale is noteworthy as this assemblage differs from that of the Lake Iroquois beach.

ODM8158

Photo 3–Kame gravel at the Township of Pickering pit, property 32.

Photo 3 shows the buried kame gravel at this pit.

Consolidated Sand and Gravel Company (33)

Location: lot 15 S½, concession V, Pickering Township.

Type of deposit: Lake Iroquois beach.

Gravand Construction Company Limited (34)

A gravel pit is operated (in 1965) by Gravand Construction Company Limited on lot 22, concession V, Pickering Township. The deposit is a kame covered by 4 to 6 feet of clay till. A 15-foot face examined consisted of well stratified medium sand and fine gravel with approximately 30 percent stone and 70 percent sand. Maximum size of boulders observed was about 4 inches, with 80 percent of the gravel exceeding 1 inch in size. Coarse gravel occurs at the east end of the pit. The percentage of stone is variable from face to face.

A sieve analysis of sand from one section of the face is given in Table 17.

In 1968, the pit was being operated by Rad Trucking Limited.

Giordano Sand and Gravel Limited (35)

Location: lot 31, concession V, Pickering Township.

Type of deposit: buried kame; see Hewitt and Karrow (1963, p. 87-88).

Photo 4 shows the kame gravel at this pit near Whitevale.

Concession VI, Lot 21 (36)

A sand and gravel pit was formerly operated on lot 21, concession VI, Pickering Township. The faces are now largely slumped but about 10 feet of sand with fine to medium gravel are exposed. The deposit is capped by till. There is considerable silt and clay.

Table 17 SIEVE ANALYSIS OF SAND FROM GRAVAND CONSTRUCTION COMPANY LIMITED PIT, PROPERTY 34

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	3.2	7.8	6.35	14.2	41.0	22.3	2.5	2.65

Table 18 SIEVE ANALYSIS OF SAND FROM E. R. SCHUTZ PIT, PROPERTY 38

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	.8	4.25	15.2	33.6	31.1	12.85	.95	1.25

ODM8159

Photo 4–Kame gravel at Giordano Sand and Gravel Limited pit, property 35.

Pearse Pit (37)

Location: lot 22, concession VI, Pickering Township.
Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

E. R. Schutz Pit (38)

A gravel pit, formerly operated by E. R. Schutz, is located on lot 2, concession IX, Pickering Township. The deposit is part of the Oak Ridges interlobate kame moraine and is covered by a capping of 6 to 12 feet of stony clay till. Although no fresh faces were exposed when the pit was examined, a section of 10 to 12 feet of medium to fine gravel and coarse sand was observed at one locality. Some clay and silt were observed in the upper layers. The pebbles are mainly limestone with some Precambrian crystalline rocks.

A sieve analysis of a sand sample from one section of the face is given in Table 18.

MARKHAM TOWNSHIP, YORK COUNTY

J. Sabiston Limited (39)

Location: lots 3 and 4, concession II, Markham Township.
Type of deposit: interstadial deltaic sand deposit; see Hewitt and Karrow (1963, p. 74).

A sieve analysis of another sand sample taken from one section of the face, in 1965, is given in Table 20.

Table 19 | LIST OF PROPERTIES IN MARKHAM TOWNSHIP, YORK COUNTY, SHOWING PROPERTY NUMBER, LOCATION, AND COMPANY NAME

PROPERTY NUMBER ON MAP 2124, BACK POCKET	LOCATION	NAME
39	Concession II, lots 3 and 4	J. Sabiston Ltd.
40	Concession II, lot 20 E½	Warnock and Johnson, Headford pit
41	Concession IV, lots 6 and 7 W½	Markham Sand and Gravel
42	Concession VIII, lot 16	Warnock and Johnson, Groves pit

Table 20 | SIEVE ANALYSIS OF SAND FROM J. SABISTON LIMITED PIT, PROPERTY 39

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	nil	0.7	6.7	10.4	31.5	44.5	4.65	1.7

Warnock and Johnson (40)

Headford Pit

The Headford pit, operated by Warnock and Johnson in 1965, is located on the east half of lot 20, concession II, Markham Township. It is a buried kame deposit covered by a capping of 3 to 6 feet of stony clay till. A 30-foot face exposes irregularly stratified fine and coarse gravel and sand. The deposit is poorly sorted and, in places, contains several large 2- to 3-foot boulders.

Markham Sand and Gravel (41)

Location: lots 6 and 7 W½, concession IV, Markham Township.

Type of deposit: buried kame; see Hewitt and Karrow (1963, p. 79).

A pebble count of a gravel sample from the 1-inch stockpile gave the following assemblage: Black River and Trenton Limestones, 72.2 percent; dolomite, 2.1 percent; white Potsdam Sandstone, 2.5 percent; black and grey shale, 4.4 percent; brown siltstone, 5.2 percent; Precambrian felsic igneous rocks, 8.2 percent; Precambrian metamorphic rocks, 5.4 percent.

A sieve analysis of a sand sample from the south face of the pit is given in Table 21.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 36.0 percent; feldspar, 9.5 percent; Paleozoic limestone, 45.0 percent; grey shale and siltstone, 1.5 percent; qlack shale, 2.0 percent; cemented aggregates, 3.0 percent.

Warnock and Johnson (42)

Groves Pit

The Groves pit, operated by Warnock and Johnson in 1965, is located on lot 16, concession VIII, Markham Township. At the west end of the pit a 3- to 5-foot till cap rests on 10 feet of fine sand and fine gravel. Part of the north face consists of 12 feet of sandy silty till with boulders, mainly of Paleozoic limestone, up to 8 inches in size. Along the north face, at the east end, 10 feet of sandy till overlie 4 feet of coarse sand and fine gravel. At the east end of the pit the writer observed 5 feet of sand and fine gravel on top of 6 feet of sandy till, which in turn rest on sand. The sections are quite variable. At the southeast end of the pit, coarse and fine crossbedded sand is exposed. Principal production is pit run and sand fill.

A sieve analysis of a sand sample from the southeast face is given in Table 22.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 35.0 percent; feldspar, 15.0 percent; Paleozoic limestone, 44.0 percent; grey shale and siltstone, 1.0 pecrent; felsic igneous rocks, 1.5 percent.

VAUGHAN TOWNSHIP, YORK COUNTY

Rockmor Products Limited (43)

This pit was formerly operated by Kenmore Building Materials Limited.

Location: lot 30, concession II, Vaughan Township.

Table 21 SIEVE ANALYSIS OF SAND FROM SOUTH FACE OF MARKHAM SAND AND GRAVEL PIT, PROPERTY 41

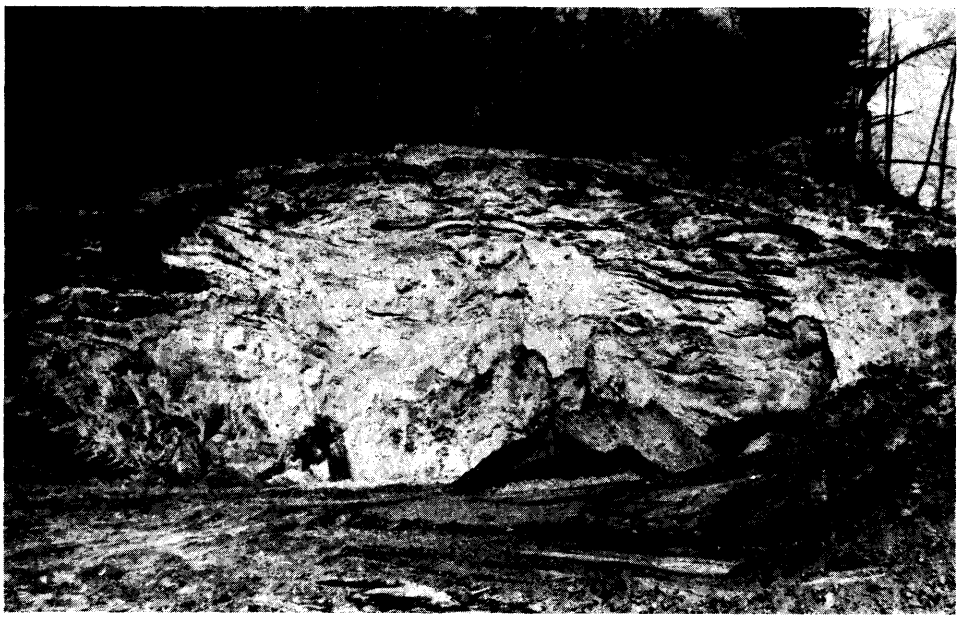
Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	11.15	10.45	11.05	14.45	25.65	19.05	4.25	3.95

Table 22 SIEVE ANALYSIS OF SAND FROM SOUTHEAST FACE OF WARNOCK AND JOHNSON, GROVES PIT, PROPERTY 42

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	1.75	3.4	5.75	13.0	30.0	37.9	5.0	3.2

Table 23 LIST OF PROPERTIES IN VAUGHAN TOWNSHIP, YORK COUNTY, SHOWING PROPERTY NUMBER, LOCATION, AND COMPANY NAME

PROPERTY NUMBER ON MAP 2124, BACK POCKET	LOCATION	NAME
43	Concession II, lot 30	Rockmor Products Ltd.
44	Concession III, lots 21 and 22	Superior Sand Gravel and Supplies Ltd.



ODM8160

Photo 5–Outwash sand of the Oak Ridges kame moraine at the Rockmor Products pit, property 43, Maple, Ontario.

Type of deposit: outwash sand of the Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 73, Kenmore Building Materials Limited).

Photo 5 shows the outwash sand in a section of this pit.

A sieve analysis of another sand sample, taken in 1965, from the pit face is given in Table 24.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 34.5 percent; feldspar, 23.5 percent; Paleozoic limestone, 37.0 percent.

Superior Sand, Gravel and Supplies Limited (44)

Location: lots 21 and 22, concession III, Vaughan Township.

Type of deposit: outwash sand and gravel in Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 68, 69-71).

Photo 6 shows part of the Superior pit.

A sieve analysis of another sand sample, taken in 1965, from the pit face is given in Table 25.

WHITCHURCH TOWNSHIP, YORK COUNTY

Baker Sand and Gravel (45)

The sand pit, operated by Baker Sand and Gravel, is on lot 68, concession I, Whitchurch Township, just north of Wilcocks Lake. It is in an area of hummocky knob-and-kettle topography of the Oak Ridges kame moraine. The deposit is well stratified

Table 24 SIEVE ANALYSIS OF SAND FROM ROCKMOR PRODUCTS LIMITED PIT, PROPERTY 43

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	nil	0.5	6.65	18.1	23.6	40.6	8.35	2.2

Table 25 SIEVE ANALYSIS OF SAND FROM SUPERIOR SAND, GRAVEL AND SUPPLIES LIMITED PIT, PROPERTY 44

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	nil	nil	nil	0.05	0.95	37.5	42.6	18.9

ODM8161

Photo 6–Stratified outwash sand at Superior Sand, Gravel and Supplies Limited pit, property 44, Maple, Ontario.

Table 26 LIST OF PROPERTIES IN WHITCHURCH TOWNSHIP, YORK COUNTY, SHOWING PROPERTY NUMBER, LOCATION, AND COMPANY NAME

PROPERTY NUMBER ON MAP 2124, BACK POCKET	LOCATION	NAME
45	Concession I, lot 68	Baker Sand and Gravel
46	Concession II, lots 9 and 10	Markham Sand and Gravel Ltd.
47	Concession II, lot 11	Geo. A. White
48	Concession II, lot 11 W½	Miller Paving Ltd.
49	Concession II, lot 13	York Sanitation
50	Concession III, lot 9 E½	Warnock and Johnson (Cecci property)
51	Concession IV, lot 8 E½	Pike pit
52	Concession IV, lot 9 E½	Brillinger pit
53	Concession IV, lot 16	Van Norstrand property
54	Concession V, lot 8 W½	Gormley Sand and Gravel, Atkinson pit
55	Concession V, lot 9 W½	Gormley Sand and Gravel, Bolender pit
56	Concession V, lot 11 E½	Consolidated Sand and Gravel Co.
57	Concession VI, lot 9 W½	Parkway Sand and Gravel
58	Concession VI, lot 9 E½	Gormley Sand and Gravel
59	Concession VI, lot 15 E½	K. J. Beamish pit
60	Concession VIII, lot 8 or 9 W½	Commercial Sand and Gravel Ltd.
61	Concession VIII, lots 9 and 10 W½	F. H. Roberts and Sons Ltd.
62	Concession VIII, lot 30	Willingshofer property
63	Concession IX, lots 12 and 13 W½	Campbellville Gravel Supply Ltd.
64	Concession IX, lot 13 E½	Consolidated Sand and Gravel Co.
65	Concession IX, lot 14 W½	Lee Sand and Gravel Ltd.
66	Concession IX, lot 14 E½	Consolidated Sand and Gravel Co.
67	Concession IX, lot 14 E½	Commercial Sand and Gravel Ltd.
68	Concession IX, lot 15 E½	Aprile Contracting Ltd.
69	Concession IX, lot 20	Island Lake pit

Table 27 SIEVE ANALYSIS OF SAND FROM A 10-FOOT FACE AT BAKER SAND AND GRAVEL PIT, PROPERTY 45

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	nil	nil	0.55	4.25	19.65	47.50	20.75	7.3

sand containing minor gravel. The sand beds are capped by thin till in places, and overburden ranges between 0 and 6 feet. A sieve analysis of sand from a 10-foot face is given in Table 27.

A mineralogical analysis of the sand indicates the following mineral constituents: quartz, 45 percent; feldspar, 13 percent; Paleozoic limestone, 32.5 percent; grey shale and siltstone, 2 percent; black shale and siltstone, 0.5 percent; hornblende, 1 percent; mica, 0.5 percent; pyroxene, 1.0 percent; sandstone, 0.5 percent; felsic igneous rock, 2 percent; mafic igneous rock, 0.5 percent; cemented aggregates, 1.5 percent.

Markham Sand and Gravel Limited (46)

Location: lots 9 and 10, concession II, Whitchurch Township.

Type of deposit: outwash sand of Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 74, Valley Sand and Gravel).

George A. White (47)

Location: lot 11, concession II, Whitchurch Township.

Type of deposit: outwash deposit of Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 74).

A pebble count of gravel from the pit gave the following assemblage: Black River and Trenton Limestones, 78.0 percent; dolomite, 0.6 percent; black shale, 1.2 percent; white Potsdam Sandstone, 4.3 percent; brown siltstone, 1.8 percent; Precambrian felsic igneous rocks, 6.1 percent; Precambrian mafic igneous rocks, 0.6 percent; Precambrian metamorphic rocks, 7.4 percent.

A sieve analysis of another sand sample taken from the pit, in 1965, is given in Table 28.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 31.0 percent; feldspar, 17.0 percent; Paleozoic limestone, 41.0 percent; black shale, 5 percent; felsic igneous rocks, 1.0 percent; mafic igneous rocks, 1.5 percent.

Miller Paving Limited (48)

Location: lot 11 W½, concession II, Whitchurch Township.

Type of deposit: outwash deposit of Oak Ridges kame moraine.

York Sanitation (49)

Location: lot 13, concession II, Whitchurch Township.

Type of deposit: outwash deposit of Oak Ridges kame moraine.

Warnock and Johnson (50)

Cecci Property

Location: lot 9 E½, concession III, Whitchurch Township.

Pike Pit (51)

A sand pit has been operated on the farm of M. Pike, on the east half of lot 8, concession IV, Whitchurch Township. A till cap of 6 to 10 feet covers the stratified sand and fine gravel. There was 80 to 90 percent sand in one face examined.

A sieve analysis of a sand sample taken from the pit is given in Table 29.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 28.0 percent; feldspar, 13.0 percent; Paleozoic limestone, 51.5 percent; grey shale and siltstone, 1.5 percent; black shale, 2.0 percent.

Brillinger Pit (52)

Location: lot 9 E½, concession IV, Whitchurch Township.

Type of deposit: glacial spillway associated with Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 79).

Table 28 SIEVE ANALYSIS OF SAND FROM GEORGE A. WHITE PIT, PROPERTY 47

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	2.2	1.05	2.1	12.45	64.1	16.9	0.8	0.4

Table 29 SIEVE ANALYSIS OF SAND FROM PIKE PIT, PROPERTY 51

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	1.55	2.8	6.5	22.0	54.5	10.8	0.4	1.45

A sieve analysis of a sand sample from the face of the pit is given in Table 30.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 25.5 percent; feldspar, 14.5 percent; Paleozoic limestone, 53.5 percent; black shale, 1.5 percent.

A sieve analysis of a sand sample from the floor of the pit is given in Table 31.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 26.5 percent; feldspar, 7.5 percent; Paleozoic limestone, 56.0 percent; black shale, 1.5 percent; felsic igneous rocks, 2.5 percent; mafic igneous rocks, 1.5 percent.

Van Norstrand Property (53)

Location: lot 16, concession IV, Whitchurch Township.

Type of deposit: kame.

Gormley Sand and Gravel (54, 55)

Atkinson and Bolender Pits

Location: Atkinson pit; lot 8 W½, concession V, Whitchurch Township.

Type of deposit: glacial spillway associated with Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 75).

Location: Bolender pit; lot 9 W½, concession V, Whitchurch Township.

The Atkinson and Bolender pits form part of one gravel pit operated, in 1965, by Gormley Sand and Gravel. A till cap of 3 to 8 feet covers the sand and gravel. The west pit is mainly stratified sand with some gravel, but was poorly exposed due to slumping. Some cemented gravel is present.

The east pit exposed a 20-foot face of stratified sand and fine gravel. One face examined consisted of 30 percent stone and 70 percent sand. Thirty percent of the stone exceeded 1 inch in size. In places, till and clay seams were observed in the face.

A sieve analysis of a sand sample from the east pit is given in Table 32.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 28.5 percent; feldspar, 20.0 percent; Paleozoic limestone, 38.5 percent; grey shale and siltstone, 2.5 percent; black shale, 1.5 percent; hornblende, 1.5 percent; cemented aggregates, 5.0 percent.

A pebble count of gravel from the Atkinson pit gave the following assemblage: Black River and Trenton Limestones, 76 percent; white Potsdam Sandstone, 2 percent; Precambrian felsic igneous rocks, 21 percent; Precambrian metamorphic rocks, 1 percent.

Consolidated Sand and Gravel Company (56)

Plant location: lot 11 E½, concession V, Whitchurch Township; see Hewitt and Karrow (1963, p. 79).

Parkway Sand and Gravel (57)

A gravel pit, operated in 1967 by Parkway Sand and Gravel, is located on the west half of lot 9, concession VI, Whitchurch Township. It was formerly operated by Roadway Sand and Gravel. The sand and gravel is capped by 6 to 10 feet of clay till. A 40-foot face examined consisted of stratified medium sand and fine gravel. The face was composed of approximately 10 percent stone and 90 percent sand.

Table 30 SIEVE ANALYSIS OF SAND FROM THE FACE OF THE BRILLINGER PIT, PROPERTY 52

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	23.5	6.55	8.7	27.5	29.3	3.05	0.35	1.05

Table 31 SIEVE ANALYSIS OF SAND FROM THE FLOOR OF THE BRILLINGER PIT, PROPERTY 52

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	0.1	2.5	12.4	27.0	41.4	16.0	0.5	0.15

Table 32 SIEVE ANALYSIS OF SAND FROM THE ATKINSON PIT, PROPERTY 54

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	4.8	2.45	3.55	7.0	18.2	36.9	12.5	14.6

Maximum size of boulders was 8 inches; 20 percent of the stone exceed 4 inches in size and 50 percent exceed 1 inch in size.

A sieve analysis of sand from the face is given in Table 33.

A mineralogical analysis of the sand indicates the following mineral constituents: quartz, 44.5 percent; feldspar, 16.5 percent; Paleozoic limestone, 32.5 percent; black shale and siltstone, 2.5 percent; garnet, 0.5 percent; hornblende, 1.0 percent; pyroxene, 0.5 percent; felsic igneous rock, 2.0 percent.

The principal products are sand fill and pit run gravel.

Gormley Sand and Gravel (58)

Location: lot 9 E½, concession VI, Whitchurch Township.

Type of deposit: glacial spillway associated with the Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 75).

A pebble count of the gravel gave the following assemblage: Black River and Trenton Limestones, 70 percent; white Potsdam Sandstone, 2 percent; Precambrian felsic igneous rocks, 18 percent; Precambrian metamorphic rocks, 10 percent.

Sieve analyses of sand from the lower and upper lifts of the pit are given in Table 34.

Mineralogical analyses of the sands from the lower and upper lifts gave the following major mineral constituents: quartz, 34.0 and 24.0 percent; feldspar, 10.5 and 12.5 percent; Paleozoic limestone, 48.5 and 57.5 percent; grey shale and siltstone, 0.5 and 1.5 percent; black shale, 2.0 and 0.5 percent; felsic igneous rocks, 0.5 and 1.5 percent; mafic igneous rocks, 1.5 and 0.5 percent.

K. J. Beamish Pit (59)

Location: lot 15 E½, concession VI, Whitchurch Township.

Type of deposit: Oak Ridges kame moraine. Not active in 1965.

Commercial Sand and Gravel Limited (60)

Location: lot 8 W½, concession VIII, Whitchurch Township; see Hewitt and Karrow (1963, p. 77).

F. H. Roberts and Sons Limited (61)

Location: lots 9 and 10 W½, concession VIII, Whitchurch Township.

Type of deposit: Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 77).

A pebble count of gravel from this deposit gave the following assemblage: Black River and Trenton Limestones, 81.3 percent; black shale, 0.5 percent; white Potsdam Sandstone, 1.5 percent; Precambrian felsic igneous rocks, 7.4 percent; Precambrian mafic igneous rocks, 0.5 percent; Precambrian metamorphic rocks, 8.8 percent.

A sieve analysis of another sand sample from the pit, taken in 1965, is given in Table 35.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 30.0 percent; feldspar, 21.5 percent; Paleozoic limestone, 43.5 percent; felsic igneous rocks, 2.0 percent.

Table 33 SIEVE ANALYSIS OF SAND FROM THE PARKWAY SAND AND GRAVEL PIT, PROPERTY 57

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	2.55	0.45	1.95	8.25	40.85	44.15	1.0	0.85

Table 34 SIEVE ANALYSES OF SAND FROM LOWER AND UPPER LIFTS OF THE GORMLEY SAND AND GRAVEL PIT, PROPERTY 58

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent								
Lower lift	nil	0.4	3.8	34.2	52.0	8.6	0.1	0.9
Upper lift	15.5	1.9	3.95	27.4	42.0	8.5	0.25	0.5

Table 35 SIEVE ANALYSIS OF SAND FROM F. H. ROBERTS AND SONS LIMITED PIT, PROPERTY 61

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	0.6	0.4	2.2	10.1	47.15	37.75	0.15	1.65

Willingshofer Property (62)

Location: lot 30, concession VIII, Whitchurch Township.

Campbellville Gravel Supply Limited (63)

Location: lots 12 and 13 W½, concession IX, Whitchurch Township.

Type of deposit: outwash sand of Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 77).

This property was formerly Uxbridge Sand and Gravel pit.

Consolidated Sand and Gravel Company (64)

Location: lot 13 E½, concession IX, Whitchurch Township.

Type of deposit: kame.

Lee Sand and Gravel Limited (65)

Location: lot 14 W½, concession IX, Whitchurch Township.

Type of deposit: kame; see Hewitt and Karrow (1963, p. 77).

A pebble count of gravel from this pit gave the following assemblage: Black River and Trenton Limestones, 76.1 percent; Precambrian felsic igneous rocks, 10.1 percent; Precambrian mafic igneous rocks, 3.7 percent; Precambrian metamorphic rocks, 10.1 percent.

A sieve analysis of sand taken from the pit face, in 1965, is given in Table 36.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 23.5 percent; feldspar, 10.0 percent; Paleozoic limestone, 60.5 percent; grey shale and siltstone, 1.0 percent; black shale, 1.0 percent; mafic igneous rocks, 1.5 percent.

Consolidated Sand and Gravel Company (66)

Location: lot 14 E½, concession IX, Whitchurch Township.

Type of deposit: kame.

Commercial Sand and Gravel Limited (67)

The gravel pit, operated in 1968 by Commercial Sand and Gravel Limited, is on the east half of lot 14, concession IX, Whitchurch Township. It is described by Hewitt and Karrow (1963, p. 77-78) under the name of Western Sand and Gravel Limited.

A pebble count of gravel from this pit gave the assemblage shown in Table 37.

Table 37 PEBBLE COUNT OF GRAVEL FROM COMMERCIAL SAND AND GRAVEL LIMITED PIT, PROPERTY 67

Pebble type	Frequency
Black River and Trenton Limestones	Flood
Dolomite	Very rare
Black shale	Rare
Siltstone	Very rare
Sandstone	Very rare
Precambrian felsic igneous rocks	Scarce
Precambrian mafic igneous rocks	Very rare
Precambrian metamorphic rocks	Scarce

A sieve analysis of sand taken from the face is given in Table 38.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 37.0 percent; feldspar, 13.0 percent; Paleozoic limestone, 37.0 percent; black shale, 2.0 percent; dolomite, 1.5

Table 36 SIEVE ANALYSIS OF SAND FROM LEE SAND AND GRAVEL LIMITED PIT, PROPERTY 65

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	49.65	5.95	5.45	9.8	17.05	9.75	1.45	0.9

Table 38 SIEVE ANALYSIS OF SAND FROM COMMERCIAL SAND AND GRAVEL LIMITED PIT, PROPERTY 67

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	5.1	7.25	9.8	16.7	31.4	26.8	2.1	0.85

Table 39 SIEVE ANALYSIS OF SAND FROM APRILE CONTRACTING LIMITED PIT, PROPERTY 68

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	nil	nil	nil	0.05	13.5	75.25	10.45	0.75

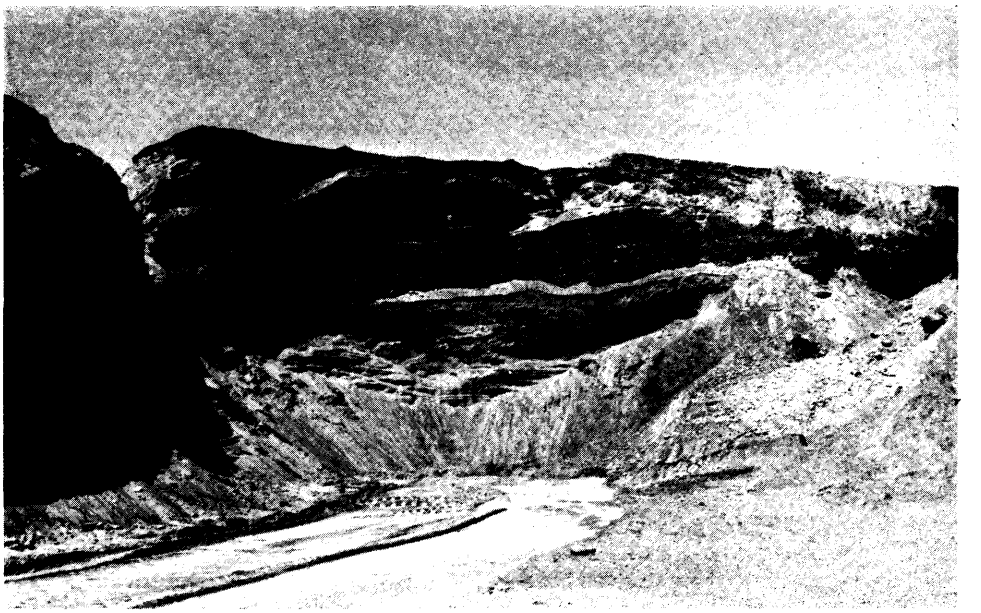


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Photo 7–Kame gravels at Consolidated Sand and Gravel Company pit, property 70.

percent; felsic igneous rocks, 5.0 percent; mafic igneous rocks, 2.0 percent.

Aprile Contracting Limited (68)

A gravel pit was operated, in 1967 by Aprile Contracting Limited, on the east half of lot 15, concession IX, Whitchurch Township. The sand and gravel is overlain by silty till. A 40-foot face examined consisted of stratified sand and medium gravel with approximately 30 percent stone and 60 percent sand with some silt. About 10 percent of the pebbles exceeded 4 inches in size, with 50 percent exceeding 1 inch in size. There is silt interlayered with the stratified sand. A portable plant was employed for crushing. The principal products were "granular A" gravel, pit run, crusher run, and fill.

A sieve analysis of a sand sample from a section of the face is given in Table 39.

A mineralogical analysis of the sand gave the following mineral constituents: quartz, 41.0 percent; feldspar, 15.5 percent; Paleozoic limestone, 35.5 percent; grey shale and siltstone, 1.0 percent; black shale and siltstone, 2.0 percent; hornblende, 2.0 percent; mica, 0.5 percent; pyroxene, 0.5 percent; limonite, 0.5 percent; felsic igneous rocks, 1.0 percent; mafic igneous rocks, 0.5 percent.

Island Lake Pit (69)

Location: lot 20, concession IX, Whitchurch Township.

Pit inactive in 1965.

UXBRIDGE TOWNSHIP, ONTARIO COUNTY

Consolidated Sand and Gravel Company (70)

Location: lot 16 W½, concession I, Uxbridge Township.

Type of deposit: kame; see Hewitt and Karrow (1963, p. 79).

The kame gravels in this pit are shown in Photo 7.

A sieve analysis of a sand sample taken from the face, in 1965, is given in Table 41.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 33.5 percent; feldspar, 12.0 percent; Paleozoic limestone, 45.0 percent; grey shale and siltstone, 1.0 percent; black shale, 4.0 percent; felsic igneous rocks, 1.5 percent.

A pebble count of gravel from this deposit gave the following assemblage: Black River and Trenton Limestones, 76.2 percent; black shale, 1.9 percent; Precambrian felsic igneous rocks, 8.6 percent; Precambrian mafic igneous rocks, 0.9 percent; Precambrian metamorphic rocks, 12.4 percent.

Table 40 LIST OF PROPERTIES IN UXBRIDGE TOWNSHIP, ONTARIO COUNTY, SHOWING PROPERTY NUMBER, LOCATION, AND COMPANY NAME

PROPERTY NUMBER ON MAP 2124, BACK POCKET	LOCATION	NAME
70	Concession I, lot 16 W½	Consolidated Sand and Gravel Co.
71	Concession I, lot 16 W½	Commercial Sand and Gravel Ltd.
72	Concession I, lot 17 W½	Rossfrank Ltd.
73	Concession I, lot 20 W½	Consolidated Sand and Gravel Co., W. A. Irwin pit
74	Concession II, lot 18 E½	Consolidated Sand and Gravel Co.
75	Concession II, lot 19	General Concrete Ltd.
76	Concession II, lot 20 E½	Consolidated Sand and Gravel Co.
77	Concession II, lot 20	Campbellville Gravel Supply Ltd.
78	Concession II, lot 21 E½	Hall pit
79	Concession II, lot 22	Goodwood Airways
80	Concession II, lot 24	Richmond property
81	Concession II, lot 27 W½	W. Mantle pit
82	Concession II, lot 30 W½	Beach farm
83	Concession III, lot 15	Campbellville Gravel Supply Ltd., Bunker pit
84	Concession III, lot 16	F. H. Roberts and Sons Ltd.
85	Concession III, lot 18	Gormley Sand and Gravel
86	Concession III, lot 18	Consolidated Sand and Gravel Co.
87	Concession III, lot 19	Consolidated Sand and Gravel Co.
88	Concession III, lot 20	Reiss pit
89	Concession III, lot 23 W½	James pit
90	Concession IV, lots 11 and 12 E½	J. B. Regan Ltd.
91	Concession IV, lot 12	Giordano Sand and Gravel Ltd.
92	Concession IV, lot 14 E½	Jas. Sabiston Ltd.
93	Concession IV, lot 14 E½	Burgin pit
94	Concession IV, lot 15 E½	Elmer Carter pit
95	Concession IV, lot 17 W½	Commercial Sand and Gravel Ltd.
96	Concession IV, lot 17	Concession IV, lot 17
97	Concession IV, lot 19 E½	K. J. Beamish
98	Concession IV, lot 20 E½	Consolidated Sand and Gravel Co., Home pit
99	Concession IV, lot 22 E½	Miller Paving Ltd.
100	Concession V, lot 2 or 3 E½	Township of Pickering pit
101	Concession V, lot 15 E½	Consolidated Sand and Gravel Co., Davis pit
102	Concession V, lot 15 W½	Consolidated Sand and Gravel Co., Blake pit
103	Concession V, lot 16 W½	Coppins pit
104	Concession V, lot 16	Highland Creek Sand and Gravel Co. Ltd.
105	Concession V, lot 17 E½	Miller Paving Ltd.
106	Concession V, lot 17	Consolidated Sand and Gravel Co.
107	Concession V, lot 18 W½	Consolidated Sand and Gravel Co.
108	Concession V, lot 37 E½	Shillinglaw pit
109	Concession VI, lot 3	Miller Paving Ltd.
110	Concession VI, lot 11 E½	Township of Uxbridge pit
111	Concession VII, lots 9 and 10 E½	Ballard farm, Township of Whitby pit
112	Concession VII, lot 12 E½	County of Ontario pit
113	Concession VII, lot 13 E½	Consolidated Sand and Gravel Co.
114	Concession VII, lot 17	Evans pit
115	Concession VII, lot 18 W½	Miller Paving Ltd.
116	Concession VIII, lot 16	Miller Paving Ltd.
117	Concession VIII, lot 23 E½	Giordano Sand and Gravel Ltd.

Table 41 SIEVE ANALYSIS OF SAND FROM CONSOLIDATED SAND AND GRAVEL COMPANY PIT, PROPERTY 70

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	42.4	12.2	14.05	14.7	11.15	5.0	0.2	0.5

Table 42 SIEVE ANALYSIS OF SAND FROM GENERAL CONCRETE LIMITED PIT, PROPERTY 75

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	11.6	6.9	8.3	16.8	29.2	22.1	3.2	1.9

Commercial Sand and Gravel Limited (71)

A pit, operated by Commercial Sand and Gravel Company in 1967, is on lot 16, concession I, Uxbridge Township, just east of the pit of Consolidated Sand and Gravel Company. A 20-foot face exposes stratified sand and medium gravel. The face is composed of approximately 30 percent stone and 70 percent sand. The maximum size of boulders is 6 inches; 30 percent of the stone exceed 4 inches, and 60 percent of the stone exceed 1 inch in size. The gravel is hauled to the plant on Highway 48 for processing. This plant is described by Hewitt and Karrow (1963, p. 88).

Rossfrank Limited (72)

Location: lot 17 W½, concession I, Uxbridge Township.

Type of deposit: kame.

Consolidated Sand and Gravel Company (73)

W. A. Irwin Pit

The Irwin pit, located on the west half of lot 20, concession I, Uxbridge Township, has been operated by Consolidated Sand and Gravel Company. A 20-foot face examined consisted of medium stratified sand and fine to medium gravel. The maximum size of boulders observed was 8 inches. There was 30 percent stone and 70 percent sand in one section of the face. Seventy percent of the pebbles are Black River and Trenton Limestones, with about thirty percent Precambrian crystalline rocks. There is rare black shale.

Consolidated Sand and Gravel Company (74)

Location: lot 18 E½, concession II, Uxbridge Township.

Type of deposit: outwash sand and gravel.

Pit not active in 1965.

General Concrete Limited (75)

Goodwood Division

A gravel pit is operated by General Concrete Limited, on lot 19, concession II, Uxbridge Township. A 20-foot face examined consisted of good stratified medium gravel and sand. The face is composed o approximately 60 percent stone and 40 percent sand· The maximum size of boulders is 6 inches; 20 percent of the stone exceed 4 inches in size and 50 percent exceed 1 inch in size.

A crushing, screening, and washing plant on the property produces a complete line of stone and sand products.

A sieve analysis of a sand sample from the face is given in Table 42.

A mineralogical analysis of the sand gave the following mineral constituents: quartz, 44 percent; feldspar, 10.5 percent; Paleozoic limestone, 33.5 percent; grey shale and siltstone, 3.5 percent; black shale and siltstone, 3 percent; garnet, 1 percent; hornblende, 2.5 percent; mica, 0.5 percent; felsic igneous rocks, 1 percent; mafic igneous rocks, 0.5 percent.

Consolidated Sand and Gravel Company (76)

Location: lot 20 E½, concession II, Uxbridge Township.

Type of deposit: outwash sand and gravel; see Hewitt and Karrow (1963, p. 89).

The pit is now much enlarged and has two lifts.

Campbellville Gravel Supply Limited (77)

A gravel pit has been opened, by Campbellville Gravel Supply Limited, on the west half of lot 20, concession II, Uxbridge Township. A 15-foot face examined consisted of coarse sand and fine to medium gravel. There was 30 to 40 percent stone and 60 to 70 percent coarse sand. Black River and Trenton Limestone pebbles made up 60 to 70 percent of the gravel, the bulk of the remainder being Precambrian crystalline rocks. It is a coarse outwash deposit.

A sieve analysis of a sand sample taken from a section of one face is given in Table 43.

Hall Pit (78)

Location: lot 21 E½, concession II, Uxbridge Township.

Type of deposit: outwash gravel of the Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 89).

Table 43 | SIEVE ANALYSIS OF SAND FROM CAMPBELLVILLE GRAVEL SUPPLY LIMITED PIT, PROPERTY 77

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	21.8	11.6	19.6	36.0	9.5	0.55	0.15	0.75

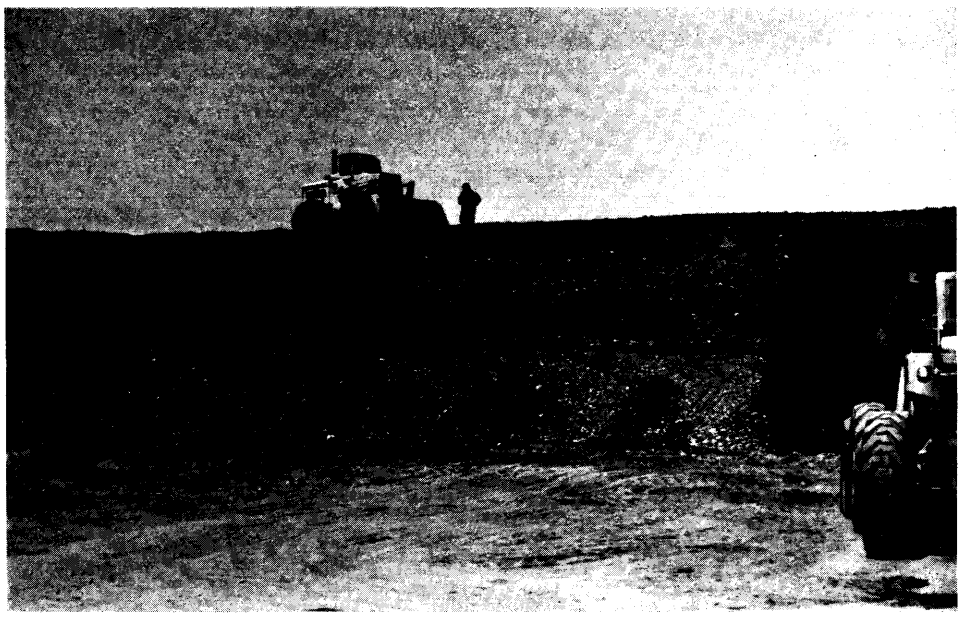

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Photo 8–Outwash gravel at the Hall pit, property 78.

A face of this pit is shown in Photo 8.

A pebble count of gravel from this deposit gave the following assemblage: Black River and Trenton Limestones, 83.6 percent; sandstone, 1 percent; black shale, 1.0 percent; Precambrian felsic igneous rocks, 7.2 percent; Precambrian mafic igneous rocks, 1.0 percent; Precambrian metamorphic rocks, 6.2 percent.

A sieve analysis of a sand sample taken, in 1965, from one section of the face is given in Table 44.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 27.5 percent; feldspar, 13.5 percent; Paleozoic limestone, 45.5 percent; grey shale and siltstone, 2.0 percent; black shale, 5.0 percent; felsic igneous rocks, 3.0 percent; mafic igneous rocks, 1.0 percent.

Goodwood Airways (79)

A gravel pit has been opened on the property of Goodwood Airways, in lot 22, concession II, Uxbridge Township. A 20-foot face exposed stratified sand and fine gravel composed approximately of 30 percent stone and 70 percent sand. The maximum size of boulders observed was 7 inches, with 30 percent of the stone exceeding 4 inches in size, and 60 percent exceeding 1 inch in size. In July 1968, K. J. Beamish Construction Limited was operating a portable crushing plant in the pit.

Richmond Property (80)

Location: lot 24, concession II, Uxbridge Township.

Type of deposit: outwash of Oak Ridges kame moraine.

W. Mantle Pit (81)

Location: lot 27 W½, concession II, Uxbridge Township.

Type of deposit: outwash of Oak Ridges kame moraine.

Beach Farm (82)

Location: lot 30 W½, concession II, Uxbridge Township.

Type of deposit: sandy outwash of Oak Ridges kame moraine.

Campbellville Gravel Supply Limited (83)

Bunker Pit

Location: lot 15, concession III, Uxbridge Township.

Table 44 | SIEVE ANALYSIS OF SAND FROM HALL PIT, PROPERTY 78

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	4.6	7.65	17.2	32.8	31.6	5.15	0.15	0.6

Type of deposit: outwash gravel of Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 89, Uxbridge Sand and Gravel).

F. H. Roberts and Sons Limited (84)

A gravel pit was operated, in 1967, by F. H. Roberts and Sons Limited on lot 16, concession III, Uxbridge Township. A 25-foot face examined consisted of stratified sand and medium gravel. The maximum size of boulders is 15 inches. The face is composed of approximately 40 percent stone and 60 percent sand. About 20 percent of the stone exceed 4 inches in size and 50 percent exceed 1 inch in size. Up to 6 feet of till cap the sand and gravel. A portable plant produces sand, gravel, or crusher run.

Gormley Sand and Gravel Limited (85)

A gravel pit was operated, in 1967, by Gormley Sand and Gravel Limited on lot 18, concession III, Uxbridge Township. The pit, located north of Highway 47 just east of Goodwood, exposed about 20 feet of stratified sand and medium gravel under a 5-foot cap of till. The face exposed consisted of 50 percent stone and 50 percent sand. The maximum size of boulders is about 6 inches with 20 percent of the stone exceeding 4 inches and 60 percent exceeding 1 inch in size. The sand and gravel is trucked to a central plant for processing.

Consolidated Sand and Gravel Company (86)

Location: lot 18, concession III, Uxbridge Township.

Type of deposit: outwash of Oak Ridges kame moraine.

Consolidated Sand and Gravel Company (87)

Location: lot 19, concession III, Uxbridge Township.

Type of deposit: outwash gravel of Oak Ridges kame moraine.

A 15-foot face examined consisted of stratified sand and gravel with approximately 30 percent stone and 70 percent sand. The maximum size of boulders observed was 8 inches, with 20 percent of the stone exceeding 4 inches in size and 40 percent exceeding 1 inch in size. Four to seven feet of clay till are stripped from the surface of the deposit. A pebble count of gravel from the pit gave the following assemblage: Black River and Trenton Limestones, 66 percent; Precambrian felsic igneous rocks, 18 percent; Precambrian metamorphic rocks, 10 percent; Precambrian mafic igneous rocks, 6 percent.

A sieve analysis of a sand sample from the face is given in Table 45.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 30.5 percent; feldspar, 11.0 percent; Paleozoic limestone; 49.5 percent; grey shale and siltstone, 3.0 percent; black shale, 2.0 percent; felsic igneous rocks, 1.0 percent; mafic igneous rocks, 1.5 percent.

Reiss Pit (88)

Location: lot 20, concession III, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

James Pit (89)

Location: lot 23 W½, concession III, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

J. B. Regan Limited (90)

Location: lots 11 and 12 E½, concession IV, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

Giordano Sand and Gravel Limited (91)

A gravel pit is operated by Giordano Sand and Gravel Limited, in lot 12, concession IV, Uxbridge Township. A 60-foot face exposes stratified medium sand (35 percent) and medium coarse gravel (65 percent). The maximum size of boulders is 12 inches, with 30 percent of the stone exceeding 4 inches in size and 60 to 70 percent exceeding 1 inch in size. There are 2 to 10 feet of overburden overlying the gravel. Gravel reserves are large.

A new crushing, screening, washing, and classifying plant was erected in 1968, at the property, and a complete line of sand and gravel products is produced.

Jas. Sabiston Limited (92)

Location: lot 14 E½, concession IV, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

Table 45 SIEVE ANALYSIS OF SAND FROM CONSOLIDATED SAND AND GRAVEL COMPANY PIT, PROPERTY 87

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	4.45	2.95	4.2	8.7	52.2	24.8	1.55	1.1

Burgin Pit (93)

Location: lot 14 E½, concession IV, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

Elmer Carter Pit (94)

This pit was formerly operated by Norton Sand and Gravel.

Location: lot 15 E½, concession IV, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 89).

Commercial Sand and Gravel Limited (95)

A gravel pit, operated in 1967 by Commercial Sand and Gravel, is located on the west half of lot 17, concession IV, Uxbridge Township. The deposit consists of stratified fine and medium sand, and fine gravel. A 30-foot face examined was composed of approximately 20 percent stone and 80 percent sand. The maximum size of boulders was 8 inches, with 20 percent of the stone exceeding 4 inches in size and 40 percent of the stone exceeding 1 inch in size.

A pebble count of gravel from this pit gave the assemblage shown in Table 46.

The sand and gravel is trucked to a central plant for processing.

Table 46 | PEBBLE COUNT OF GRAVEL FROM COMMERCIAL SAND AND GRAVEL PIT, PROPERTY 95

Pebble type	Frequency
Black River and Trenton Limestones	Flood
Sandstone	Very rare
Black shale	Very rare
Precambrian felsic igneous rocks	Scarce
Precambrian metamorphic rocks	Scarce

Concession IV, Lot 17 (96)

A gravel pit opened by Stouffville Sand and Gravel in lot 17, concession IV, Uxbridge Township, exposes a 15-foot face of stratified sand and fine gravel.

K. J. Beamish (97)

Location: lot 19 E½, concession IV, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

Consolidated Sand and Gravel Company (98)

Home Pit

Location: lot 20 E½, concession IV, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 90).

A pebble count of gravel from this pit gave the following assemblage: Black River and Trenton Limestones, 70 percent; white Potsdam Sandstone, 2 percent; Precambrian felsic igneous rocks, 23 percent; Precambrian metamorphic rocks, 4 percent; Precambrian mafic igneous rocks, 1 percent; rare black shale.

Miller Paving Limited (99)

Location: lot 22 E½, concession IV, Uxbridge Township.

Type of deposit: outwash sands and gravels of Oak Ridges kame moraine.

Township of Pickering Pit (100)

The Township of Pickering pit is located on the east half of lot 2 or 3, concession V, Uxbridge Township. A 30-foot face exposes irregularly stratified sand and medium gravel. The face consists of approximately 30 percent stone and 70 percent sand. The maximum size of boulders is 6 inches, with 10 percent over 4 inches in size and 40 percent over 1 inch in size. Crusher run gravel is produced by a portable plant.

Consolidated Sand and Gravel Company (101)

Davis Pit

Location: lot 15 E½, concession V, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

An 18-foot face examined exposed stratified sand and medium gravel with approximately 70 percent stone and 30 percent sand. There is some cross-bedding. Maximum size of boulders observed was 8 inches with 30 percent of the stone exceeding 4 inches in size and 60 percent exceeding 1 inch. The pebbles are predominantly limestone.

Consolidated Sand and Gravel Company (102)

Blake Pit

The Blake pit, operated by Consolidated Sand and Gravel Limited, is located on the west half of lot 15, concession V, Uxbridge Township. A 20-foot face examined consisted of stratified sand (40 percent) and medium gravel (60 percent). The maximum size of boulders observed was 8 inches, with about 30

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Photo 9–Outwash sand and gravel at Coppins pit, property 103.

percent exceeding 4 inches and 60 percent exceeding 1 inch in size. The pebbles are mainly limestone and Precambrian crystalline rocks. The sand and gravel are trucked to the Pickering plant of Consolidated Sand and Gravel for processing.

Coppins Pit (103)

Location: lot 16 W½, concession V, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine; see Hewitt and Karrow (1963, p. 90).

Outwash sand and gravel of one face of this pit is shown in Photo 9.

A pebble count of gravel from this pit gave the following assemblage: Black River and Trenton Limestones, 83.5 percent; black shale, 0.6 percent; Precambrian felsic igneous rocks, 6.7 percent; Precambrian metamorphic rocks, 9.2 percent.

Highland Creek Sand and Gravel Company Limited (104)

A gravel pit was operated, in 1967, by Highland Creek Sand and Gravel Company Limited on lot 16, concession V, Uxbridge Township. A 20-foot face exposes stratified sand (60 percent) and medium gravel (40 percent). The maximum size of boulders was 8 inches, with about 20 percent of the stone exceeding 4 inches in size and 50 percent exceeding 1 inch in size. The sand and gravel are trucked to a central plant for processing.

Miller Paving Limited (105)

Location: lot 17 E½, concession V, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

Consolidated Sand and Gravel Company (106)

A gravel pit has been operated by Consolidated Sand and Gravel Company on lot 17, concession V, Uxbridge Township. A 20-foot face examined consisted of stratified medium sand (70 percent) and fine gravel (30 percent). The maximum size of boulders observed was 8 inches, with 10 percent of the stone exceeding 4 inches in size, and 50 percent of the stone exceeding 1 inch in size. The gravel is trucked to a central plant for processing.

Consolidated Sand and Gravel Company (107)

Location: lot 18 W½, concession V, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

Shillinglaw Pit (108)

Location: lot 37 E½, concession V, Uxbridge Township.

Miller Paving Limited (109)

A gravel pit has been operated by Miller Paving Limited in lot 3, concession VI, Uxbridge Township.

A 30-foot face exposes stratified medium sand and medium gravel composed of approximately 40 percent stone and 60 percent sand. Maximum size of boulders is 6 inches, with 20 percent of the stone exceeding 4 inches in size, and 40 percent exceeding 1 inch in size. A portable plant produces crusher run gravel.

Township of Uxbridge Pit (110)

Location: lot 11 E½, concession VI, Uxbridge Township.

Type of deposit: outwash sand and gravel of Oak Ridges kame moraine.

A 20-foot face exposed stratified medium sand and medium gravel with approximately 50 percent stone and 50 percent sand. The maximum size of boulder is 6 inches, with 10 percent exceeding 4 inches in size and 50 percent exceeding 1 inch in size.

A sieve analysis of a sand sample from the face is given in Table 47.

Ballard Farm (111)

Township of Whitby Pit

Location: lots 9 and 10 E½, concession VII, Uxbridge Township.

Type of deposit: outwash sand and gravel.

County of Ontario Pit (112)

Location: lot 12 E½, concession VII, Uxbridge Township.

Type of deposit: outwash sand and gravel.

Consolidated Sand and Gravel Company (113)

Location: lot 13 E½, concession VII, Uxbridge Township.

Type of deposit: outwash sand and gravel.

Evans Pit (114)

Location: lot 17, concession VII, Uxbridge Township.

Type of deposit: outwash sand and gravel.

Miller Paving Limited (115)

Location: lot 18 W½, concession VII, Uxbridge Township.

Type of deposit: outwash sand and gravel.

A large pit has been opened in the west half of lot 18, concession VII, Uxbridge Township by Miller Paving Limited. A 40-foot face examined consisted of stratified sand and medium gravel with approximately 60 percent stone and 40 percent sand. Maximum size of boulders observed was 8 inches, with 30 percent of the stone exceeding 4 inches in size, and 60 percent exceeding 1 inch in size. A pebble count of the gravel gave the following assemblage: Black River and Trenton Limestones, 70 percent; Precambrian felsic igneous rocks, 18 percent; Precambrian mafic igneous rocks, 3 percent; Precambrian metamorphic rocks, 5 percent; white Potsdam Sandstone, 4 percent.

A sieve analysis of a sand sample from the face is given in Table 48.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 24 percent; feldspar, 17.5 percent; Paleozoic limestone, 51.5 percent; black shale, 1.0 percent; felsic igneous rocks, 2.0 percent; mafic igneous rocks, 1.0 percent.

Miller Paving Limited (116)

Location: lot 16, concession VIII*, Uxbridge Township.

Type of deposit: outwash sand and gravel.

Table 47 SIEVE ANALYSIS OF SAND FROM TOWNSHIP OF UXBRIDGE PIT, PROPERTY 110

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	16.45	19.5	34.4	25.9	2.9	0.2	0.05	0.6

Table 48 SIEVE ANALYSIS OF SAND FROM MILLER PAVING LIMITED PIT, PROPERTY 115

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	22.0	12.6	13.2	24.4	22.7	3.8	0.35	0.95

*Concession VIII is a small concession north of the County Road.

Giordano Sand and Gravel Limited (117)

Location: lot 23 E½, concession VIII, Uxbridge Township.

A gravel pit has been operated on the east half of lot 23, concession VIII, by Giordano Sand and Gravel. A 30-foot face exposes stratified sand and medium gravel. The maximum size of boulders is 8 inches. The face examined consisted of approximately 40 percent stone and 60 percent sand. Twenty percent of the stone exceed 4 inches in size and sixty percent exceed 1 inch in size.

A pebble count of gravel from this pit gave the following assemblage: Black River and Trenton Limestones, 62 percent; Precambrian felsic igneous rocks, 26 percent; Precambrian mafic igneous rocks, 2 percent; Precambrian metamorphic rocks, 8 percent; brown shale, 2 percent.

A sieve analysis of a sand sample from the pit is given in Table 49.

A mineralogical analysis of this sand gave the following major mineral constituents: quartz, 35.0 percent; feldspar, 13.5 percent; Paleozoic limestone, 43.0 percent; grey shale and siltstone, 2.0 percent; black shale, 1 percent; felsic igneous rocks, 3.5 percent.

Table 49 SIEVE ANALYSIS OF SAND FROM GIORDANO SAND AND GRAVEL LIMITED PIT, PROPERTY 117

Mesh	+4	−4 +8	−8 +14	−14 +28	−28 +48	−48 +100	−100 +200	−200
Weight Percent	23.3	17.1	21.8	24.9	10.3	1.0	0.4	1.2

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APPENDIX I

The following property is not shown on Map 2124 (back pocket).

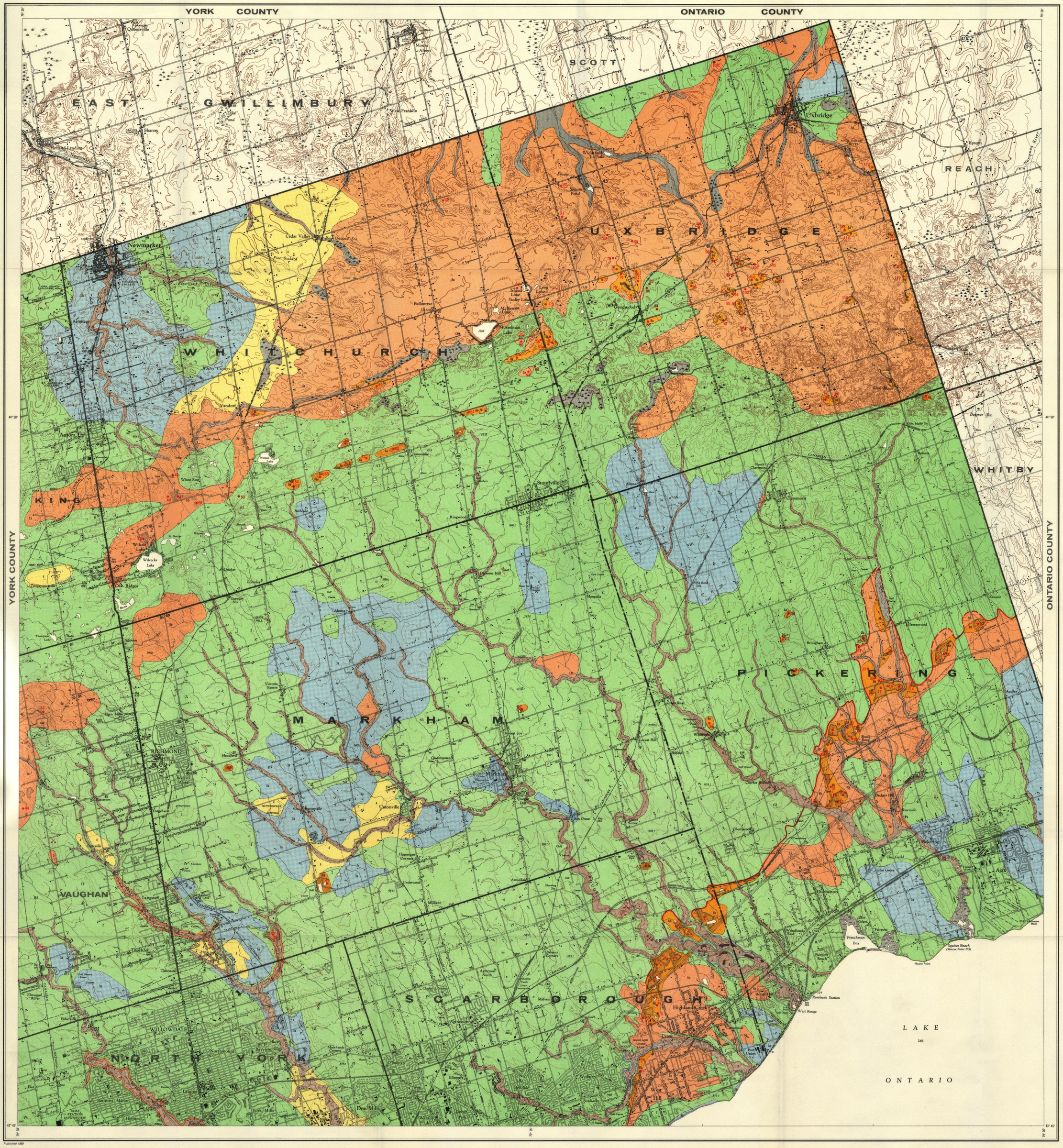
Campbellville Gravel Supply Limited

In 1968, a new gravel pit was opened up by Campbellville Gravel Supply Limited on the east half of lot 23, concession III, Uxbridge Township, Ontario County. The face ranges from 20 to 60 feet in height and is composed of approximately 20 percent stone and 80 percent sand. The stone ranges up to 6 inches in size. The sand is very suitable for the manufacture of concrete sand. Substantial reserves estimated by the company at about 5,000,000 tons have been outlined.

INDEX

ONTARIO
DEPARTMENT OF MINES
HON. ALLAN F. LAWRENCE, *Minister of Mines*
D. P. Douglass, *Deputy Minister* J. E. Thomson, *Director, Geological Branch*

Map 2124
Markham—Newmarket Area
Industrial Mineral Resources Sheet



LEGEND

CENOZOIC

PLEISTOCENE AND RECENT

8 — *Alluvium, stream deposits, including some stream gravels and sands.*

Bog and swamp deposits:

7 — *Peat and muck.*

Stratified sand and gravel:

6 — *6a Kame and kame moraine.*
6b Lake Iroquois beach gravel and sand.

5 — *5 Sand, some stratified sand and gravel.*
5a Oak Ridges kame moraine.
5b Lake Iroquois sand.
5c Interstadial outwash and deltaic sand.

Sand and silt:

4 — *4 Glaciolacustrine sand and silt, frequently as a veneer on till.*

Clay and silt:

3 — *3a Glaciolacustrine clay and silt.*
3b Interglacial clay and silt.
3c Schomberg Lake clay and silt.

2 — *2 Clay till, sand till, includes some clay veneer on till.*

PALEOZOIC

ORDOVICIAN

COLLINGWOOD FORMATION

1 — *1 Black shale.*

SYMBOLS

- *County boundary.*
- *Township boundary.*
- *Topographic contours.*
- *Drumlin.*
- *Geological boundary, position interpreted.*
- *Lake Iroquois shoreline; position defined, assumed.*
- *Sand, gravel pit.*
- 22 — *Location of property.*

For other conventional signs refer to 1:50,000 National Topographic System.

LIST OF PROPERTIES

SCARBOROUGH TOWNSHIP
1 Highland Creek Sand and Gravel Co. Ltd.
2 Miller Paving Limited
3 J. Blake Sand and Gravel Company Limited
4 Crawford Sand and Gravel Limited
5 Highland Creek Sand and Gravel Co. Ltd.
6 John B. Regan Company Limited
7 Connor Transport Limited

PICKERING TOWNSHIP
8 Miller Paving Limited
9 Miller Paving Limited
10 Highland Creek Sand and Gravel Co. Ltd.
11 Ontario Department of Highways
12 Warnock and Johnson pit
13 K. S. Currey pit
14 Highland Creek Sand and Gravel Co. Ltd.
15 Miller Paving Limited
16 A. H. Rowe and McEwen Estate
17 Forsyth pit
18 Consolidated Sand and Gravel Company
19 Gravand Construction Co. Ltd., McKenzie pit
20 Highland Creek Sand and Gravel Co. Ltd.
21 Gravand Construction Company Limited
22 Miller Paving Limited
23 Highland Creek Sand and Gravel Co. Ltd.
24 Highland Creek Sand and Gravel Co. Ltd.
25 Miller Paving Limited
26 Chandler pit
27 Barclay Transport Limited
28 Cooper, Leder and McLachlan pits
29 Highland Creek Sand and Gravel Co. Ltd.
30 Consolidated Sand and Gravel Company
31 John B. Regan Company Limited
32 Township of Pickering pit
33 Consolidated Sand and Gravel Company
34 Gravand Construction Company Limited
35 Giordano Sand and Gravel Limited
36 Concession VI, lot 21
37 Pearse pit
38 E. R. Schutz pit

MARKHAM TOWNSHIP
39 J. Sabiston Limited
40 Warnock & Johnson, Headford pit
41 Markham Sand and Gravel
42 Warnock & Johnson, Groves pit

VAUGHAN TOWNSHIP
43 Rockmor Products Limited
44 Superior Sand Gravel and Supplies Limited

WHITCHURCH TOWNSHIP
45 Baker Sand and Gravel
46 Markham Sand and Gravel Limited
47 George A. White
48 Miller Paving Limited
49 York Sanitation
50 Warnock and Johnson, Cecci property
51 Pike pit
52 Brillinger pit
53 Van Norstrand property
54 Gormley Sand and Gravel, Atkinson pit
55 Gormley Sand and Gravel, Bolender pit
56 Consolidated Sand and Gravel Company
57 Parkway Sand and Gravel
58 Gormley Sand and Gravel
59 K. J. Beamish pit
60 Commercial Sand and Gravel Limited
61 F. H. Roberts & Sons Limited
62 Willingshofer property
63 Campbellville Gravel Supply Limited
64 Consolidated Sand and Gravel Company
65 Lee Sand and Gravel Limited
66 Consolidated Sand and Gravel Company
67 Commercial Sand and Gravel Limited
68 Aprile Contracting Limited
69 Island Lake pit

UXBRIDGE TOWNSHIP
70 Consolidated Sand and Gravel Company
71 Commercial Sand and Gravel Limited
72 Rossfrank Limited
73 Consolidated Sand and Gravel Co., W. A. Irwin pit
74 Consolidated Sand and Gravel Company
75 General Concrete Limited
76 Consolidated Sand and Gravel Company
77 Campbellville Gravel Supply Limited
78 Hall pit
79 Goodwood Airways
80 Richmond property
81 W. Mantle pit
82 Beach farm
83 Campbellville Gravel Supply Ltd., Bunker pit
84 F. H. Roberts and Sons Limited
85 Gormley Sand and Gravel
86 Consolidated Sand and Gravel Company
87 Consolidated Sand and Gravel Company
88 Reiss pit
89 James pit
90 J. B. Regan Limited
91 Giordano Sand and Gravel Limited
92 Jas. Sabiston Limited
93 Burgin pit
94 Elmer Carter pit
95 Commercial Sand and Gravel Limited
96 Concession IV, Lot 17
97 K. J. Beamish
98 Consolidated Sand and Gravel Co., Home pit
99 Miller Paving Limited
100 Township of Pickering pit
101 Consolidated Sand and Gravel Co., Davis pit
102 Consolidated Sand and Gravel Co., Blake pit
103 Coppins pit
104 Highland Creek Sand and Gravel Co. Ltd.
105 Miller Paving Limited
106 Consolidated Sand and Gravel Company
107 Consolidated Sand and Gravel Company
108 Shillinglaw pit
109 Miller Paving Limited
110 Township of Uxbridge pit
111 Ballard farm, Township of Whitby pit
112 County of Ontario pit
113 Consolidated Sand and Gravel Company
114 Evans pit
115 Miller Paving Limited
116 Miller Paving Limited
117 Giordano Sand and Gravel Limited

List of properties compiled by D. F. Hewitt, 1966

SOURCES OF INFORMATION

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Cartography by D. V. Impey, Ontario Department of Mines, 1968.

Topography directly from maps 30M/14E, 30M/14W, 31D/3E, 31D/3W of the National Topographic System.

Magnetic declination in the area approximately 8°W 1965.

Published 1969

Map 2124

MARKHAM–NEWMARKET AREA

YORK AND ONTARIO COUNTIES

Industrial Mineral Resources Sheet

Scale 1: 63,360 or 1 Inch to 1 Mile

Chains 80 40 0 1 2 3 4 5 Miles
Feet 10,000 0 10,000 20,000 Feet
Metres 1000 0 1 2 3 4 5 6 Kilometres