Soils of
PETERBOROUGH COUNTY

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PETERBOROUGH COUNTY

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Introduction

This report and accompanying maps provide an inventory of the soil resources of Peterborough County. They were prepared in response to ever-increasing pressures for soil information by agricultural, recreational and forestry agencies. Peterborough County straddles the Precambrian Shield. The large number of hectares of good farmland in the south and extensive areas of recreational, forest and wildlife lands in the north present many difficult land use planning decisions, and therein lies the need for soils information.

The project included not only mapping the various soils but gathering information about their characteristics and environments from which to judge their capability for growing agricultural and forestry crops. The reader therefore will find sections in the report that describe the climate, bedrock geology and other factors influencing the use of land.

A section is included on the rating and suitability of Peterborough County soils for engineering uses.

The scale and reliability of the soil maps permit initial land use planning decisions but, due to the diversity of soil characteristics, detailed on-site soil surveys are required for engineering projects, septic tank installations and other uses requiring specific soils information.

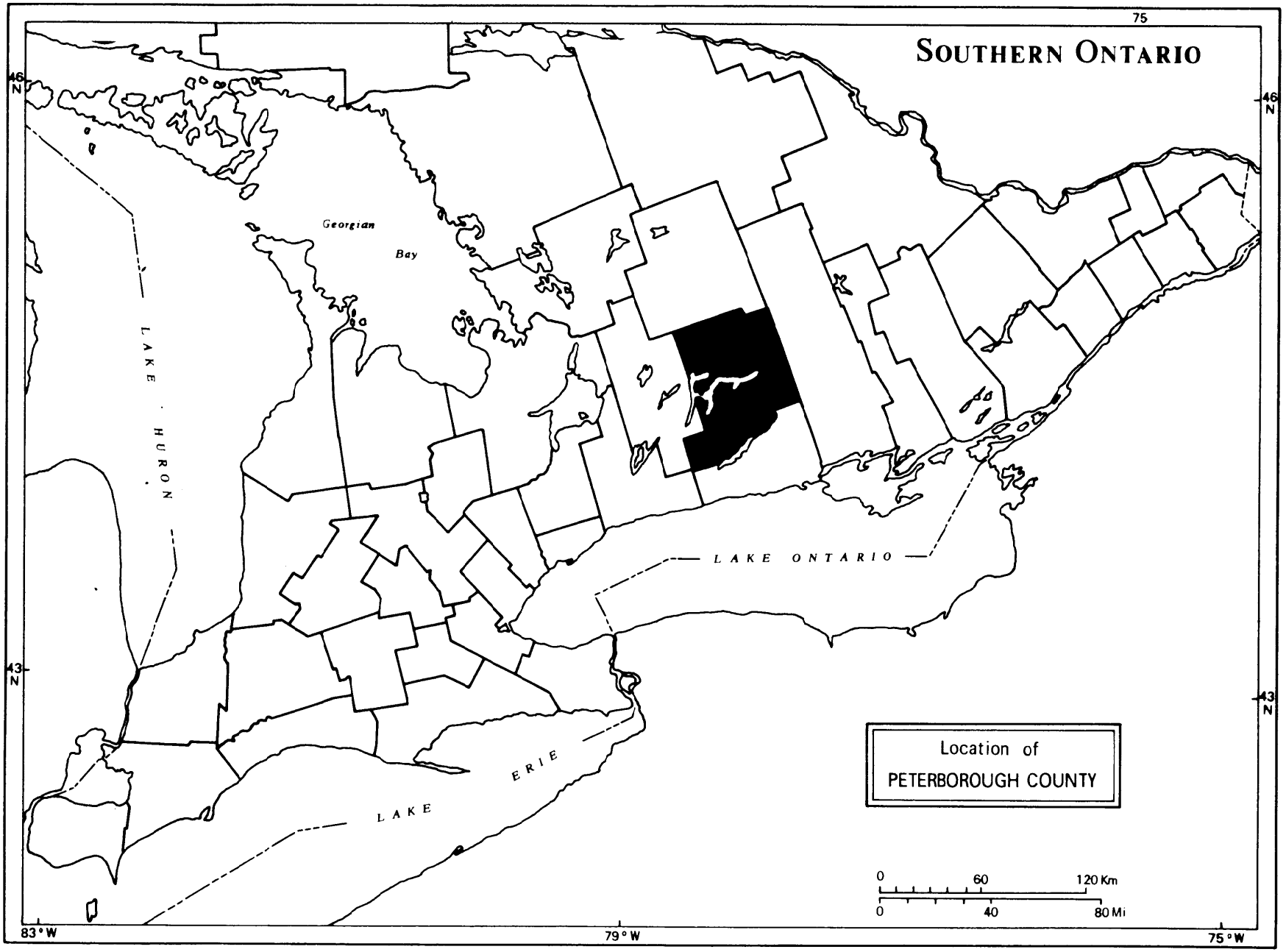

Figure 1. Location of Peterborough County

General Description Of The Area

Location and Size

The location of the county is shown in Figure 1. It is bordered on the south by Rice Lake and Trent River, by Victoria County on the west, by Hastings County on the east, and by Haliburton County on the north. It has a total area of 362 240 ha.

County Seat and Principal Towns

The county seat, Peterborough, has a resident population of 58,111 (1) augmented by thousands of tourist visitors during the summer season. The city has a complement of long-established industries, and is a center of higher education consisting of Trent University and Sir Sanford Fleming College. Peterborough's famous lift lock, the largest in the world, utilizes the Otonabee River which bisects the city.

Lakefield, a small town 13 km north of Peterborough (population 2245), was once an important cement-manufacturing center, but now relies chiefly on the tourist trade and serves as residence for many people employed in Peterborough. Other important centers in the county are: Warsaw, an agricultural center; Havelock (population 1225), a rail center; and, the busy recreational areas of Buckhorn, Burleigh Falls and Apsley.

The townships, main centers, highways, secondary roads and railway lines are shown in Figure 2.

Historical Development

The first settlement in the county was in 1818 in the vicinity of the present City of Peterborough. A saw and grist mill built by Adam Scott in the following year firmly established the site for population growth. In 1825 Peter Robinson, later a parlimentary representative, guided an important influx of Irish immigrants to this area. They settled in the townships of Ennismore, Douro, Smith, Otonabee and Asphodel. Residences and quarters for the officials were built around Scott's mill, and the name previously known as Scott's plains was changed to Peterborough in honor of the leader of the expedition. The county assumed the same name when it was formed. Subsequently additional immigrants came from England, Scotland and Ireland. Two of these immigrants, Mrs. Moody and her sister Mrs. Strickland, have left a rich historical record in their books about the labor, trials and tribulations of life in the backwoods. There was such an intermingling of these people that it is only in Ennismore and Douro that the original Irish settlements have remained distinct.

The early pioneers in the southern part of the county were attracted by the agricultural potential of the area. It had fewer stones, smoother topography and was easier to clear.

The lumber industry became established in the northern part of the county in the 1860's, and the establishment of saw mills encouraged the development of communities. Farms were established in cutover areas that were amenable to cultivation and many of these persisted into the 1940's. However, the low agricultural potential of the land finally resulted in abandonment of most farm operations in the north.

Bedrock Geology

The bedrock geology of the county is shown in Figure 3. Information on the Precambrian geology of the area was taken from a geological map prepared by Hewitt (2).

The major Precambrian bedrock formations in the area comprise granites, marble and amphibolite. These are confined largely to the northern half of the county. The resistance of these bedrock formations to the grinding action of glacial ice, and to physical and chemical weathering processes since deglaciation, has led to very shallow surficial deposits or barren rock in this area.

The limestone formations of the southern part of the county are of Ordovician age (3). Two formations have been identified: the Black River formation is composed of dense, thickly bedded calcitic limestone, and the Trenton limestone is thinly bedded and more susceptible to weathering forces. Glaciation has had the most effect on the Trenton formation producing deep glacial till deposits overlying the bedrock.

For the most part, the soils are not derived directly from the weathering of the underlying bedrock, nevertheless their characteristics are closely related to the nature of the bedrock. Where the bedrock is acidic, the soils tend to be coarse textured, stony and low in natural fertility. Bedrock of a more basic nature gives rise to soils which are of lower sand content, redder in color and usually of higher natural fertility.

Surficial Geology

The distribution of surface deposits in the southern half of the county is shown in Figure 4. The map of the surficial deposits was prepared from the soil maps. Deep soil materials in the Precambrian area are widely scattered and difficult to illustrate on a drawing of this scale, hence, the area was left undifferentiated.

The till deposits of the south are generally related to the underlying bedrock geology. The till moraines overlying the Black River formation are very stony, and relatively thin except along the terminal moraine landforms in Dummer township. The glacial till overlying the Trenton formation is thick, moderately stony, calcitic limestone till, with strongly drumlinized landform.

Peterborough County is noted for its many drumlins with the City of Peterborough occupying the geographic center of the drumlin field. The plain contains approximately 3000 drumlins, in addition to other drumlinoid-hills and surface flutings of the glacial drift (Figure 8). The general orientation of the drumlin axes is from northwest to southeast indicating the direction of ice advance. The drumlins throughout are composed of highly calcareous glacial till containing great quantities of angular limestone and Precambrian materials. Typical drumlins (Figure 9) are less than 1.5 km in length, 400 m or less in width and 25 m in height. Many are closely spaced, averaging two or three to the square kilometer, and rest on a gently sloping moraine base. In other instances the drumlins are more widely separated and glacial spillway channels, sand or clay plains occupy the intervening space.

Long sinuous gravel ridges (eskers) also are a prominent feature of the drumlinized landscape (Figure 7). These were produced by rivers flowing within the glacial ice and were deposited on the landscape as the ice melted away. The sand and gravel spillway material reveals the courses of large postglacial rivers carrying water and glaciofluvial materials across the county from their source to the northwest.

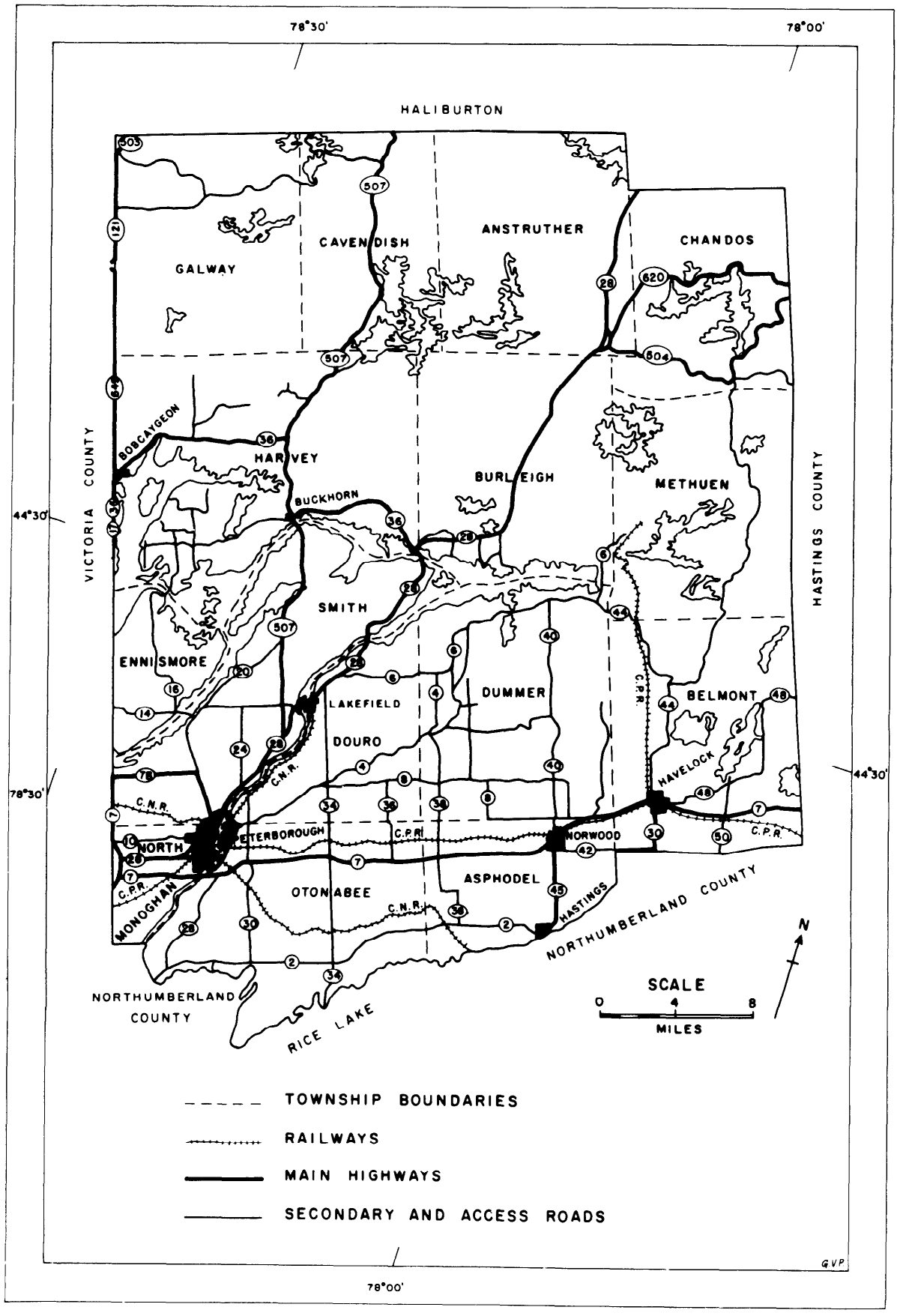

Figure 2. Townships, principal towns, highways and railways in Peterborough County

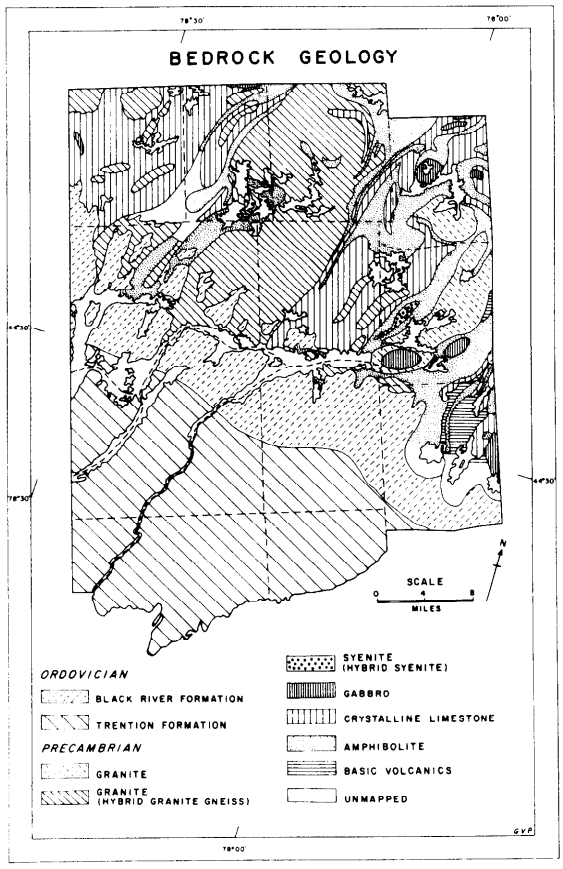

Figure 3. Outline map showing bedrock geology of Peterborough County

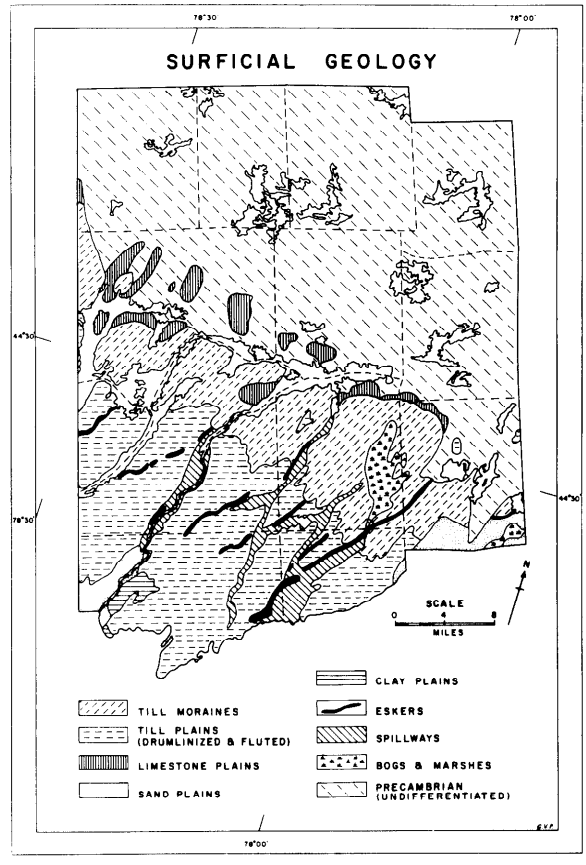

Figure 4.. Outline map showing surficial geology of Peterborough County

Small areas of lacustrine clay, encountered in the southern portion of the county, are remnants of a glacial lake probably created by the following sequence of events. A glacial advance and later retreat produced a till ridge in the south that blocked a glacial meltwater channel and formed a lake in the southern part of Otonabee township. A re-advance of the ice broke the barrier bringing an end to the lake. Much of the glaciolacustrine clay produced was eroded by the final ice advance but a few areas still persist. The flat landscapes created by the lacustrine deposits may not be as striking or as numerous as the drumlin or esker landforms, but they were instrumental in development of the good quality soils on these deposits.

The organic deposits in Peterborough, as in neighboring counties of Victoria, Northumberland, and southern Hastings, Lennox and Addington and Frontenac counties, have developed mainly from woody remains, and hence are quite different in character from the organic deposits in other areas of the province.

In the middle part of the region which includes Peterborough County there are two kinds of organic deposits. Those located near the lakes are predominantly very wet and are composed of the remains of water-tolerant vegetation, such as sedges and reeds. In many cases, the deposits are very shallow.

Organic soils located at a distance from the lakes have developed from forest vegetation and sphagnum moss. Present vegetation consists of mosses, sedges, birch, tamarack, spruce, fir, poplar, white pine and white cedar. These deposits have a pH of 4.5 - 5.5 and a high moisture content because of high groundwater levels. On the basis of degree of decomposition of the organic material, most of these soils are classified in the Humisol Great Group; the remainder are Mesisols.

The northern part of the region is higher in elevation and has steeper slopes. It also has higher precipitation and lower temperatures which change the character of the organic terrain from what is described for the middle and southern part of the region. The composition of the tree cover has changed and conifers are most commonly found in wet areas. In the north the organic deposits are deeper and derived chiefly from *hypnum* and *sphagnum* mosses. Subdominant material consists of the remains of wood, sedges and cattail which are mixed with layers of mosses and cotton grass. Sometimes there are silty mineral layers mixed with the organic layers. Present vegetation consists of mosses, sphagnum, club-moss, fern, small cranberry, sheep laurel, birch, poplar, spruce, tamarack, hemlock and white cedar. These deposits have a pH of 3.5-5.0 and an average depth of 120-150 cm. The organic soils in this region are mainly Humisols and appear to compare to semiterrestrical mesotrophic types found in Europe.

Natural Drainage

The drainage systems of the county are shown in Figure 5. The entire drainage system is part of the Trent River system. This chain of lakes and rivers traverses the county through Pidgeon, Buckhorn, Stony and Rice Lakes connected by the Otonabee River. All streams empty into the system.

There is a large hectarage of very poorly drained depressional basins in the southern part of the county with water table levels at or near the surface for most of the year. These are valuable holding basins retaining large quantities of water which otherwise would be drained away and lost to the county.

Most of these areas should remain in their undrained state to aid in maintaining groundwater levels.

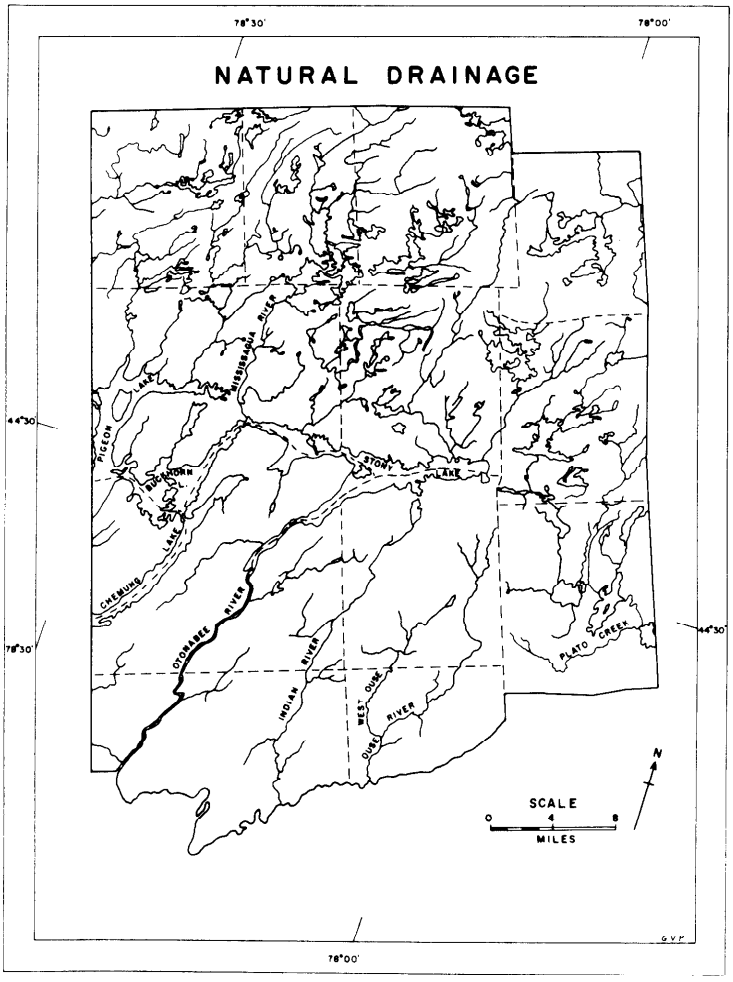

Figure 5. Outline map showing the principal streams in Peterborough County

Climate

Peterborough County lies north of Lake Ontario somewhat removed from the modifying influence of this large body of water. Brown *et al* (4) classify Peterborough County in two climatic zones shown in Figure 6. The southern part of the county is in the Simcoe and Kawartha lakes region and the northern part is in the Haliburton slopes region. The data in Table 1 shows that the climate of the southern region is slightly more favorable for crop production than that of the northern region.

Present Land Use

The good agricultural land lies in the southern part of the county where the principal crops are hay, spring grain and corn (Figure 10, Table 2), supporting a livestock industry comprised mainly of beef and dairy enterprises (Table 3). Most of the drumlinized till areas (Figure 11) contain soils suitable for sustained crop production, and other soils best suited for long-term improved pasture.

Table 1. Climatic data for Peterborough County

Climate	Simcoe & Kawarthas	Haliburton Slopes
Elevation m	200	360
Mean annual temperature for the year, °C	6	5
Mean annual temperature for April	11	10
Mean annual temperature for July	26	26
Mean annual temperature for October	14	13
Start of growing season >6°C	Apr. 18	Apr. 22
End of growing season <6°C	Oct. 28	Oct. 24
Length of growing season, days	195	185
Length of frost-free period, days	135	115
Mean annual precipitation, cm	80	71
Moisture deficiency, cm	2.5	5
Mean annual growing degree days >42°C	3200	2900
Mean annual growing degree days >5°C	1778	1611

Table 2. Area and yield of principal farm crops in Peterborough County for crop year 1979 (5)

Crop	Hectares	Yield (kg/ha) as stated	Provincial average 1976-79 (kg/ha)
Oats	4,450	1945	2132
Barley	850	2587	3010
Mixed Grains	3,645	2345	2841
Grain Corn	7,290	5050	5544
Fodder Corn	4,860	12 tonnes	12 tonnes
Hay	27,945	2.4 tonnes	2.5 tonnes

Table 3. Livestock population in Peterborough County 1979

Type	No.
Dairy breeding herd one year and over	12,700
Beef breeding herd one year and over	18,800
Steers one year and over	8,100
Total cattle	58,300
Total pigs	26,800

The number of commercial farms in the county is reported as 733 with a hectarage of 71 604 (1).

Much of the northern part of the county is under forest and managed by the Ontario Ministry of Natural Resources with headquarters at Apsley and Gooderham. Some reforestation has been done and there are many more areas in the county amenable to planting. Site index determinations for red pine were made during the survey and are listed elsewhere in this report. These apply to various soil series and predict tree height at age 50 years.

There are extensive areas suitable for recreational use around the numerous lakes. Thousands of cottages dot the shorelines; many developments are under way to meet an almost insatiable demand for recreational land. Strict controls on cottage density and sewage and garbage disposal must be maintained if eutrophication of lakes and an unsightly environment are to be avoided. Many shorelines are rocky with thin soil cover and unsuitable for septic tanks unless costly installation procedures are followed.

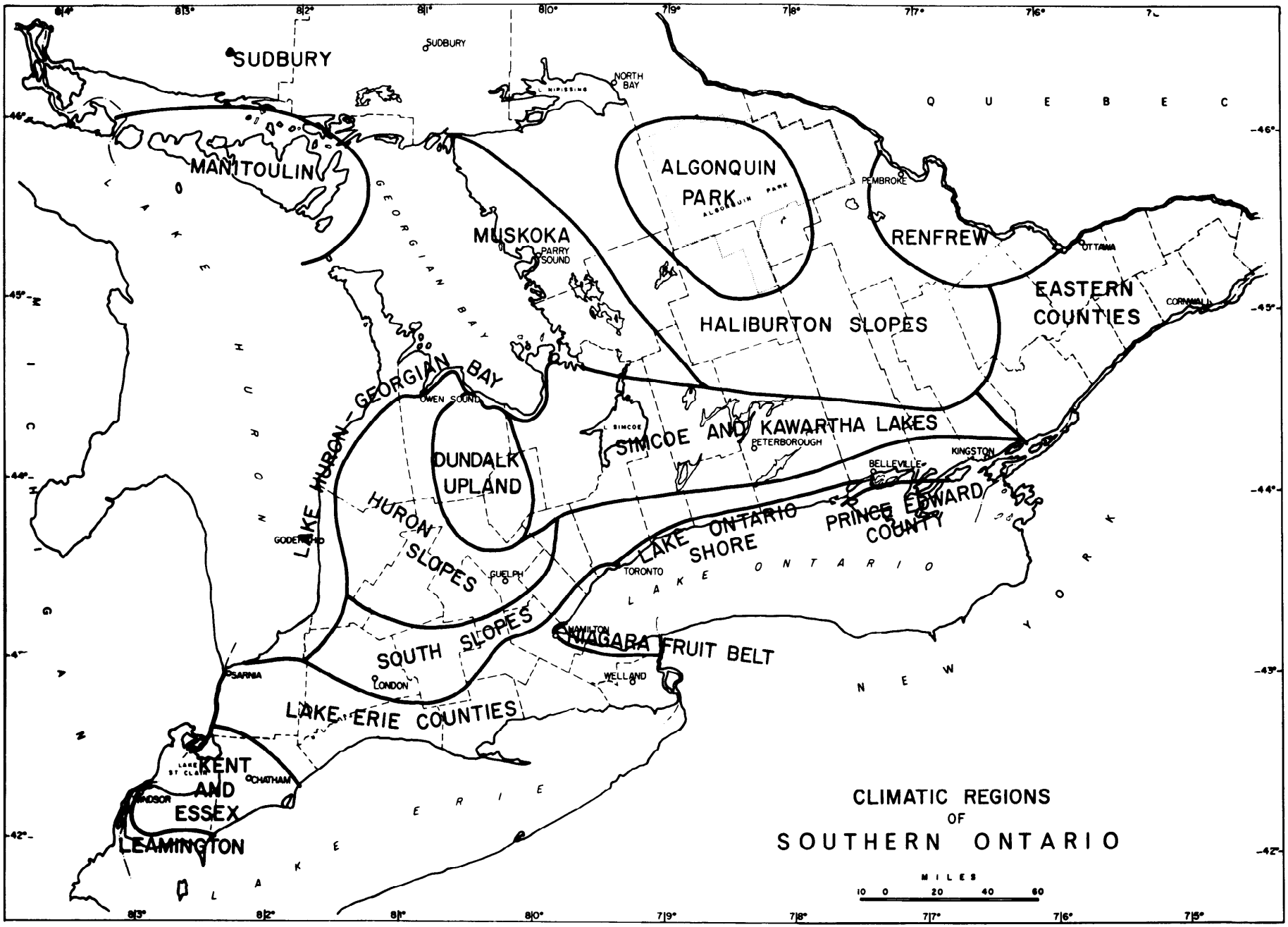

Figure 6. The climatic regions of southern Ontario

The Classification and Description of the Soils of Peterborough County

Soil Formation

The glacial deposits are the parent materials on which the soils of the county have developed. The variety of soils is due primarily to differences in the parent materials and natural drainage.

During the course of soil development, carbonates are dissolved and removed from the upper soil layer. When sufficient lime has been removed, iron, aluminum, clay and other compounds may move downwards, precipitate or flocculate, and form a horizon characterized by brown or red colors and frequently of finer texture.

The vertical sequence of horizons in a soil is called the soil profile. In agricultural practice it is customary to refer to the different horizons as surface soil, subsoil and parent material. However, because many soils have more than three horizons it is convenient to use the specific pedological terms — A horizon, B horizon and C horizon — which are further subdivided as required into Ah, Ae, Bm, Bt, Ck etc. These terms and symbols are used throughout this report and definitions are given in the glossary.

The A horizon is the zone of maximum weathering from which bases have been removed. In many soils the A horizon can be subdivided into Ah and Ae.

The Ah horizon under grass or tree vegetation is enriched by accumulations of humus giving it a dark color. The Ae horizon is light colored ranging from white to light grayish brown in different soils. Some of the constituents (clay, iron, humus etc.) leached from the A horizons accumulate in the B horizon. Hence the B horizon has colors derived from these constituents. Lowercase letters used with the horizon letter (e.g. Bt, Bf, Bh) indicate certain levels of accumulation of clay, iron and humus, respectively, in the horizon. The C horizon generally referred to as the parent material is unaltered or only slightly altered by soil weathering processes.

Soil Classification

Soils are classified into five categories including Orders, Great Groups, Subgroups, Families and Series varying in the degree of generalization. The first three categories are based on the kind, arrangement and number of horizons in a soil. These horizon characteristics are expressions of soil forming processes such as climate, time, topography and vegetation. Thus soils can be grouped into orders, then subdivided into great groups, right down to the soil series. Soils of the same family have similar particle size, mineralogy and soil climate. A soil series is restricted to soils of similar internal drainage, the same kind and arrangement of horizons, and with similar parent material.

The diversity of kinds of parent material, vegetation, topography and climate in Peterborough County has resulted in the development of soils characteristic of the Podzolic, Luvisolic, Brunisolic, Gleysolic and Organic Orders.

Photographs and descriptions of soils representative of some of these orders, and classified at the subgroup level, are shown in Figures 12-15.

Soil Series and Soil Type

The principal unit of classification is the soil series, which may in turn be subdivided into two or more types according to the texture of the surface layer. Each soil series is defined in terms of the kind and texture of the parent material and the characteristics of the soil horizons. Each member profile of a soil series must have similar horizon development. Since soil is a three-dimensional continuum, the features of each horizon vary both laterally and vertically. It is therefore necessary to choose the range of characteristics that best describes each soil series. The principal soil series in the county are named and described, but the minor series of limited occurrence commonly are not named or described in the report. The series descriptions given in the appendix of this report present a central concept of each series. The name given to a series is usually a geographical name, often referring to an area where it was first established, e.g., Otonabee series, a name given to a series first mapped in Otonabee township.

Soil Key

	Map Symbol	Hectares
A. Soils developed on glacial till		
1. Calcareous loam and sandy loam parent material		
(a) Well drained		
1. Bondhead loam	(Bl)	650
2. Bondhead sandy loam	(Bsl)	9 810
3. Eldorado loam	(Eol)	730
4. Otonabee loam	(Ol)	41 765
5. Otonabee sandy loam	(Osl)	2 330
(b) Imperfectly drained		
1. Emily loam	(El)	5 474
(c) Poorly drained		
1. Lyons loam	(Lyl)	5 910
2. Calcareous very stony loam and stony sandy loam parent materials		
(a) Well drained		
1. Dummer loam	(Dl)	25 340
2. Dummer sandy loam	(Dsl)	1 560
3. Deloro loam	(Del)	1 300
(b) Imperfectly drained		
1. Rockcroft sandy loam	(Rkl)	1 990
(c) Poorly drained		
1. Harney loam	(Hrl)	1 960
3. Noncalcareous, stony sandy loam parent materials		
(a) Well drained		
1. Monteagle sandy loam	(Msl)	11 940
2. Balmer sandy loam	(Bls)	5 506
(b) Imperfectly drained		
1. Wemyss loamy sand	(Ws)	180
B. Soils developed on 30-100 cm of outwash or lacustrine deposits overlying calcareous till		
1. Sandy loam outwash over calcareous loam till		
(a) Well drained		
1. Dundonald sandy loam	(Dusl)	534
2. Silty clay loam and clay loam deposits overlying calcareous loam till		
(a) Well drained		
1. Waupoos silty clay	(Wsc)	80
(b) Imperfectly drained		
1. Solmesville clay loam	(Socl)	453
2. Solmesville silty clay loam	(Sosicl)	243

	Map Symbol	Hectares
C. Soils developed on lacustrine deposits		
1. Calcareous fine sandy loam and silty deposits		
(a) Imperfectly drained		
1. Trent fine sandy loam	(Tfsl)	943
2. Trent silt loam	(Tsil)	113
(b) Poorly drained		
1. Foxboro fine sandy loam	(Ffsl)	390
2. Foxboro silt loam	(Fsil)	6 024
2. Calcareous clay deposits		
(a) Poorly drained		
1. Simcoe silty clay loam	(Sic)	1 440
3. Noncalcareous fine sandy loam and silt deposits overlying marble		
(a) Imperfectly drained		
1. Galway sandy loam	(Gws)	453
(b) Poorly drained		
1. St. Croix sandy loam	(Scl)	97
D. Soils developed on outwash sands and gravels		
1. Calcareous sandy outwash		
(a) Well drained		
1. Brinco sandy loam	(Brsl)	1 340
2. Brinco loamy sand	(Brs)	240
3. Tioga sandy loam	(Tis)	1 800
(b) Imperfectly drained		
1. Tecumseth sandy loam	(Tes)	490
(c) Poorly drained		
1. Granby sandy loam	(Grsl)	1 490
2. Calcareous gravelly outwash		
(a) Well drained		
1. Cramahe gravelly sandy loam	(Cs)	3 640
2. Colborne sandy loam	(Cos)	260
3. White Lake gravelly sandy loam	(WLs)	130
3. Noncalcareous sandy outwash		
(a) Well drained		
1. Wendigo loamy sand	(Wes)	8 260
2. Chandos loamy sand	(Cds)	16 875
(b) Imperfectly drained		
1. Mallard sandy loam	(Ms)	1 490
(c) Poorly drained		
1. Kenabeek sandy loam	(Ks)	2 400
4. Noncalcareous gravelly outwash		
(a) Well drained		
1. St. Peters gravelly sandy loam	(SPg)	260
E. Soils developed on shallow materials over bedrock		
1. Calcareous loam and sandy loam overlying limestone		
(a) Well drained		
1. Douro loam	(Drl)	11 870
2. Douro sandy loam	(Drsl)	196
3. Farmington loam	(Fl)	8 712
4. Farmington sandy loam	(Fsl)	940
5. Long loam	(Lol)	310
(b) Imperfectly drained		
1. Franktown loam	(Fns)	240
(c) Poorly drained		
1. Brooke loam	(Bol)	290
F. Residual soils developed from bedrock		
1. Noncalcareous sandy loam materials over gabbro and granite		
(a) Well drained		
1. Belmont sandy loam	(Bmsl)	2 430
2. Methuen sandy loam	(Mes)	11 935
2. Calcareous soils developed on marble		
(a) Well drained		
1. Tweed sandy loam	(Tws)	22 900
G. Undifferentiated bedrock outcrop		
1. Rockland	(RL)	
H. Soils developed on recent alluvial deposits		
1. River floodplains, variable textures		
(a) Poorly drained		
1. Bottom Land	(BL)	
2. In shallow water or intermittently flooded areas adjacent to lakes or rivers		
(a) Very poorly drained		
1. Marsh	(Ma)	
I. Soils developed on organic materials		
1. Organic soils 40-100 cm deep		
(a) Underlain by fine textured materials, clay, clay loam		
1. Colbar	(Cb)	310
(b) Underlain by medium textured materials		
1. Loretto	(Lo)	1 600
2. Tallon	(To)	194
(c) Underlain by coarse textured materials		
1. Washago	(Wh)	3 740
(d) Underlain by bedrock		
1. Uhthoff	(Uh)	2 100
(e) Underlain by marl and claycy material		
1. Angers	(An)	113
2. Organic soils 100-160 cm deep		
(a) Underlain by fine textured materials - clay, clay loam		
1. Pefferlaw	(Pf)	518
2. Sheldrake	(Sd)	1 390
(b) Underlain by medium textured materials		
1. Severn	(Sm)	130
2. Bailey	(By)	777
(c) Underlain by coarse textured materials		
1. Vallentyne	(Vt)	3 910
2. Eels	(Es)	49
(d) Underlain by bedrock		
1. Navan	(Np)	2 350
2. Anson	(Ay)	194
3. Organic soils greater than 160 cm deep		
1. Vespra	(Vr)	10 050
2. Hasty	(Hs)	97
3. Coates	(Ct)	1 480
4. Minden	(Mh)	280
4. Undifferentiated Organic soils	(O)	

Soil Map Units

The system for naming bodies of soils which occur together in a landscape utilizes the dominant soil series as the basis for the map unit name. The usual practice is to allow up to 20% of unnamed inclusions in any map unit. Thus an area delineated on the soil map which carries a single series name, e.g., $\frac{B\text{-}1}{B2}$, would consist of approximately 80% soils of the Bondhead series and 20% of other soils. There may be instances where the proportions of unnamed inclusions exceed the acceptable level of 20%, particularly in areas of poor accessibility where field examination was less intensive.

Where intricate patterns of landform and soils exist, compound map units indicate where the individual soil series could not be delineated at the scale of mapping used. Most map units in the northern part of the county are of this type — comprised of complexes of principal soil series plus, in many cases, rock outcrop. Percentage estimates for each member of the compound map unit were estimated by stereoscopic methods. The first-named soil series of each compound map unit is the dominant component. Thus, an area on the soil map with the delineation $\frac{Ms1\text{-}0\text{-}RL}{d9}$ represents a collection of soils, some of which (approximately 60%) belong to the taxonomic soil series named Monteagle sandy loam, approximately 20% are undifferentiated organic soils, and the remaining 20% is rockland.

In the following pages the single and compound map units are described in alphabetical order, and information is given on the soil parent materials, soil drainage, topography, general profile characteristics and uses. The inclusions which might be expected within the map unit also are identified.

Angers Map Unit (113 ha)

The dominant soils of this map unit have been developed from shallow organic materials originating from grasses, mosses and woody vegetation. The organic material is generally well decomposed, neutral to mildly alkaline in reaction. Mineral materials underlay the organic layers at depths of approximately 90 cm and range from marl, containing a concentration of small shells, to silty clay loam textures. The soils are very poorly drained with water table levels at or near the surface throughout much of the year. They are classified as Terric Humisols.

Minor inclusions in areas of the Angers map unit could include soils of the Harney, Washago, Navan and Uhthoff soil series.

Soils of this map unit have severe restrictions for agricultural uses and large-scale reclamation is not feasible. They also are very poor or unsuited for engineering or recreational uses because of prolonged high water table conditions.

Anson Map Unit (194 ha)

The dominant soils of this map unit have developed from organic materials with bedrock substrata. Mosses, grasses, sedges, rushes and wood comprise the organic materials. They are primarily in a moderate stage of decomposition and are slightly acidic in reaction. The underlaying bedrock is of Precambrian origin and occurs at depths of 100-160 cm below the surface. The soils are very poorly drained with water table levels at or very near the surface throughout much of the year. The dominant soils are classified as Typic Mesisols. shallow lithic phase.

Minor inclusions in areas of the Anson map unit could include soils of the Vespra series.

Soils of this map unit have very severe limitations for agricultural uses and improvement practices are not feasible. They are also unsuited for engineering or recreational uses because of trafficability and strength limitations, as well as prolonged and high water table conditions.

Bailey Map Unit (777 ha)

The dominant soils of this map unit have developed from shallow organic materials, originating predominantly from sedges and common reeds. These materials are generally well decomposed and the resultant soil is strongly acid to neutral in reaction. The mineral layer occurs at a depth of approximately 100 cm and is composed of silt loam or fine sandy loam. The soil is very poorly drained with water table levels at or near the surface throughout much of the year. The dominant soils are classified as Terric Humisols.

Minor inclusions in areas of the Bailey map unit could include soils of the Vespra, Kenabeek and Tweed series.

Soils of this map unit have severe limitations for agricultural production and large-scale reclamation is not feasible. They are unsuited to engineering uses because of high water table and trafficability limitations. For the same reasons they are considered poor for recreational uses.

Balmer Map Unit (5506 ha)

The Balmer soils are derived from glacial till largely of syenite origin, and are found in areas of relatively large syenite outcroppings. They were first encountered in Chandos township along the Balmer road, hence the soil name. They also have been mapped in Burleigh and Harvey townships.

The landform is bedrock controlled and generally consists of undulating topography of low relief. Frequent rock outcrop exposures intermixed with 90-120 cm of soil form a pattern in the Balmer road area. Fewer outcroppings occur in other areas, particularly in Harvey township. The Balmer soils are much less stony than the Monteagle soils due to the relative softness and crushability of the syenite by glacial ice. The parent material is noncalcareous loamy sand till.

The natural vegetation occupying these soils comprises mixed hardwoods and softwoods, primarily maple and birch.

The dominant soil encountered in the map unit is Balmer sandy loam, an Orthic Dystric Brunisol. The surface organic layer comprises an L and F horizon underlain by a thin (3 cm) Ah horizon. The Ah is very dark brown with a high content of organic matter. Occasionally a white Aej horizon is encountered below this layer, but generally the Ah horizon is underlain by a reddish-brown Bm horizon. The Bm is sandy loam in texture and of friable granular structure. It grades into the parent material at about 75 cm depth.

The Balmer soils are not suitable to agriculture due to the high incidence of bedrock, but appears to be satisfactory for forestry purposes. They support a variety of wildlife including deer, black bears, racoons, foxes, partridge and rabbits.

Soils of the Monteagle, Chandos and Mallard series, and undifferentiated organic soils could occur as inclusions in the Balmer map unit.

Compound map units in which soils of the Balmer series are dominant are as follows:

Balmer-Chandos Map Unit (518 ha)

This complex is mapped immediately east of Jack Lake and is composed of equal proportions of the two soils. The topography of the area has complex gentle to moderate slopes. There are some rock outcrops occurring with these soils especially in the eastern portion of the area.

These soils provide a fair forest area suitable for hardwoods or conifers. Some areas are suitable for machine planting.

Balmer-Mallard Map Uint (340 ha)

This complex is mapped in the Jack Lake area. The dominant member is the Balmer series with 30-40% Mallard soils. Small inclusions of Wendigo and Kenabeek soils also are present. A considerable part of the shoreline has been made accessible by

road and a large cottage development is under way on soils of this type.

The soils are generally deep and suitable for both deciduous and coniferous forest. The topography ranges from complex gentle to moderate slopes on the Balmer soils, to smooth gently sloping on the Mallard soils. Forest capability varies from good to poor depending upon frequency of rock outcroppings.

Balmer-Organic Map Unit (1720 ha)

The largest area of soils comprising this complex occurs in Cavendish township west of Catchacoma Lake. They occur on gently to moderately sloping topography with about 70% of the area consisting of Balmer soils, the remainder being small undifferentiated organic deposits. Several small streams cross the complex draining into the Squash River, which forms the western boundary of these soils. A number of small lakes are included. These soils provide a fair forest site, and have good wildlife capability for such species as beaver, muskrats, ducks and deer.

Belmont Map Unit (2430 ha)

These soils are mapped only in Belmont township. They have developed in an easily weathered gabbro bedrock. The topography is complex, moderately sloping. The soils are well drained. Soil development has occurred to variable depths indicative of different weathering rates of the gabbro rock.

The most common profile of the map unit representative of the Belmont series is an Orthic Dystric Brunisol. It has developed under a mixed forest vegetation and the surface Ah horizon is very dark, grayish brown, friable sandy loam. It is underlain by a sandy loam, dark reddish brown Bm horizon about 5 cm thick, grading with depth to strong brown. The underlying bedrock is weak red. The soil reaction is acid.

This is not an agricultural soil but has a fair potential as a forest soil. Regeneration of maple seems to be good.

Common inclusions in areas of the Belmont map unit are soils of the Chandos and Monteagle series, and miscellaneous land types including Marsh and Rockland. A compound map unit which contains soils of the Belmont series is the following:

Belmont-Marsh-Rockland Map Unit (959 ha)

This complex is mapped in Methuen township south of Twin Lakes. It is a large depressional area with numerous outcrops of gabbro bedrock in which the Belmont soils have developed. The latter are relatively shallow but the bedrock is weathered to depths of 60-90 cm which allows deep penetration of tree roots. This is a fair forestry soil for either hardwoods or conifers. The use of machinery on this complex is impossible except in small isolated areas. The complex provides a fair habitat for waterfowl.

Bondhead Map Unit (10460 ha)

The largest area of Bondhead soils is located north of the eastern end of Rice Lake. It is a strongly drumlinized area with steep-sided drumlins resting on a gently sloping moraine base. A smaller area of these soils near Norwood has fewer drumlins and a more subdued topography.

The parent material of the Bondhead soils is calcareous, moderately stony loam till. The most common profile is classified in the Brunisolic Gray Brown Luvisol subgroup. These soils are well drained to rapidly drained on some slopes and range in stoniness from slight to moderate. The topography varies from gently to steeply sloping.

The undisturbed soil profile as seen in woodlots has a very dark grayish brown surface horizon 8-10 cm thick, loam or sandy loam texture, with friable granular structure (Figure 16). A Brunisolic B horizon several centimetres thick separates the surface horizon from the grayish brown eluviated Ae horizon. This horizon is often of variable thickness. The Bt horizon underlying the Ae horizon is enriched by clay, and dark brown in color due to accumulations of clay and other materials. This horizon is sometimes associated with a stone line. The grayish brown glacial till C horizon underlying the Bt horizon is strongly calcareous and moderately stony.

The Bondhead soils are quite variable in their agricultural potential due to topography. Those soils with slope classes B and C are class 1 agricultural soils, and are suited to the production of a wide variety of crops. Some care in soil management is needed on C slope classes to prevent topsoil erosion. Bondhead soils having D slopes require more restrictive soil management. This will include longer rotations under sod and limited use of intertilled crops. Soils with slope classes steeper than D should be kept in permanent pasture. If land pressure demands, it may become feasible to terrace such slopes and use them for specialized crops such as berries and tree fruits.

In areas of the Bondhead map unit inclusions of soils of other series may occur, the most common being Otonabee, Emily, Lyons and Cramahe.

Brinco Map Unit (1590 ha)

These soils are scattered throughout the southern half of the county with the major hectarages mapped in Asphodel, Smith and Ennismore townships. The topography is smooth gently sloping, and soil drainage is good. The soil parent material is calcareous sandy outwash.

The dominant soil profile of the map unit is the Brinco series, a Brunisolic Gray Brown Luvisol. Two soil types, Brinco loamy sand and Brinco sandy loam, are mapped. The former is a coarser grade of sand and lower in clay content than the Brinco sandy loam.

The dark brown sandy loam or loamy sand surface Ah horizon is 5-8 cm thick. This is underlain by a yellowish red Bm horizon about 10-15 cm thick that is very friable loamy sand with numerous roots. The underlying Ae horizon varies in depth from 15-50 cm and is yellowish-brown loamy sand with single grain structure. The Bt horizon is 5-10 cm thick, brown sandy loam to loam with an irregular wavy lower boundary. The parent material consists of pale brown calcareous loose sand.

These soils when well managed are good agricultural soils. They are low in natural fertility and somewhat droughty, but these deficiencies can often be corrected. With proper management they are capable of producing excellent yields of a wide variety of farm crops and specialized crops such as small fruits and vegetables. They also are suitable for pine plantations and rank with the best soils in southern Ontario for this purpose.

Within areas of the Brinco map unit, soils of the Tecumseth, Cramahe and Otonabee series also could occur as inclusions. The Brinco-Cramahe complex map unit is described below.

Brinco-Cramahe Map Unit (260 ha)

Most of this complex is mapped in Ennismore township and consists of a long esker intermixed with sandy outwash and kame hills, consisting of the two soil series, Brinco and Cramahe. The topography ranges from gently sloping to moderately sloping. Some of the area is farmed, but the soils are not particularly suited to this use. However, they do provide a good source of gravel.

Brooke Map Unit (290 ha)

These soils are the poorly drained members of the Farmington catena. They occur in depressional areas where water collects and the soil remains saturated for moderately long periods of the year.

They are comprised of less than 30 cm of loam textured glacial till overlying limestone bedrock. The loamy Ah horizon, 13-15 cm thick, is very dark brown to black, friable with granular structure. The subsoil horizon (Bg) is gleyed, grayish brown loam with yellowish red mottles and overlies the bedrock. The dominant profile of the Brooke map unit is classified as an Orthic Humic Gleysol (Lithic phase).

Soils in this map unit are not suitable for agricultural use except for low intensity grazing purposes. Much of these lands still retain their tree cover which is predominantly cedar vegetation.

The most common inclusions include soils of the Franktown and Navan series.

Chandos Map Unit (16 875 ha)

These soils were first mapped in Chandos township where large hectarages occur surrounding Chandos Lake. The same map unit also has been mapped in Burleigh, Belmont and Galway townships with fewer hectarages in several other townships.

Some of the larger areas are deltaic in origin, others of kame derivation. The soil parent material is noncalcareous sand overlying marble bedrock in some areas, and marble banded amphibolite in others. In Galway township the sand has fairly uniform depth (>120 cm), and the topography is gently to moderately sloping. The topography in the Chandos area is more complex varying from moderately sloping to hilly. Also, in this area rock exposures are frequent.

The dominant soil profile in the map unit is the Chandos series, an Orthic Dystric Brunisol. The surface Ah horizon, about 5 cm thick, is a friable, granular black sandy loam. The underlying Bm horizon is brown loamy sand to sand. It may be 65 cm in thickness, but can be subdivided into several horizons on the basis of color. The lowest horizon has the darkest color and overlies the calcareous rock.

Many areas of Chandos soils were cleared and farmed in the late 19th and early 20th centuries. However, at the time of this survey, most farms already had been abandoned. These soils are low in natural fertility and droughty. On the higher landscape positions in Chandos township there is evidence of severe losses of soil by wind erosion. Severe infestations of white grubs were prevalent in the 1940's and 50's and caused widespread damage to pastures, which contributed to farm abandonment. This ultimately aided in abetting the erosion process.

It is generally recommended that these soils should return to forest use. They are suitable for conifers or hardwoods.

There are a number of compound map units in which soils of the Chandos map unit occur along with other soils. The associated soils include the Brady, Granby, Mallard, Wendigo and Monteagle map units, as well as Rockland and undifferentiated organic soils. These complex map units are described below:

Chandos-Brady Map Unit (340 ha)

This complex is mapped in Galway township to the northeast of Bass Lake. This is an area of sandy soils having gently sloping topography, but with much steeper slopes. One small stream crosses the area but there are no bogs. The sandy soils are good to fair soils for forestry use, but rock outcrop presents problems for mechanized equipment.

Chandos-Granby Map Unit (290 ha)

This complex is mapped near Cordova Mines in Belmont township and consists of well-drained Chandos soils and poorly drained Granby soils. The topography is very gently to gently sloping, and about 50% of the area is poorly drained. These are poor agricultural soils, but are fair forestry soils. The low incidence of rock outcrops makes the area suitable for mechanical operations, however, the poorly drained Granby soils restrict the choice of tree species that can be successfully established.

Chandos-Mallard Map Unit (97 ha)

This map unit occurs on the eastern border of Catchacoma Lake. It consists dominantly of well-drained Chandos and imperfectly drained Mallard soils. The topography is gently sloping and there is a low incidence of rock outcrop. It serves as a good recreational area with numerous cottages dotting the shoreline. Hiking trails could be easily made and maintained.

The area should have a good to fair capability for forestry use including production of both conifers and hardwoods.

Chandos-Mallard-Organic Map Unit (1250 ha)

The largest area of this map unit occurs in Methuen township north of the Blue Mountains. About 40% of the complex is composed of Chandos soils, the remainder is equally divided between Mallard and Organic soils. There is considerable rock outcrop, but large areas are relatively rock free. There are two long marshes associated with streams which traverse the complex. Considerable parts of the area provide fair forestry soils and the combination of streams, marshes and highlands provides a good wildlife habitat for waterfowl and beaver. The carrying capacity for deer is relatively low.

Chandos-Marsh-Rockland Map Unit (490 ha)

This complex is found in Burleigh township, north of Stony Lake and in the Peterborough game reserve. About 40% of the complex consists of Chandos soils; the remainder is evenly divided between Marsh and Rockland. The topography varies from depressional to gently sloping. The high incidence of marsh and rockland makes this complex relatively poor for forestry, but a good wildlife habitat especially for beaver, muskrats and waterfowl.

Chandos-Monteagle Map Unit (550 ha)

This map unit occurs in Burleigh township west of Jack Lake. The topography is gently sloping. The incidence of bedrock is the main limiting feature of this map unit; the Monteagle soils are very rocky and the Chandos soils moderately rocky. The soils are fair to poor for forestry and the use of mechanical equipment is difficult. It provides a fair to poor habitat for deer.

Chandos-Organic Map Unit (2280 ha)

This map unit occurs in a number of areas in Burleigh, Cavendish, Harvey and Anstruther townships. The largest hectarage runs north from Big Cedar Lake for several miles with Eel's Creek flowing along its eastern boundary. The topography is gently sloping and the area contains numerous small undifferentiated organic deposits. Rock outcrops are numerous, restricting the use of mechanical equipment for forestry. This complex map unit forms part of a large area of Rockland, lakes and shallow soils that remains a refuge for numerous species of wildlife.

Chandos-Rockland Map Unit (450 ha)

This complex is mapped around the north and western sides of Oak Lake, and is a very rocky area interspersed with Chandos soils. It presents serious difficulties for the use of mechanical equipment and is considered fair to poor for forestry use.

Coates Map Unit (1480 ha)

The dominant soils of this map unit have developed from the plant remains of sedges, grasses, rushes, reeds, mosses and

wood. This organic material is partially decomposed and strongly acid to neutral in reaction. The soils are very poorly drained with water table levels at or near the surface throughout much of the year. The classification of the dominant soils of this map unit is Typic Mesisol.

Minor inclusions in areas of the Coates map unit could include soils of the Monteagle series, and Rockland or Undifferentiated Organic soils.

Soils of this map unit are well suited to vegetable production following drainage and development for agricultural use. They are, however, unsuited or poorly suited to most engineering and recreational activities due to the high water table conditions and poor trafficability.

Colbar Map Unit (310 ha)

The dominant soils of this map unit have developed from organic materials consisting predominantly of sedges, reeds and wood. These materials are well decomposed and the resultant soil is strongly acid to neutral in reaction. The shallow organic layer of 40-100 cm depth is immediately underlain by a clay-textured mineral layer. The soil is very poorly drained with water table levels at or near the surface during a large part of the year. The classification for the dominant soils of this map unit is Terric Humisol.

Within some areas of the Colbar map unit, soils of the Lyons series can be found.

Soils of this map unit are severely limited in their capability for agricultural production, and large-scale reclamation is not feasible. The soils are also unsuited or poorly suited to most engineering and recreational uses because of high water table conditions, poor trafficability, and unstable organic materials.

Colborne Map Unit (260 ha)

The Colborne soils have developed in sandy material overlying calcareous gravel. These soils are sometimes found on the lower slopes of eskers, and occasionally occur continuously on adjacent areas of low relief. They are well-drained soils, and the dominant soil profile of the map unit is the Colborne series, a Brunisolic Gray Brown Luvisol. The Ah horizon is very dark grayish brown, friable sandy loam approximately 8 cm thick. This is underlain by approximately 8 cm of very friable reddish brown sandy loam Bm horizon. This grades into the very pale brown Ae horizon that is loose, loamy sand. The underlying horizon is a reddish brown, sandy loam Bt horizon with a wavy lower boundary. The parent material is grayish brown calcareous gravel.

The Colborne soils generally are exploited for their gravel content, and in this county are not used for crop production. A few areas have been planted to pine and are suitable for this purpose.

Minor components of the Colborne map unit include soils of the Cramahe series, where the strength of soil development is less strongly expressed.

A description of a compound map unit including both the Colborne and Cramahe soils is given below.

Colborne-Cramahe Map Unit (210 ha)

Two areas, one in Douro and one in Otonabee township, were mapped as this complex. They are intricate mixtures of the two soil series which occur in esker formations. The areas are mainly exploited for their sand and gravel.

Cramahe Map Unit (2640 ha)

These soils have developed in calcareous, poorly sorted gravelly materials deposited as kames and eskers. Eskers are sinuous ridges of gravel deposited by streams flowing within glacial ice, and deposited on the landscape by the melting and retreating ice front. The gravel deposited on the bottom of these fast flowing streams was contained and molded by the ice walls. Much of the finer material was washed away by the water and the scouring and rolling of the coarser material produced the rounded cobbles characteristic of the material. Slopes on the esker flanks often exceed 25%. One of the largest eskers in Ontario extends from the eastern end of Rice Lake in a northeasterly direction to Havelock. The county road from Peterborough to Warsaw follows the top of another esker for several kilometres. Many eskers are discontinuous, perhaps due to washouts by large volumes of glacial water or re-advances of ice lobes.

The dominant soils of the Cramahe map unit are classified as Orthic Melanic Brunisols. The dark grayish brown gravelly sandy loam Ah horizon is about 8 cm thick. The Bm horizon is brown, gravelly and cobbly, calcareous sandy loam. It may vary in thickness from 15-20 cm. The underlying parent material is coarse, cobbly, calcareous gravel. Finer sand and gravel strata are found in some exposures.

Within areas of the Cramahe map unit, soils of the Colborne and Brinco series may occur as inclusions. Colborne soils exist where a sandy overburden has accumulated on top of the gravelly parent material. Brinco soils occur where the sandy overburden deepens such that the underlying gravelly material becomes less significant to use and management.

The Cramahe soils are a valuable resource providing a source of aggregate material for the construction industry. They have little agricultural value except for pasture land.

Deloro Map Unit (1300 ha)

Remnants of red and gray shale beds occur within the limestone formation in Belmont and Methuen townships, and these are the source materials of the Deloro soils developed from stony, coarse cherty, reddish, calcareous glacial till parent material. The landform is complex, varying from gently to moderately sloping. Surface stoniness ranges from moderate to very stony.

The dominant soils in the map unit are well drained and are classified as Orthic Melanic Brunisols. Deloro loam is the only soil type of the Deloro series mapped in the county. The surface soil is dark brown loam, about 10 cm thick, and has a granular, friable structure. Free carbonates are generally present. The underlying Bmk horizon is about 15 cm thick and is dark brown to dark reddish brown friable loam. Free carbonates are present. The parent material (Ck) is a reddish brown, stony, calcareous till.

The largest hectarages of soils of the Deloro map unit are in woodlots or used for rough pasture. However, a few areas near Round and Oak Lakes have less stone and are under cultivation. They produce good to fair crops of hay and grain and are excellent soils for pasture crops.

Minor components of the Deloro map unit include soils of the Dummer, Rockcroft and Harney series. The Dummer soils differ from the dominant Deloro soils in their absence of shale in the parent material, and correspondingly, more browner colors. Soils of the Rockcroft and Harney series have similar parent material to the dominant member, but are increasingly more poorly drained.

Douro Map Unit (12 070 ha)

The Douro map unit occurs in Harvey, Belmont, Duoro, Smith and Burleigh townships. Douro soils are developed on shallow deposits of very stony, calcareous, recessional moraine till overlying limestone bedrock. Depth to consolidated limestone bedrock rarely exceeds 60 cm. The topography is irregular gently sloping and soil drainage is good to excessive. The surface is very stony.

The most common soil profile in the map unit is the Douro

series, an Orthic Melanic Brunisol. The friable Ah horizon is very dark grayish brown stony loam, well supplied with organic matter. It is underlain by a brown loam Bm horizon 13-15 cm thick, friable and very stony. The soil parent material is a light gray calcareous very stony gravelly loam till. Bedrock occurs between 30 and 50 cm below the surface.

In areas of the Douro map unit, soils of the Rockcroft series and Rockland may occur as minor inclusions. The Rockcroft soils are developed on similar parent materials to the dominant soils, but periodically have restricted drainage conditions. Rockland occurs where the soil material overlying bedrock becomes very shallow (less than 10 cm) or bedrock is exposed at the surface.

Areas of the Douro map unit are not suitable for cropping. Large areas are used as unimproved pastures and others remain in woodlots.

A description of a compound map unit including both the Douro soils and Rockland is given below.

Douro-Rockland Map Unit (97 ha)

This area mapped near Kawartha Park in Smith township consists of the shallow Douro soils and Rockland in about equal proportions. It has little agricultural value except for unimproved pasture, but hardwood trees apparently can anchor themselves in rock fissures and survive reasonably well.

Dummer Map Unit (26 900 ha)

The largest area of Dummer map unit is found in Dummer and Belmont townships. Other areas occur in Douro, Smith, Harvey and Ennismore townships.

The Dummer map unit includes those soils developed on the very stony calcareous materials of a recessional moraine, described by Chapman and Putman(3) as the Dummer moraine.

The landform is featured by strongly sloping, complex topography. In a few areas the soil materials are relatively thin over limestone bedrock.

Surface stoniness varies from very stony to exceedingly coarse, cherty, stony. Large areas although cleared of trees have never been cultivated. Dummer loam and Dummer sandy loam are the two common soil types.

These soils have a thinly weathered solum and are classified as Orthic Melanic Brunisols. In the uncultivated state the Dummer soils have a very dark grayish brown surface horizon with high levels of organic matter. Free carbonates are present in this horizon. The friable brown Bm horizon is about 35 cm thick, containing some weathered sesquioxide materials. The unweathered parent material occurs at approximately 45 cm beneath the surface, directly below the B horizon.

In areas of the Dummer map unit, soils of the Rockcroft and Harney series also may occur as minor inclusions. Their parent material is similar; however, Rockcroft soils have significant periods of restricted drainage conditions, and the period during which saturated conditions occur is prolonged in the case of Harney soils.

Soils of the Dummer map unit in the eastern part of the county are mainly used for pasture and some are uncultivated in woodlots. Less bouldery areas especially in Douro, Smith and Ennismore townships have been cleared of much stone and are under cultivation. Such areas can produce good to fair crops of hay, grain and pasture, however, they do require continual stone removal. Hardwoods are the natural vegetative cover, and some of these soils might be better utilized if they could revert to forest use.

A description of a compound map unit including both Dummer and Rockcroft soils is given below.

Dummer-Rockcroft Map Unit (5040 ha)

This map unit occurs in Dummer and Belmont townships. The topography of the map unit in Dummer township is very complex with numerous glacial till ridges interspersed with gently sloping areas on which the gleyed Rockcroft soils occur. There are only small areas suitable for cultivation with the predominant land use being for pasture with some woodlots remaining.

In Belmont township the map unit has lower relief, less depth of soil, common rock outcrops and poorly drained Harney soil inclusions. Most of the area has not been cleared for agriculture and remains in deciduous forest. It is extremely stony and the use of mechanized equipment is limited to small areas.

Dundonald Map Unit (534 ha)

The major occurrence of the Dundonald map unit is in the North Monaghan township immediately west of a large floodplain of the Otonabee River. Dundonald soils are developed on 30-100 cm of sandy alluvial material over calcareous glacial till. The topography is smooth gently sloping, and the soils are well drained.

The dominant profile in the map unit is Dundonald sandy loam, a Brunisolic Gray Brown Luvisol (Figure 17). The soil profile consists of a very dark brown sandy loam surface Ah horizon with granular structure and friable consistency. The surface horizon is underlain by a Bm eluvial horizon of strong brown color, weak fine structure and friable consistency. This grades into the Ae horizon which is about 25 cm thick, yellowish brown with single grain structure. The Bm and Ae horizons are stone free. The underlying yellowish red loamy Bt horizon is about 5 cm thick, subangular blocky, and friable. This horizon is at the sand-glacial till interface and contains some pebbles. The underlying calcareous till is moderately stony loam to sandy loam.

In areas of the Dundonald map unit, soils of the Otonabee series also may occur as minor inclusions where the sandy textured overburden becomes thinner or disappears, allowing the loamy glacial till to influence soil characteristics.

The Dundonald map unit contains good agricultural soils capable of growing a wide range of crops. It is especially suitable for grain corn, market vegetables and small fruits. It has a low inherent fertility level and requires applications of barnyard manure and commercial fertilizers for maximum productivity.

Eels Map Unit (46 ha)

The dominant soils of this map unit have developed from a shallow organic layer 100-160 cm thick consisting of partially to well-decomposed grasses, sedges, mosses and woody vegetation. The underlying mineral material is noncalcareous loamy sand or sand. The soils are very poorly drained with water table levels at or near the surface throughout much of the year. They are classified as Terric Mesisols.

Minor inclusions in areas of this map unit could include soils of the Anson series which are similar in terms of organic materials, but occur where the depth of the organic material exceeds 160 cm.

Use of the soils of this map unit for agricultural or engineering purposes is severely restricted because of high water table and flooded conditions during much of the year.

Eldorado Map Unit (730 ha)

The Eldorado soils are found in the eastern part of Peterborough County in the vicinity of Round and Oak Lakes. They have developed from calcareous till containing a high proportion of locally occurring red shale. The landform is an undulating morainal plain. Eldorado loam is the only type mapped in the county.

The Eldorado soils are well drained and the topography is gently to moderately sloping. The soil is moderately stony at the surface.

The dominant soil profile developed is Orthic Gray Brown Luvisol and has a relatively deep eluviated Ae horizon underlain by a dark reddish brown Bt horizon. The cultivated layer has a good level of organic matter and a friable granular structure. The Ae or leached horizon is 20-25 cm thick, and has a characteristic pinkish color inherited from the parent material. It has lost some clay by eluviation and is quite permeable. The underlying clay loam Bt horizon is about 20 cm thick. This horizon has an accumulation of clay leached from the layers above. The parent material (C) is reddish brown, calcareous, stony loam till.

The reaction of Eldorado soils is nearly neutral in the top horizons, becoming strongly alkaline in the parent material. They have a good moisture-holding capacity, and are well supplied with exchangeable bases.

In areas of the Eldorado map unit soils of the Lyons series may occur as minor inclusions. Their parent materials are similar, however, the Lyons soils occupy depressional sites in the morainal landscape where drainage is poor.

The principal use of these soils is for the production of hay and grain crops of which both yield high. Because they are surrounded by habitats suitable for wild bees they also have potential for seed production of forage crops such as alsike clover and alfalfa.

Emily Map Unit (5474 ha)

The Emily soils have a scattered distribution pattern across the southern part of the county. They occur on gently sloping ground moraine often along the flanks of drumlins where drainage is imperfect. As a consequence, they receive surface runoff from the higher land, and have saturated moisture conditions for a significant period of the year. This results in a relatively short effective growing season.

The dominant soil profile developed is classified as Gleyed Melanic Brunisol. The surface cultivated horizon is about 15 cm thick, very dark brown, friable loam. Soil reaction is neutral. The underlying Bm horizon is brown, 15-20 cm thick, mottled and friable. The C horizon is mottled gray, calcareous, moderately stony loam till.

The most common inclusions in areas of the Emily map unit include soils of the Otonabee and Lyons soil series, the former being well drained and the latter poorly drained soils on similar materials.

Soils of this map unit are well suited for the production of mixed hay, grain, ensilage corn and pasture crops. Tile drainage will greatly improve performance especially in wet seasons, and particularly for the production of grain corn.

Farmington Map Unit (9652 ha)

These soils do not occur in single large areas, but are found in all the townships below the Precambrian Shield. They have developed in thin deposits of glacial till overlying limestone bedrock, occurring within 30 cm of the surface.

The predominant profile of the map unit is the Farmington series, an Orthic Melanic Brunisol. The surface Ah horizon is about 8 cm thick, dark grayish brown in color and loam or sandy loam in texture. The brown Bm horizon is 15-25 cm thick, friable, loam or sandy loam. Limestone bedrock underlies the Bm horizon. Soil reaction is neutral to alkaline and drainage is variable depending upon landscape position and permeability of the underlying bedrock.

Minor inclusions in the Farmington map unit include soils of the Douro series where the glacial till is 30-60 cm thick, and Rockland where the bedrock occurs at a depth of less than 10 cm below the soil surface.

Areas of the Farmington map unit are uneconomical for agricultural crops due to the shallow soils, but have some value as pasture. They are poor forest soils due to rooting limitations resulting in severe windthrow losses.

Foxboro Map Unit (6413 ha)

These soils have a wide distribution in the county. They occur in river floodplains and in glacial spillway channels between the till drumlins across the southern part of the county. The topography ranges from nearly level to slightly depressional, and the soils are dominantly poorly drained.

The soil parent materials are calcareous, fine sands and silts that have been deposited in very slow moving water, or in shallow ponded basins. Shallow organic accumulations up to 30 cm in thickness have developed in some areas under reed or softwood vegetation. In areas under cultivation the layer of organic matter accumulation is thinner. Either accumulation of organic matter never developed, or it has been incorporated into the plow layer.

The dominant profile of the map unit is Foxboro series, an Orthic Humic Gleysol. The fine sandy loam or silt loam cultivated surface is about 20 cm thick, neutral and stone free. The subsoil is a grayish brown, mottled fine sandy loam or silt loam. Free carbonates are sometimes present in this horizon. The mottled, calcareous fine sand and silt material usually is encountered about 50 cm below the surface.

In some areas of the Foxboro map unit, soils of the Trent series may occur as minor inclusions where the soil drainage condition is somewhat improved.

Most areas of the Foxboro map unit are under cultivation and, although spring seeding is delayed by poor drainage, these soils produce good crops of hay and grain. Large depressional areas have water table levels at or near the surface most of the year, and are presently unsuited for agriculture, although their agricultural potential is good if drained. They are mostly under tree cover of cedar, balsam, white birch, elm, white ash and soft maple.

Franktown Map Unit (209 ha)

These soils have developed in thin deposits of glacial till less than 30 cm thick overlying limestone bedrock. They occur on nearly level landscapes in lower slope positions, or slightly depressional areas. Their drainage is imperfect.

The predominant soil of the map unit is the Franktown series, a Gleyed Melanic Brunisol. The surface Ah horizon is a very dark brown friable loam. It is underlain by a mottled, yellowish brown loam Bm horizon. This horizon is underlain by limestone bedrock.

In areas of the Franktown map unit, soils of the Farmington series may occur as minor inclusions where drainage conditions are somewhat improved. Soils of the Brooke series also may occur in association with Franktown soils where the drainage is poor.

The predominant use of these soils is for pasture with negligible amounts of cultivation for annual crops.

Galway Map Unit (453 ha)

The Galway map unit occurs in Galway and Cavendish townships in the northwestern part of the county. They are found in level and slightly depressional locations in bedrock landforms of crystalline limestone, syenite and hybrid granite gneiss. They are predominantly imperfectly drained.

The soil parent materials are alluvium derived from material weathered from the surrounding bedrock. The depth of soil over rock ranges from 30-100 cm over short distances.

The Galway series is classified as a Gleyed Dystric

Brunisol. The surface Ah horizon is black sandy loam, 8 cm thick, friable with numerous fine roots. The Bm horizon is yellowish brown sandy loam. This grades into a yellowish brown sandy loam with few prominent yellowish red mottles overlying the marble bedrock.

In areas mapped as the Galway map unit, soils of the St. Croix series may occur as minor inclusions where the drainage is poor.

The Galway soils are not suitable for agricultural uses, and most areas remain under a forest cover of softwoods.

Complex map units, including Galway, Tweed, Organic soils and Rockland, occur where the individual map units were inseparable at the scale and intensity of mapping employed. These are described in the following.

Galway-Organic Map Unit (713 ha)

This complex map unit occurs on the border of Galway and Cavendish townships. It is a relatively low area of imperfectly drained Galway soils intermixed with undifferentiated organic deposits and rock outcrop. The complex is fair to poor for forestry, but offers food and shelter for deer, beaver, etc.

Galway-Tweed-Organic Map Unit (923 ha)

This complex map unit occurs in the central part of Cavendish township. It consists of about 40% Galway soils and the remaining 60% is equally divided among the Tweed soils and numerous small organic bogs. The topography is undulating to rolling and there is a high incidence of rock outcrops. The dominant vegetation of the area consists of wet-tolerant species including both deciduous and coniferous types. The area has low potential for forest products and presents difficulties for machine operation. It provides food and lodging for wildlife including deer, beaver and waterfowl.

Granby Map Unit (1490 ha)

The Granby map unit consists dominantly of poorly drained soils. These soils are common across the southern part of the county. The topography is level to slightly depressional, and the soils are water saturated for considerable portions of the year. The soil parent material consists of well sorted, calcareous, medium sand.

The dominant soil profile of the map unit is Granby series, an Orthic Humic Gleysol. The cultivated surface horizon is friable, very dark brown sandy loam 15-20 cm thick. The Bg horizon is gray, mottled sand about 45 cm thick, with single grain structure. The parent material is calcareous, gray sand with yellowish brown mottles.

In areas of the Granby map unit, imperfectly drained soils of the Tecumseth series may occur as minor inclusions where slight undulations in the surface provide somewhat improved soil drainage. Conversely, in excessively wet depressional sites organic soils may be found.

Areas of Granby soils have limited agricultural potential. They are fair to poor soils for hay crops, and poorly suited to spring grains. If tile drainage is established they have potential for specialized crops such as corn, vegetables or sod. Problems can arise in maintaining the efficiency of drainage systems in these soils because the sandy materials tend to flow when wet, and plug drainage outlets.

Granby-Organic Map Unit (539 ha)

Complex map units of Granby and Organic soils occur in Galway township in the northwestern portion of the county near Crystal Lake. These are level to depressional landscapes of poorly drained sandy soils and very poorly drained undifferentiated organic soils. They have very limited agricultural potential. Cedar and other softwood vegetation in these areas provide shelter for deer and other wildlife.

Harney Map Unit (1960 ha)

The Harney map unit occurs in Dummer and Douro townships, on nearly level morainal plains often bordering organic deposits. As a consequence of their landscape position, the soils are poorly drained.

The dominant soil profile encounted in the Harney map unit is classified as an Orthic Humic Gleysol. The water table is at or near the surface for most of the year and, as a consequence, the Harney soil series has a thick, dark colored surface containing large amounts of organic matter; in places a reed or woody peat layer up to 30 cm in thickness is present. The subsoil is stony, gray and strongly mottled. The soil parent material is a very stony, calcareous glacial till. The depth to bedrock varies between 30 and 60 cm.

In areas of the Harney map unit, soils of the Rockcroft series may occur as minor inclusions where the drainage is somewhat improved. Conversely, small depressional areas may be present in the landscape where drainage is severely impeded such that organic soils have developed.

Areas of Harney soils have very limited use for agriculture. Occasionally, they are used for unimproved pasture, but most remain under a swamp type of vegetation.

Complex map units of Harney and Rockcroft soils are described below.

Harney-Rockcroft Map Unit (2070 ha)

The largest hectarage of this map unit is in Dummer township, the remainder being in Douro township. The map unit consists of imperfect and poorly drained members of the Dummer catena, namely the Harney and Rockcroft series. The topography is level to very gently sloping, and the soils are very stony. They are generally unsuitable for cultivation, and are used for grazing or remain as woodlots.

Hasty Map Unit (97 ha)

The dominant soils of this map unit consist of well-decomposed organic materials derived from the plant remains of grasses, mosses, rushes, sedges and wood, which extend to a depth of approximately 160 cm. These soils are neutral to mildly alkaline in reaction. They are very poorly drained with a water table that is usually at or near the surface. Their classification is Typic Humisol.

With drainage and clearing of vegetation these soils have good potential for agricultural use, such as vegetable production. They are considered to have slight limitations because of depth of the organic materials. Areas of this map unit are not suited to engineering or recreational uses because of their high water tables or flooded conditions, and the unstable nature of the organic materials.

Kenabeek Map Unit (2400 ha)

The Kenabeek soils have developed on noncalcareous sandy outwash within the Precambrian Shield area. The topography is depressional and these areas receive runoff water from surrounding land. The soils are water saturated for many months of the year.

The most common profile of the Kenabeek map unit is the Kenabeek series, an Orthic Humic Gleysol. The surface Ah horizon is a very dark brown sandy loam about 10 cm thick. It is underlain by gleyed and mottled subhorizons grading into mottled, yellowish brown non-calcareous sand parent material at about 50 cm below the surface.

In areas of the Kenabeek map unit, soils of the Mallard

series and organic soils may occur as minor inclusions. The Mallard soils are similar in parent material, however, they have somewhat improved drainage in comparison to Kenabeek soils. Conversely, undifferentiated organic soils occur in very poorly drained locations which have permitted an increased thickness of organic materials to accumulate.

Primarily because of the prolonged wet conditions of the Kenabeek map unit, these areas are not used for agriculture, but remain under forest cover.

Several areas exist where soils of the Kenabeek map unit are complexed with other map units. These generally are poorly accessible areas where the intensity of mapping did not permit separation of the individual map units. These are given below.

Kenabeek-Mallard Map Unit (381 ha)

This map unit occurs in Burleigh township near Jack Lake. It is predominantly a low-lying, nearly level area of sandy textured, poorly drained soils, but is broken with occasional imperfectly drained gently undulating uplands, and numerous bedrock exposures. The area is suitable for moisture-tolerant tree species.

Kenabeek-Organic Map Unit (102 ha)

This map unit occurs in Harvey township and comprises a level area of poorly drained sandy soils and organic soils in depressional sites. Because of the excessively wet conditions the map unit has a low potential for forestry use.

Long Map Unit (310 ha)

These soils are mapped in Asphodel and Dummer townships. They have developed on moderately stony to stony, calcareous loam till deposits overlying limestone bedrock at depths of 30-75 cm. The landform is a smooth, gently sloping, bedrock controlled morainal plain. The soils are well drained.

The most common profile of the map unit is Long series, an Orthic Melanic Brunisol. The surface Ah horizon is a very dark brown friable loam, 10 cm thick and neutral in reaction. It is underlain by a brown loam Bm horizon, 20 cm thick, friable and stony. The soil parent material is light brownish gray, calcareous, stony loam till, which overlies the limestone bedrock.

In areas of the Long map unit, soils of the Farmington or Dummer series may occur as minor inclusions. The Farmington soils occur in situations where the bedrock is shallower than 30 cm, and the Dummer soils where depth to bedrock exceeds 100 cm from the surface.

Most areas of this map unit are under cultivation, generally for hay and grain production. The lack of soil depth limits agricultural use resulting in very poor yields in droughty summers. These areas also have a stoniness problem; flaggy limestone fragments periodically are brought to the surface by plowing, and necessitate constant stone removal.

Loretto Map Unit (1600 ha)

The dominant soils of this map unit consist of well-decomposed organic materials derived from sedges, mosses and wood. The organic layer is shallow (approximately 75 cm) and is underlain by a layer of silt loam. The pH of these soils ranges from strongly acid to neutral. They are very poorly drained with water table levels that are usually at or near the surface for much of the year. The soils are classified as Terric Humisols.

In areas of the Loretto map unit, soils of the Sheldrake series may occur as minor inclusions where the underlying mineral material is of finer texture. Poorly drained mineral soils such as the Harney series also could be found in areas of this map unit.

Soils of the Loretto map unit are severly limited in their capability to support agricultural crops because of the shallow organic layer, and large-scale reclamation is not feasible. They also are poorly suited or unsuitable for engineering and recreational uses because of their high water table, unstable material and poor trafficability properties.

Lyons Map Unit (5910 ha)

The Lyons soils are poorly drained and occur in depressional areas, often adjacent to the Otonabee and Bondhead map units. They have developed on stony, calcareous glacial till on the swales between drumlins or morainic ridges. Since these soils are often flooded or saturated with water for extended periods, they develop a thick, dark surface horizon containing large amounts of organic matter. Indeed those subject to flooding may develop a woody organic layer up to 30 cm thick. The subsoil is gray and mottled, and lacks the color and distinct horizon development of better drained soils.

The cultivated surface layer is about 20 cm thick. It is very dark grayish brown and friable. It is neutral to alkaline in reaction. Underlying the surface layer is a gray, mottled, stony, loamy, Bg horizon, neutral to alkaline in reaction and quite friable. The gray calcareous till parent material occurring at about 50 cm in depth is often quite stony. This soil is classified as an Orthic Humic Gleysol.

Minor inclusions of other soils may occur in areas of the Lyons map unit. The most common ones include soils of the Bondhead, Otonabee and Emily series which are catenary associates of the Lyons series, differing as a result of their improved drainage characteristics.

With drainage improvement, Lyons soils are suitable for a narrow range of crops, including hay and oats. The soils that are flooded for much of the year are suitable only for pasture. Some of the Lyons soils are not suitable for tile drainage due to the very stony and bouldery parent material. Most of the land areas consisting of these soils fit the description of swamps and are presently supporting a mixed tree cover of cedar, balsam, elm, etc.

Mallard Map Unit (1490 ha)

The largest hectarages of these soils are found in Belmont, Burleigh, Chandos and Anstruther townships. The topography is level to slightly depressional. They are dominantly imperfectly drained soils developed on noncalcareous sandy outwash parent material.

The most common profile in the map unit is Mallard series, a Gleyed Humo-Ferric Podzol. Its surface Ah Horizon is black, 5 cm thick with weak granular structure that is underlain by a loose light gray sand Ae horizon about 8 cm thick. The upper Bf horizon is reddish brown with accumulations of both iron and humus. This sandy loam horizon is only 5-8 cm thick. It is underlain by strongly mottled reddish brown and brown horizons that grade into the light yellowish brown parent material at about 70 cm below the surface. The solum is acid in reaction with pH values of 3.9 in the surface to 5.8 in the lower B horizon.

In areas of the Mallard map unit, soils of the Wendigo and Kenabeek series may occur as minor inclusions. These soils are on similar parent materials, but differ in drainage characteristics compared to the Mallard soils.

The soils of this map unit are mostly under forest cover, and they are capable of supporting a fast growth of conifers. Except for some grazing, they are not used for agriculture.

Compound map units occur where the Mallard map unit and another unit are combined to describe the range in soil and landscape characteristics which exist. These are discussed following.

Mallard-Kenabeek Map Unit (344 ha)

An area of this map unit occurs in the southeastern portion of Anstruther township. It includes the imperfect and poorly drained members of the Wendigo catena on level to a very gently undulating topography. These soils are primarily used for forestry; they are considered to have fair capability for production of softwoods.

Mallard-Marsh Map Unit (1116 ha)

Areas of this map unit occur in Galway township comprising gently undulating landscapes of imperfectly drained Mallard soils on the upland and marsh conditions in depressional areas surrounding small lakes in the bedrock controlled landscape. Undifferentiated organic soils also may occur as minor inclusions in association with the Marsh map unit.

These areas are considered to be fair to poor in terms of forest capability.

Mallard-Monteagle-Organic Map Unit (884 ha)

An area of this map unit occurs in Cavendish township comprising the imperfectly drained Mallard soils in the swales of Precambrian bedrock uplands having a shallow cover of glacial till (Monteagle soils). In depressional areas, undifferentiated organic soils may occur in lesser amounts.

These areas are almost entirely under forest vegetation although they are capable of only fair to poor production of adapted softwood species.

Methuen Map Unit (11935 ha)

The Methuen map unit occurs predominantly in Methuen township. The granite gneiss from which it has developed has been described by Hewitt (6) as a medium grained grano-blastic rock which is weathered in place to a yellowish-brown feldspathic gravel. Biotite is the main dark mineral and albite or soda oligoclase and microcline are the feldspars. These soils occur on a nearly level bedrock plain landform between the granitic bedrock uplands and bogs in low areas.

The most common profile in the map unit is Methuen series, an Orthic Dystric Brunisol. The surface Ah horizon is black, sandy loam and about 2 cm thick (Figure 18). It is underlain by a reddish-brown Bm horizon about 10 cm thick, grading through yellowish-red and light brown sand subhorizons to the weathered granite gneiss at about 30 cm. Hard bedrock is encountered at 40 cm from the surface. Soil reaction is acid throughout the profile.

Soil development can be quite variable within areas of the Methuen map unit. Under a protective forest cover, soil development often is characteristic of Humo-Ferric Podzols with thin eluvial Ae horizons and reddish-colored Bf horizons. However, on excessively drained upland sites the profile development can be minimal, resembling that of the Orthic Regosol subgroup. Areas of rockland, and undifferentiated organic soils are of common occurrence as minor inclusions in the Methuen map unit.

Areas of the Methuen map unit predominantly remain under forest cover. Large, partly burned pine stumps provide evidence of a former pine forest. Some replanting of pine has been carried out, and productivity studies have indicated a site index of 53 at 50 years of age. These soils are not considered suitable for agricultural use.

Methuen soils also occur in compound map units with organic soils and rockland. These are discussed below.

Methuen-Organic Map Unit (1074 ha)

Areas of this map unit occur in Methuen township in undulating landscapes where the Methuen soils occupy well to excessively drained upland ridges, with undifferentiated organic soils in deep, bedrock controlled depressions.

Methuen-Rockland-Organic Map Unit (793 ha)

This map unit occurs in Methuen township on undulating to rolling Precambrian landscapes where Methuen soils dominate, however, there are significant occurrences of Rockland, generally on the more steeply sloping uplands, and undifferentiated organic soils in depressional areas.

These map units are considered to be fair to poor in capability for forestry use.

Minden Map Unit (115 ha)

The dominant soils of this map unit are developed from organic materials originating predominantly from sedges, mosses and wood. The organic materials are mostly well decomposed and form a layer approximately 160 cm thick. The soils range from strongly acid to neutral in reaction. They are very poorly drained with water table levels at or near the surface during a large percentage of the year. The classification of these soils is Typic Humisol.

In areas of Minden map unit, soils of the Lyons series may occur as minor inclusions. These exist in poorly drained sites where the thickness of the organic layer is less than 40 cm and is underlain by stony loam glacial till.

The presence of woody material in the organic layer and occasionally shallow depth contribute to minor limitations in the use of these soils for agriculture. Woody layers interfere with cultivation and ditching during drainage operations. Otherwise, they can be considered good soils for agricultural use once clearing, drainage and development have taken place. They are unsuitable for engineering or recreational uses in their natural condition as a result of their high water table, unstable materials and poor trafficability.

Monteagle Map Unit (11 940 ha)

The Monteagle map unit occurs in the Precambrian Shield area of north Peterborough County. The largest hectarages are found in Anstruther, Cavendish, Galway, Burleigh and Methuen townships. The landform is controlled by bedrock and accordingly varies from undulating slopes of low relief to a complex hilly morainal landform. The soils are well to excessively drained. They are derived from stony, noncalcareous till parent materials, largely of granitic origin. The deposit has a great range in depth.

The natural vegetation of the Monteagle soils is mixed, deciduous and coniferous trees including maple, beech, yellow birch, hemlock, red and white pine.

The dominant soil in the map unit is Monteagle sandy loam, classified as an Orthic Humo-Ferric Podzol, but the degree of profile development is variable and may depend considerably on the type of tree cover, both past and present. Under coniferous trees the soil profile consists of L, F and H organic layers reflecting the degree of decomposition of the needles. The organic layer is underlain by a gray Ae horizon about 5 cm thick. The Ae is strongly leached and has a single grain structure. The underlying Bf horizon is dark reddish-brown, has friable granular structure and abundant fine roots. The Bf color gradually fades with depth. The olive colored, stony parent material (C horizon) is encountered at a depth of 45-50 cm below the surface.

In areas of the Monteagle map unit, soils of the Chandos, Methuen and Wemyss series, as well as Rockland and organic soils, may occur as minor inclusions.

The stony Monteagle soils never should have been used for agriculture, but are good soils for the production of either hardwoods or pine. They do not lend themselves easily to machine planting because of stones and steep slopes. When trees are

harvested sufficient numbers of desirable trees should be left for natural regeneration.

Site index determinations for natural regenerated red pine ranged between 15-18 cm at 50 years of age. This value may include some years of suppression. Site index values are not known for hardwoods, but the levels of exchangeable P, K, Ca and Mg are adequate for good hardwood growth.

Monteagle soils occur in compound map units with a number of soils as well as Rockland. These are described below.

Monteagle-Chandos-Rockland Map Unit (447 ha)

Areas of this compound map unit occur in Burleigh township on moderately rolling landscapes in which Monteagle soils are dominant, but significant areas of shallow sandy outwash occur overlying bedrock (Chandos soils) as well as bedrock outcrops (Rockland).

Monteagle-Wemyss Map Unit (741 ha)

An area of this map unit occurs in Cavendish township on gently undulating topography where Monteagle soils are dominant, but there are significant areas of associated imperfectly drained Wemyss soils on similar parent materials.

Monteagle-Wendigo Map Unit (495 ha)

This map unit occurs quite extensively in Methuen township on gently to moderately undulating, irregular topography in which the Monteagle soils are dominant, but there are significant areas of deep, excessively drained soils developed from sandy outwash of Precambrian origin.

The compound map units described above are lower in forest capability in comparison to areas of the Monteagle map unit. However, if cedar swamps occur within the map unit they are of superior value as wildlife habitats.

Monteagle-Mallard Map Unit (328 ha)

This compound map unit has been shown in Galway township. It describes an area of gently undulating topography in which the Monteagle soils dominate, however, there are significant occurrences of imperfectly drained Mallard soils derived from sandy Precambrian outwash.

Monteagle-Methuen Map Unit (304 ha)

An area of this map unit occurs in Methuen township on gently undulating topography in which the Monteagle soils are dominant, but there also are significant areas of Methuen soils which are shallow soils overlying bedrock developed from weathering of the granitic Precambrian bedrock. Exposures of the Precambrian bedrock also can be found in areas of this compound map unit.

Monteagle-Rockland-Organic Map Unit (2419 ha)

This compound map unit is used to describe extensive areas throughout the northern regions of the county in Anstruther, Methuen, Chandos, Cavendish, Burleigh, Harvey and Galway townships. The areas characteristically consist of irregular topography, moderately rolling to hilly, with Monteagle soils dominating, however, with significant occurrences of Rockland and undifferentiated organic soils. The proportions of Rockland and Organic soils may vary in different areas; however, they are consistently subdominant in their occurrence compared to the Monteagle soils.

Navan Map Unit (2350 ha)

The dominant soils of this map unit have developed from the plant remains of grasses, sedges, mosses, rushes and wood. These organic materials are dominantly well decomposed and form a layer approximately 10 cm thick. This layer is immediately underlain by limestone bedrock. The organic soil is strongly acid to neutral in reaction, and is very poorly drained. Water table levels are at or near the surface during a large percentage of the year. The classification for this dominant soil of the map unit is Typic Humisol, shallow lithic phase.

In areas of the Navan map unit, soils of the Minden series may occur as minor inclusions. These exist where the thickness of the organic layer increases to the point that bedrock is not encountered within 160 cm of the surface. Soils of the Brooke series also may occur as inclusions where the organic layer thins to less than 40 cm over the limestone bedrock.

The soils of the Navan map unit have several limitations which severely restrict their use for agricultural crops, the major limitation being the shallow depth to bedrock. Because of the severity of limitations, large-scale reclamation is not feasible in areas of this map unit. The soils also are poorly suited to engineering and recreational uses in their natural state, because of their high water table and unstable material.

Otonabee Map Unit (44 098 ha)

The Otanabee soils occupy a very large area across the southern half of the county. The soil material is calcareous glacial till. The landform is strongly drumlinized especially east of the Otonabee River. Drumlins in this area are long and narrow, aligned in a northeast-southwest orientation, often separated by glacial spillways containing alluvial materials or organic deposits, or they were scoured to bedrock. There are fewer drumlins on the west side of the river and the majority of these are oval in shape. Much of the Otonabee soils in Smith and Ennismore townships have developed on ground moraine, which has low relief with complex slopes, and which may be stony in some areas.

The Otonabee soils are well drained. They are classified as Orthic Melanic Brunisols. However, some degradation indicated by eluviation and slight transfer of clay has been noted in these soils.

In the uncultivated state these soils (Figure 19) have a thick, dark, organic-enriched Ah horizon of loam or sandy loam texture. This horizon has a friable, granular structure and is 8-10 cm thick. The Bm horizon is 20 cm thick, brown and friable. The thin solum is a prominent characteristic of this soil, as compared with similar textured Gray Brown Luvisols such as Bondhead soils.

In areas of the Otonabee map unit soils of the Bondhead, Granby, Foxboro or Washago series may occur as minor inclusions. The Bondhead soils have a deeper solum and luvisolic characteristics indicative of stronger development. Granby, Foxboro or Washago series may occur in poorly drained spillway channels between the dominating drumlin features.

The major land use in areas of this map unit is agricultural to support a livestock industry including mainly beef breeds; dairying is of lesser importance. They are good soils for the production of hay and grain crops including corn. However, good management practices are imperative of these soils. Loss of topsoil by water erosion is a real concern on soils with thin sola and moderate to steep slopes. Intertilled crops should be restricted to fields with nearly level or gentle slopes unless strip cropping methods are introduced. The penalty for not doing so is loss of topsoil and greatly reduced yields.

Pefferlaw Map Unit (518 ha)

The dominant soils of this map unit have developed from the

plant remains of mosses, grasses, sedges, rushes and wood. These materials are well decomposed and form an organic layer that reaches a depth of approximately 100 cm. A slightly decomposed wood layer greater than 8 cm thick is also evident in the top 50 cm. The organic layers are underlain by sandy clay, and both the organic and mineral layers are strongly acid to neutral in reaction. The soils are very poorly drained with water table levels that are at or near the surface throughout the year. These soils are classified as Terric Humisol.

Soils of the Kenabeek series may occur in areas of the Pefferlaw map unit as minor inclusions. These soils exist where the organic layer becomes thinner than 40 cm, and is underlain by sandy texture outwash material.

The soils of this map unit have severe limitations due to shallowness that restrict agricultural use. Large-scale reclamation is not feasible. They are also unsuited or poorly suited to engineering or recreational uses because of the high water table conditions, the occurrence of flooding, and the unstable organic materials.

Rockcroft Map Unit (1958 ha)

The Rockcroft map unit occurs mostly in Dummer township and comprises the imperfectly drained member of the Dummer catena. They are developed on parent materials which are a very stony, calcareous loam till. Limestone bedrock underlies the soil parent material generally at depths within the control section. Profile development in the Rockcroft soils has been less pronounced than on the well-drained Dummer soil associate. The dominant soils in the map unit are characterized by the Rockcroft series, a Gleyed Melanic Brunisol, shallow lithic phase.

A Ah horizon is very dark grayish brown sandy loam approximately 10 cm thick. The underlying Bmg horizon is mottled, pale brown loam, 15-20 cm thick, and overlies the mottled, grayish brown, very stony loam, calcareous till parent material. Bedrock occurs between 30 and 60 cm from the surface.

The Rockcroft soils often occur as minor inclusions in areas of the Dummer map unit, however, they also occur in larger tracts where they are the dominant soils. Soils of the Harney series, a poorly drained soil associate, may occur in areas of the Rockcroft map unit as minor inclusions.

Rockcroft soils occur in compound map units with other soil series. These are as follows:

Rockcroft-Dummer Map Unit (970 ha)

Areas of this compound map unit occur in Dummer township on gently sloping to moderately rolling topography. The Rockcroft component of the complex is more variable than normally expected for this series with depth to bedrock ranging up to 100 cm. The associated Dummer soils occur where depth to bedrock exceeds this limit.

The excessively stony nature of areas of this map unit severely restricts their use for agriculture and much of it remains in woodlot.

Rockcroft-Harney Map Unit (390 ha)

Areas of this compound map unit occur in Dummer township on very gently undulating topography, often adjacent to stream channels where the poorly drained Harney soils are present in depressional sites in the floodplain.

These complex soil landscapes have little potential for either agricultural or forestry uses.

Rockcroft-Organic Map Unit (87 ha)

Small hectarages of this map unit occur in Dummer township on very gently undulating topography where undifferentiated organic soils occupy small depressions in the landscape.

These soils have little potential for agricultural or forestry use, but have some value as wildlife habitats.

Rockland Map Unit (3885 ha)

This map unit occurs extensively throughout the northern portion of the county particularly in Anstruther, Cavendish, Harvey and Galway townships. It encompasses a wide range of conditions throughout the Precambrian Shield landscape including very shallow soils overlying bedrock and barren rock outcrops. The topography is irregular, moderately rolling to hilly. Soil depth usually is greatest in the lower slope positions, and organic soils often occur in depressions within the bedrock. Where the thickness of unconsolidated material permits appreciable soil profile development to occur, the soils have characteristics of the Podzolic, Brunisolic or Regosolic Orders.

In some areas there are significant occurrences of other soils in the Rockland map unit which necessitate the use of compound map units to describe the range of soil conditions encountered. These are described as follows:

Rockland-Monteagle Map Unit (2505 ha)

Areas of this compound map unit occur in Burleigh and Harvey townships. Deep soils developed on stony loam glacial till of Precambrian origin typical of the Monteagle series occupy significant areas, usually on middle or lower slopes in the landscape. Areas of this unit have low capability for agriculture and forestry, and also low carrying capacity for wildlife.

Rockland-Organic Map Unit (19 637 ha)

This compound map unit is used to delineate extensive areas in Anstruther, Harvey, Burleigh and Galway townships. Undifferentiated organic soils are found in significant proportions in depressions in the Precambrian landscape, which is predominantly very shallow soils and rock outcrop.

Areas of this map unit have low capability for agriculture, forestry and wildlife.

Sheldrake Map Unit (1390 ha)

The dominant soils of this map unit have developed from organic material derived from moss, grass, sedges, reeds, rushes and/or wood. The organic matter is dominantly well decomposed and is strongly acid to neutral in reaction. The organic layer is shallow and underlain by a sandy clay loam to clay mineral layer. The soils are very poorly drained with water table levels at or near the surface throughout much of the year.

A layer of slightly decomposed wood greater than 8 cm thick is found in the middle tier of these soils. The taxonomic classification for a representative series within this map unit is Terric Humisol.

In areas of the Sheldrake map unit, soils of the Harney series may occur as minor inclusions. These are found where the organic material becomes shallower, and the soils are predominantly derived from mineral material of stony, glacial till origin.

Soils of this map unit have severe limitations due to their shallow depth and wetness that restrict their use for agricultural crops. On drainage they have some potential for forage production. Large-scale reclamation and development of these organic soils for vegetable production are not feasible. Also, the soils are unsuited or poorly suited to engineering or recreational use because of their high water table condition and unstable organic material which contributes to poor trafficability.

Simcoe Map Unit (1391 ha)

The predominant occurrence of these soils is in Otonabee township. They are poorly drained soils developed from calcareous lacustrine clay on very gently sloping to level topography.

The dominant profile of the map unit is the Simcoe series, an Orthic Humic Gleysol. The cultivated surface horizon is very dark gray silty clay loam, approximately 20 cm thick. The subsoil is grayish with prominent brownish-colored mottles, medium blocky structure, firm and hard consistency. This horizon is about 45 cm thick, and is underlain by grayish-brown, calcareous, lacustrine clay.

Areas of this map unit occur within the drumlinized landforms of Otonabee township where lacustrine materials are deposited at the base of drumlinized hills. Soils of the Solmesville and Bondhead series may occur as minor inclusions in these areas where the lacustrine deposit is thinner and eventually disappears.

Most areas of the Simcoe map unit are used for agriculture. Because of their poor drainage they are "late" soils and are used primarily for hay and grain crops. With tile drainage they are well suited to a wider range of crops including grain corn.

Solmesville Map Unit (696 ha)

Solmesville soils occur in Otonabee, North Monaghan and Ennismore townships. Areas in which these soils occur are low-lying ground moraine inundated during glacial times by lake water. The lakes were of short duration and till materials were capped by 30-60 cm of lacustrine silty clay loam or clay loam. The solum is stone free and is underlain by stony loam glacial till. The resulting topography is very gently sloping and the soils are imperfectly drained.

The dominant soil profile in the map unit is the Solmesville series, a Gleyed Gray Brown Luvisol. The cultivated surface horizon is approximately 15 cm thick, very dark grayish brown and of neutral reaction. The underlying Aegj horizon is grayish brown, about 10 cm thick and has strong brown mottles. The Btg horizon is 10 cm thick, very dark brown, mottled and firm. The underlying glacial till is calcareous, moderately stony loam.

In areas of the Solmesville map unit soils of the Simcoe, Lyons or Otonabee series may occur as minor inclusions. The Simcoe soils are present where the lacustrine material constitutes the entire control section, whereas the Lyons and Otonabee soils exist where the underlying loam glacial till material dominates.

The Solmesville soils are well suited for common field crops. Spring seeding may be delayed somewhat in comparison to their well-drained associates, but they do produce good hay and grain crops including silage corn.

St. Croix Map Unit (76 ha)

The predominant occurrence of St. Croix soils is in Galway and Cavendish townships. They are developed on alluvial parent materials of fine sand and silt textures overlying marble bedrock. They occur in depressional areas usually in association with glacial spillway channels, and are poorly drained.

The dominant soil profile of the map unit is the St. Croix series, classified as an Orthic Gleysol. The surface Ah horizon is approximately 3 cm thick, and is a very dark gray sandy loam or silt loam with granular structure and friable consistency. It is underlain by a dark gray, mottled Bmg horizon 40-45 cm thick that is a weak granular structure and friable. The parent material, Cg horizon, is gray sandy loam, sometimes stratified with layers of silt loam. This is underlain by marble bedrock.

In areas of the St. Croix map unit, soils of the Galway and Tweed series occur as well as Rockland. A compound map unit comprised of these soils is as follows:

St. Croix-Tweed-Galway Map Unit (1078 ha)

This map unit occurs in Cavendish township near St. Croix Lake. The soils are underlain by marble bedrock with numerous granite rock outcrops. The topography is complex with short slopes, but the macro relief of the area is gently sloping. The map unit is bordered by the St. Croix River. The entire area is under a mixed forest cover with hemlock, spruce, maple and elm in the low areas. The Tweed soils support a mixed stand of maple, oak and red and white pine.

A great variety of wildlife, including bear, deer, beaver, numerous small animal species and partridge, is found in these areas due to the abundant and varied nature of the vegetation. The soils are not suited to agricultural use, and improvement practices are not feasible.

St. Peters Map Unit (260 ha)

The St. Peters soils have developed in noncalcareous, moderately sorted gravel deposits generally occurring within the Precambrian Shield area. An exception is an area lying between Catchawana and Clear Lakes. This gravel was deposited on limestone bedrock by glacial meltwater flowing through a spillway between the two lakes.

The topography associated with the St. Peters soils varies from undulating gentle slopes to moderate slopes. The soils are well drained to excessively drained.

The dominant profile of the map unit is the St. Peters series, an Orthic Humo-Ferric Podzol. The podzol Ae horizon is 3-5 cm thick, light gray in color, of loose consistency and sand texture. The Bf horizon is yellowish brown loamy sand containing dark reddish brown iron concretions. This horizon is about 25 cm thick and underlain by multicolored gravel. Soil reaction is between 5.3 and 5.5 throughout the profile.

In areas of the St. Peters map unit, soils of the Wendigo series may occur as minor inclusions where the soil materials are predominantly of sandy texture.

The St. Peters soils have severe limitations for agricultural use because of fertility and moisture deficiency limitations. In some cases, they were used for agriculture in the past, but have since been abandoned and planted to pine forest. Other areas have been utilized by the construction industry as a source of aggregate material.

Tallon Map Unit (162 ha)

The dominant soils of this map unit have developed from the plant remains of mosses, grasses, rushes, sedges, reeds and/or wood. This organic material is partially to well decomposed, shallow and immediately underlain by a fine sand to silt loam mineral layer. Both mineral and organic layers are acid to neutral in reaction. The soils are very poorly drained with water table levels at or near the surface during much of the year. They are classified as Terric Mesisols.

Soils of the Kenabeek and Coates series may occur in areas of the Tallon map unit as minor inclusions. The Kenabeek soils are present where the depth of organic material becomes shallower and the sandy mineral material is within 40 cm of the surface. On the other hand, Coates soils occur where the organic layer exceeds the depth of the control section.

Soils of the Tallon map unit have limitations which severly restrict agricultural production. They restrict the range of crops that can be successfully grown, and the soil often requires special development and management practices. Further, reclamation and management costs are excessive. The soils are not well suited for engineering and recreational uses because of high water table conditions, unstable organic materials and poor trafficability.

Tecumseth Map Unit (375 ha)

The Tecumseth map unit occurs in Harvey and Burleigh townships on calcareous, sandy outwash parent materials deposited by rivers or in glacial lakes. The topography is very gently sloping, and most of the soils are imperfectly drained.

The dominant soil profile of the map unit is the Tecumseth series, a Gleyed Brunisolic Gray Brown Luvisol. The cultivated surface horizon is a friable, granular, very dark grayish brown sandy loam 15 cm thick. It is underlain by a yellowish brown loamy sand Bm horizon that grades to a pale brown, mottled sand Aegj horizon. The underlying sandy loam Bt is a brown, mottled, weakly developed horizon 5-10 cm thick. The parent material is brownish, calcareous loamy sand.

Soils of the Brinco and Granby series may occur in areas of the Tecumseth map unit as minor inclusions. The Brinco soils are present on landscapes of better drainage conditions than the Tecumseth soils, whereas the Granby soils occur on wetter sites on these same parent materials.

Some of the Tecumseth soils are cultivated and produce fair crops of hay and spring grain. Low fertility levels are common, but productivity can be improved by applications of farmyard manure and other fertilizer supplements. These soils are suitable for the production of sweet corn and vegetables, and have the potential to produce fresh vegetables required by the summer population of campers and cottagers in the area.

Tioga Map Unit (1765 ha)

The Tioga soils are mapped primarily in Belmont and North Monaghan townships with smaller hectarages in Otonabee and Asphodel townships. They are formed on weakly calcareous, sandy glaciofluvial outwash, which is overlain by 60-90 cm of sandy material of Precambrian origin. The topography of the map unit is smooth gently sloping, and the soils are well drained.

The dominant soil profile of the map unit is the Tioga series, a Brunisolic Gray Brown Luvisol. Only the Tioga sandy loam type is mapped in the county. The surface Ah horizon is 3-5 cm thick, very dark brown, friable sandy loam. The Bm horizon is reddish brown, sandy loam, 13-15 cm thick. The underlying Ae horizon is light yellowish brown, 25-30 cm thick. It overlies a reddish brown, friable Bt horizon. The parent material is weakly calcareous, yellowish brown sand.

In areas of the Tioga map unit, soils of the Tecumseth and Granby series may occur as minor inclusions. The Tecumseth soils occur on imperfectly drained sites within these landscapes, and Granby soils at poorly drained locations on these same parent materials.

These soils, like the Brinco soils, have a low natural fertility and are susceptible to drought. If these conditions are corrected they are fair soils capable of growing a wide variety of field crops, small fruits and vegetables. They require liming for hay crops such as alfalfa and clover.

Trent Map Unit (1057 ha)

These soils are found in alluvial basins in North Monaghan, Asphodel, Belmont and Otonabee townships. They have developed in calcareous fine sands and silt deposits in floodplains of the Otonabee and Trent Rivers. The topography is very gently sloping, and the soils are imperfectly drained.

The dominant profile of the map unit is Trent series, a Gleyed Brunisolic Gray Brown Luvisol. The cultivated horizon is very dark grayish brown, fine sandy loam or silt loam and 15 cm thick. Soil reaction is about neutral. The upper portion of the Ae horizon is brownish yellow, 5-10 cm thick and grades into the mottled grayish brown lower Ae horizon. The Bt horizon is about 10 cm thick overlying the calcareous fine sandy loam or silt loam parent material.

In areas of the Trent map unit, soils of the Foxboro series may occur as minor inclusions. These soils are present at wetter sites where drainage is poor.

The Trent soils are good agricultural soils, and are used both in mixed farming operations, and for specialized crops such as vegetables and small fruits. They do not have a high natural fertility and require supplement fertilizers for maximum yields. Some areas have been used for continous grain corn production. This practice should be restricted to only the level fields since the soil materials tend to be highly erodible on sloping land.

Tweed Map Unit (22 900 ha)

The Tweed soils occupy extensive areas throughout the northern townships in the Precambrian Shield area. They have developed in the residuum of weathered marble bedrock (Figure 20). The marble has been described by Hewitt (6) as "medium to fine grained white to gray crystalline limestone with fine grained mica and argillaceous impurities"

The topography ranges from gently undulating to moderately sloping. The depth of soil ranges from nearly zero on excessively drained knolls to 30-45 cm in shallow basins where more water is available for leaching processes.

The predominant profile of the map unit is Tweed series, an Orthic Melanic Brunisol. The surface Ah horizon is a dark reddish brown sandy loam, with a friable, greasy consistency containing a high proportion of fecal pellets. This is underlain by a reddish brown Bm horizon 15-20 cm thick overlying crumbling marble. Firm bedrock is encountered at 30-50 cm in the deeper locations. Weathering of the marble has occurred vertically downward in mica-rich bands, the weathering surface appearing as a series of vertical parallel plates. The plates become thin and the space between plates wider where solution has increased, and disappear in the upper 30 cm of soil in the more moist locations. This pattern of weathering provides root feeding zones and firm anchorage for trees.

Within areas of the Tweed map unit, some soils formed from the marble bedrock have developed characteristics of the Orthic Dystric Brunisol subgroup, which differ from the typical Tweed soils; they have a very thin Ah horizon and some evidence of soil degradation (eluviation and illuviation) in the subsoil horizons. These soils occur as minor inclusions and have not been given series names.

Minor inclusions of rock outcrop also are common within the Tweed map unit. There are a number of compound map units in which Tweed soils occur along with other map units. The associated soils include Balmer, Chandos, Galway, Mallard and undifferentiated Organic soils. These compound map units are described below.

Tweed-Balmer Map Unit (240 ha)

This map unit occurs in Chandos and Methuen townships. The subdominant Balmer soils occur where the parent material is stony, loamy sand glacial till of Precambrian origin. In areas of this map unit there also is a high incidence of outcropping bedrock.

Tweed-Chandos Map Unit (1087 ha)

Areas of this map unit occur in Burleigh township north of Stony Lake. The Chandos soils are subdominant and occur where well-drained soils on sandy outwash parent materials overlie the marble bedrock. Outcropping bedrock occurs in this map unit as a minor component.

Tweed-Galway Map Unit (777 ha)

This map unit occurs in Burleigh township north of Stony Lake. The Galway soils are subdominant in this map unit occurring

where non-calcareous loamy textured alluvium overlies the Precambrian marble under imperfectly drained conditions.

Tweed-Mallard-Organic Map Unit (3206 ha)

Map units comprised dominantly of Tweed soils with subdominant inclusions of either Mallard soils or undifferentiated organics, or both in combination, occur in Burleigh and Galway townships. The Mallard soils occur on deep, non-calcareous sandy outwash parent materials with good to excessive drainage, whereas undifferentiated organic soils occupy very poorly drained sites in the Precambrian landscape which have deep accumulation of organic materials.

In areas of the Tweed map unit, mixed forests containing both hardwoods and conifers commonly occur. In some areas red pine have become dominant with a few white pine coexisting. The site index for red pine is 55 at 50 years of age. Forest capability depends upon the depth of soil overlying bedrock, and varies significantly throughout the map unit. The Tweed-Balmer, Tweed-Chandos and Tweed-Mallard areas are somewhat better for forestry use than the others which possess poorly drained soils. Often tree cover is sparse, however, grass and understory vegetation provide good browse for deer.

Uhthoff Map Unit (2100 ha)

The dominant soils of this map unit have developed from organic materials derived from sedges, rushes, reeds, grass and wood. The materials are well decomposed and immediately underlain by bedrock within 40-100 cm of the surface. The pH of the soils ranges from strongly acid to neutral. They are very poorly drained soils with water table levels at or near the surface throughout much of the year. The classification of these soils is Typic Humisol, lithic phase.

In areas of the Uhthoff map unit, soils of the Brooke and Harney series may occur as minor inclusions. Both of these occur in similar landscapes. Where the organic layer thins to less than 40 cm, in the first instance poorly drained loamy mineral material is underlain by bedrock, and secondly deep, poorly drained loamy mineral material exists.

Soils of this map unit have severe limitations due to shallowness that restricts their use for agriculture; large-scale reclamation is not feasible. The soils are either poorly suited or unsuited to recreational or engineering uses, respectively, because of high water table conditions, risk of flooding and shallowness to bedrock.

Vallentyne Map Unit (3910 ha)

The dominant soils of this map unit have developed from organic material derived from grasses, mosses, sedges, rushes, reeds and/or wood. The materials are dominantly well decomposed and are underlain by sandy textured mineral material at a depth of 100-160 cm. They are very poorly drained soils with water table levels at or near the surface throughout much of the year. The taxonomic classification of these soils is Terric Humisol.

Soils of the Harney, Lyons or Vespra series may occur as minor inclusions in areas of the Vallentyne map unit. Harney and Lyons soils exist in poorly drained sites where the organic material is shallower than 40 cm, and is underlain by stony loam till. Where the organic material deepens to greater than 160 cm, Vespra soils may be encountered in these landscapes.

Soils of this map unit have very severe limitations that restrict their use for agricultural production. Further, large-scale reclamation of these soils is not feasible. The soils are also poorly suited to engineering and recreational uses because of high water table levels, flooded conditions, and poor trafficability of the organic materials.

Vespra Map Unit (10 050 ha)

The Vespra soils have developed from organic materials derived from grasses, mosses, sedges, reeds, rushes and/or wood. The materials are dominantly well decomposed and exceed 160 cm in depth. They are strongly acid to neutral in reaction. With water table levels at or near the surface during much of the year they are considered to be very poorly drained soils. They are classified as Typic Humisols.

In areas of the Vespra map unit, soils of the Vallentyne series may occur as minor inclusions. These exist where the organic material is somewhat shallower, being 40-160 cm deep over sandy mineral material.

After drainage, soils of this map unit could be utilized for agriculture. However, slight limitations would continue to exist due to unfavorable woodiness, reaction, flooding and climate, which may interfere with or limit the range of crops which could be successfully grown. The soils are unsuited to engineering uses, and only poorly suited for recreational use because of high water table conditions, risk of flooding, and the poor trafficability of the organic material.

Washago Map Unit (3740 ha)

The Washago soils have developed from organic materials derived from grasses, sedges, reeds, rushes, mosses and wood. The materials are well decomposed and overlie a coarse textured mineral layer within a depth of 40-100 cm. This mineral material may vary in texture and includes gravel, sand, loamy sand and sandy loam. The soils are strongly acid to neutral in reaction. They are very poorly drained with water table levels that are at or near the surface throughout much of the year. Their taxonomic classification is Terric Humisol.

In areas of the Washago map unit, poorly drained mineral soils may occur such as those of the Lyons and Harney series, where the organic materials are less than 40 cm in depth and overlie stony or very stony loam glacial till.

Soils of the Washago map unit have very severe limitations that restrict agricultural use including excessive wetness and shallowness of the organic material. Practices such as clearing and drainage to improve the agricultural capability of these soils are not feasible. These soils also are poorly suited to engineering or recreational uses because of their high water tables, risk of flooding, unstable organic materials and poor trafficability.

Waupoos Map Unit (80 ha)

The Waupoos soils are of limited areal extent in the county, occurring only in Smith township, north of the City of Peterborough. They are associated with drumlinized morainal landforms where silty lacustrine deposits overlie the glacial till. The resulting topography is gently sloping and the soils are well drained. The dominant soil in the map unit is classified as an Orthic Gray Brown Luvisol.

The dominant profile of the Waupoos map unit is Waupoos series, an Orthic Gray Brown Luvisol. The cultivated surface horizon (Ap) is about 15 cm thick, dark grayish brown, silty clay loam to silty clay, granular and friable and of neutral reaction. The underlying Ae horizon is about 15 cm thick, grayish brown, subangular blocky and firm. The Bt horizon is dark brown, 20 cm thick, fine blocky and firm. The texture of the Bt horizon is silty clay, and it has developed immediately above the glacial till. The latter is a calcareous, grayish brown loam till.

In areas of the Waupoos map unit, soils of the Otonabee and Simcoe series may occur as minor inclusions. The Otonabee soils are present where the lacustrine overburden becomes thin or absent, and the solum develops predominantly in the loam textured glacial till under good drainage conditions. On the other hand, the Simcoe soils may be found where the lacustrine deposit deepens and soil development is solely within this material.

The Waupoos soils are well suited for common field crops. Good soil conservation measures are important with these soils, as their texture and landform are conducive to serious erosion problems.

Wemyss Map Unit (180 ha)

Soils of this map unit occur on nearly level morainal plain areas in Chandos and Anstruther townships on parent materials derived from the underlying Precambrian bedrock. They are imperfectly drained soils and are classified as Gleyed Humo-Ferric Podzols.

The dominant soil of this map unit is Wemyss sandy loam. The upper organic horizons consist of L, F and a thin H layer, and overlie a black Ah horizon about 3 cm thick that contains a high content of organic matter. The underlying horizon is a light gray Ae horizon, 3-5 cm thick with loose single grain structure. Beneath is a reddish brown sesquioxide enriched Bf horizon about 8 cm thick that has a friable consistency, fine granular structure, is moderately stony and contains abundant roots. The Bf grades into a brown Bmgj horizon about 20 cm thick with weak granular structure and friable consistency. The underlying parent material is encountered at about 35 cm depth below the surface. It is noncalcareous, moderately stony to very stony loamy sand glacial till of Precambrian origin.

The Wemyss soils are not used for agriculture, but largely remain under forest cover. They are good soils for the production of either hemlock or spruce. Large hectarages of these soils in Anstruther township once supported almost pure stands of hemlock.

In areas of the Wemyss map unit, soils of the Monteagle series may occur as minor inclusions under conditions where soil drainage improves. Compound map units comprised dominantly of Wemyss soils are described as follows:

Wemyss-Monteagle Map Unit (1046 ha)

This map unit consists of dominantly Wemyss soils with significant occurrences of Monteagle soils. The Wemyss soils occupy lower positions in the landscape on gentle slopes, whereas Monteagle soils occur on moderately to steeply sloping adjacent uplands. Areas of this map unit provide a more favorable moisture regime and less rugged topography than the Monteagle areas, and accordingly provide fair sites for forest production. They also provide good range for deer.

Wemyss-Organic Map Unit (760 ha)

The Wemyss soils are dominant in this map unit with significant occurrences of undifferentiated organic soils in depressional areas. This map unit has a fair to poor capability for forest production, being restricted to hemlock, spruce, cedar and other softwood species. Areas of this map unit also can provide winter habitats for deer and other wildlife.

Wendigo Map Unit (8260 ha)

The Wendigo map unit occupies relatively extensive areas throughout the Precambrian Shield region. The soils have developed in noncalcareous sandy outwash on nearly level fluvial plains. They are well to excessively drained.

The dominant soil of the map unit is the Wendigo series, classified as an Orthic Humo-Ferric Podzol. In the uncultivated state the soil profile has a sequence of L, F and H organic horizons underlain by a light gray Ae horizon. This is underlain by a dark reddish brown loamy sand Bf horizon. This horizon grades into a strong brown sand Bm horizon which is underlain by the yellowish brown noncalcareous sand parent material.

Many areas of Wendigo soils were sought out, cleared and farmed in the early days of settlement, but large-scale abandonment has occurred over the years. Most of these soils are too droughty and low in fertility for successful agriculture, but some are cultivated in the Havelock area where they are slightly finer in texture and have improved moisture storage capacity.

These soils are quite acid in reaction and require liming for successful cropping.

The Wendigo soils are more productive for forestry use, being most suitable for conifers. The relatively level topography and the stone free nature of these soils make them suitable for machine planting of conifer seedlings.

In areas of the Wendigo map unit, soils of the Mallard and Kenabeek series may occur as minor inclusions. These are found on imperfectly and poorly drained sites, respectively, on similar parent material to the Wendigo series.

A number of compound map units in which Wendigo soils are dominant are described following:

Wendigo-Balmer Map Unit (230 ha)

This map unit occurs in Burleigh township south of Jack Lake. The dominant Wendigo soils occur in association with Balmer soils which are developed on noncalareous, stony loamy sand glacial till overlying Precambrian bedrock. Outcrops of bedrock also may occur in this map unit as a minor component reducing its suitability for forestry use.

Wendigo-Cramahe Map Unit (160 ha)

The only occurrence of this map unit is in Belmont township east of Havelock. The dominant Wendigo soils are interspersed with Cramahe soils which have developed on calcareous coarse gravel parent material.

Wendigo-Monteagle Map Unit (2690 ha)

This map unit occurs in Methuen and Anstruther townships. The Monteagle soils are subdominant in their occurrence, formed on very stony sandy loam glacial till of Precambrian origin on complex hummocky landforms. In some areas, undifferentiated organic soils occupy the undrained depressions in this complex landscape, and have significant areal extent.

Wendigo-Organic Map Unit (6250 ha)

This map unit is common throughout the northern townships. Undifferentiated organic soils occur as a subdominant component in very poorly drained, depressional sites in these areas. In some instances, poorly drained mineral soils, such as the Granby series, also may occur within the map unit.

Wendigo-Rockland Map Unit (1034 ha)

This map unit occurs in Belmont and Methuen townships where the Wendigo soils are associated with other very shallow soils overlying bedrock and barren rock outcrops. In some cases, undifferentiated organic soils also may be found in depressional sites in these bedrock controlled landscapes.

Areas of the above map units are most suitable for forestry. The soils have low capability for wildlife and are unsuited to agriculture.

White Lake Map Unit (130 ha)

A small hectarage of this map unit occurs in the county, in Harvey and Smith townships. The White Lake soils are developed on gravelly glaciofluvial outwash of Precambrian origin. Some carbonates are present in the parent material, likely originating from marble bedrock. The soils are rapidly drained and occur on rough and hilly topography.

The dominant soil of the map unit, classified as the White Lake series, is a Luvisolic Humo-Ferric Podzol. The podzol

soil profile is developed in the sandy textured overburden, and a Bt horizon occurs in the gravelly textured subsoil at a depth of approximately 50 cm. The parent material which is a coarse gravelly sand texture occurs at about 60 cm depth.

Within areas of the White Lake map unit, soils of the Cramahe series may occur as minor inclusions. These occur where the soil profiles are less strongly developed and exhibit properties of the Orthic Melanic Brunisol subgroup.

Areas of the White Lake map unit are of limited suitability for agricultural use because of their complex hilly topography, low moisture storage capacity and low fertility. They have been extensively used as a source of sand and gravel by the aggregate industry.

Soil Capability Classification

Agricultural Capability

Preceding sections of this report have described the physical characteristics of the soils including texture, drainage, stoniness, fertility, landform, slope and soil depth, all of which affect the capability of soils to produce crops. This section of the report discusses the capability classification of the soils for agricultural uses.

Initially, the mineral soils of the county are grouped into capability classes taking into consideration the above characteristics as they affect their suitability and limitations for agricultural use. A description of the Agriculture Capability Classification System and the assumptions which must be understood by those applying the system are given in another publication (7).

The crops grown in Peterborough County are primarily those required to support a livestock industry. Mixed hay, oats, barley and fall wheat have been traditional crops, but over the last decade there has been a large increase in corn production both for ensilage and grain. Thus the soils are rated on their capability to produce this range of common field crops. Capability ratings are presented in Table 4.

Descriptions of the agricultural capability classes are as follows:

Class 1: SOILS IN THIS CLASS HAVE NO SIGNIFICANT LIMITATIONS THAT RESTRICT THEIR USE FOR CROPS (Figure 21). The topography of these soils ranges from level to gently sloping. They are deep, well to imperfectly drained, have good water-holding capacity and are reasonably well supplied with plant nutrients. They are easily maintained in good tilth, and damage from erosion is slight. Their productivity level is high for a wide range of field crops.

Class 2: SOILS IN THIS CLASS HAVE MODERATE LIMITATIONS THAT REDUCE THE CHOICE OF CROPS OR REQUIRE MODERATE CONSERVATION PRACTICES (Figure 22). They have good water-holding capacity and, if not of high natural fertility, are highly responsive to fertilizer amendments. Limitations result from one of the following characteristics: moderate erosion, stoniness, structure or permeability, low fertility or wetness (Figure 23).

Class 3: SOILS IN THIS CLASS HAVE MODERATELY SEVERE LIMITATIONS THAT REDUCE THE CHOICE AND YIELD OF CROPS. They affect one or more of the following farm practices: the timing and ease of cultivation, planting and harvesting (Figure 24).

Class 4: SOILS IN THIS CLASS HAVE SEVERE LIMITATIONS THAT MAY EITHER RESTRICT THE CHOICE OF CROPS THAT MAY BE GROWN OR THEY MAY HAVE LOW YIELD POTENTIAL.

The limitations include one or more of the following: low fertility, low moisture-holding capacity, wetness, stoniness, depth to bedrock, or steep slopes.

Class 5: SOILS IN THIS CLASS ARE RESTRICTED TO PRODUCING ONLY PERENNIAL FORAGE CROPS. They have very severe soil or external characteristics which impede their use for the production of annual field crops. They are responsive to improvement practices (Figure 25).

Class 6: SOILS IN THE CLASS ARE CAPABLE ONLY OF PRODUCING PERENNIAL FORAGE CROPS, AND IMPROVEMENT PRACTICES BEYOND WEED AND SHRUB CONTROL ARE NOT FEASIBLE.

Class 7: SOILS IN THIS CLASS HAVE LIMITATIONS SO SEVERE THAT THEY ARE NOT CAPABLE OF USE FOR ARABLE AGRICULTURE OR PERMANENT PASTURE. They may or may not have good capability for forestry, wild fruit, recreation or wildlife.

Soil Capability Subclasses

Excepting Class 1, the capability classes are divided into subclasses on the basis of kinds of limitation. The subclasses are as follows:

Subclass C: adverse climate. The main limitation is low temperature or low or poor distribution of rainfall during the cropping season, or a combination of these.

Subclass D: undesirable soils structure and/or low permeability. The soils are difficult to till, absorb water slowly or the depth of the rooting zone is restricted.

Subclass E: erosion damage. Past damage from erosion limits agricultural use of the land.

Subclass F: fertility. Low natural fertility due to lack of available nutrients, high acidity or alkalinity, low exchange capacity, high levels of calcium carbonate or presence of toxic compounds.

Subclass I: inundation. Flooding by streams or lakes limits agricultural use.

Subclass M: moisture. A low moisture-holding capacity, caused by adverse inherent soil characteristics, limits crop growth (not to be confused with climatic drought).

Subclass N: salinity. The soils are adversely affected by soluble salts.

Subclass P: stoniness. Stones interfere with tillage, planting and harvesting.

Subclass R: shallowness to solid bedrock. Solid bedrock is less than one metre from the surface.

Subclass S: soil limitations. A combination of two or more subclasses of D, F, M and N.

Subclass T: adverse topography. Either steepness or the pattern of slopes limits agricultural use.

Subclass W: excess water. Excess water other than from flooding limits use of agriculture. The excess water may be due to poor drainage, a high water table, seepage or runoff from surrounding areas.

Capability Classification of Organic Soils

The preceding system of soil capability for agriculture applies only to mineral soils and cannot be used for organic deposits. The system of capability classification for organic soils used in Peterborough County is that developed by Hoffman (8).

Organic soils have been grouped into capability classes based upon characteristics which include stage of decomposition, reaction, climate, substratum texture, wood content, and depth of the organic soil, according to the definitions which follow.

Decompostion refers to the stage of decompostion of the organic materials.

Fibric the least decomposed of all organic soil materials.

Figure 7. An oblique aerial view of a fluted till plain. These long parallel ridges are bordered by poorly drained depressions.

Figure 9. An oblique aerial view of a large esker in the Westwood area of Peterborough County

Figure 8. An oblique aerial view of a drumlin in Peterborough County

Figure 10. Corn production has increased in recent years in Peterborough County

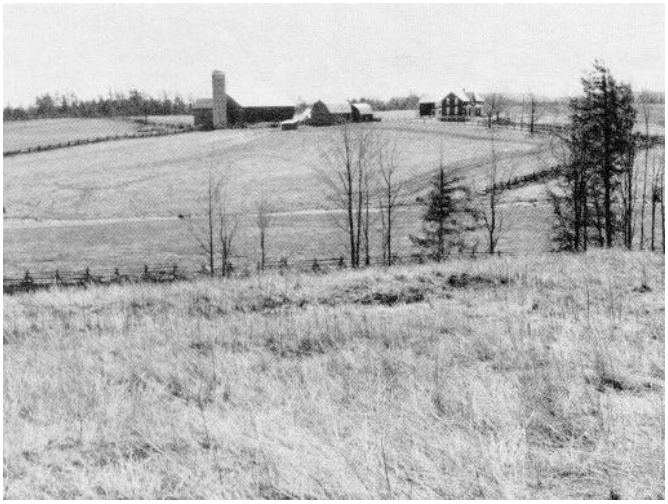

Figure 11. Farming on the rolling morainal hill land in Peterborough County

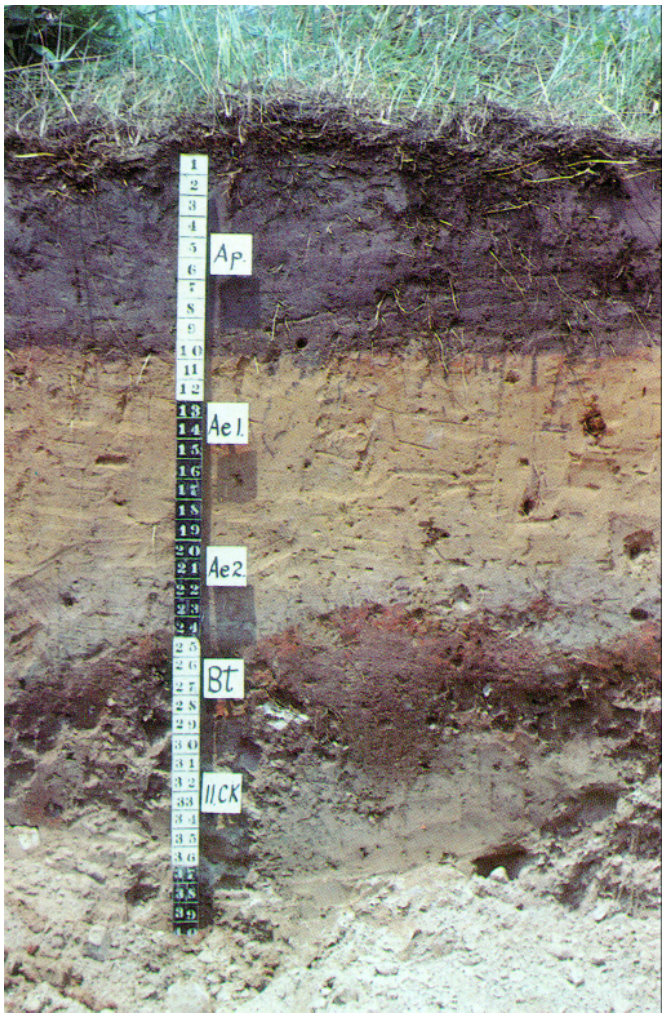

Figure 12. A Brunisolic Gray Brown Luvisol Soil Profile. The soils in Peterborough County which are classified in the Brunisolic Gray Brown Luvisol subgroup have a dark grayish brown Ah horizon underlain by a yellowish brown Ae horizon that becomes lighter in color with depth. The Bt horizon is brown or reddish brown and finer in texture than any other horizon as a consequence of the accumulation of clay-sized materials. The parent material is calcareous.

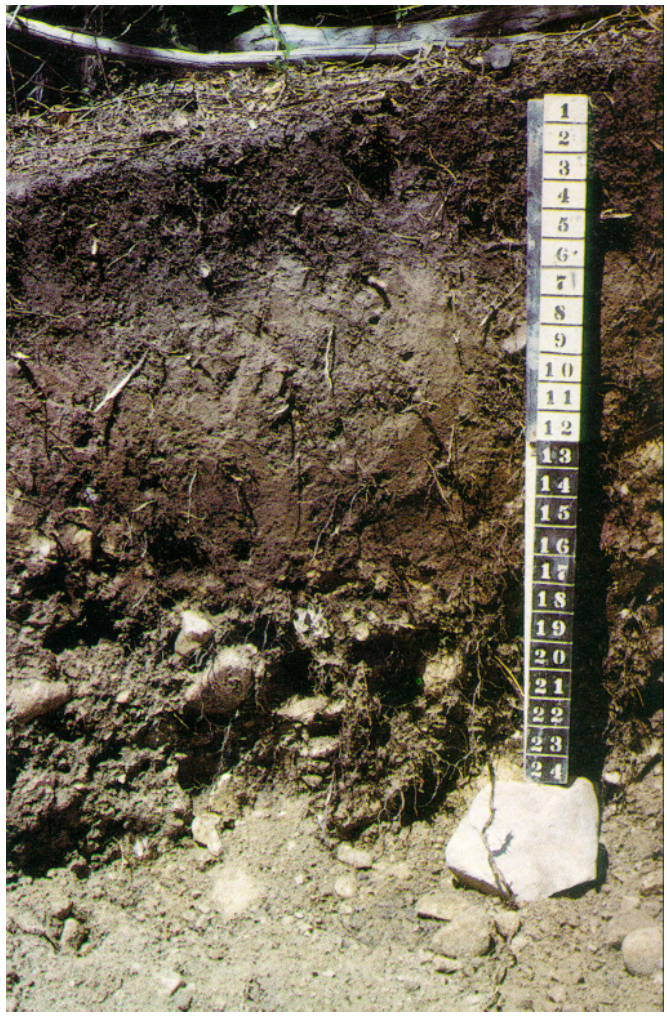

Figure 13. An Orthic Melanie Brunisol Soil Profile. The Melanic Brunisol soils have a very dark brown Ah horizon underlain by a brown or reddish brown Bm horizon containing minor accumulations of sesquioxides. They are developed on calcareous parent materials.

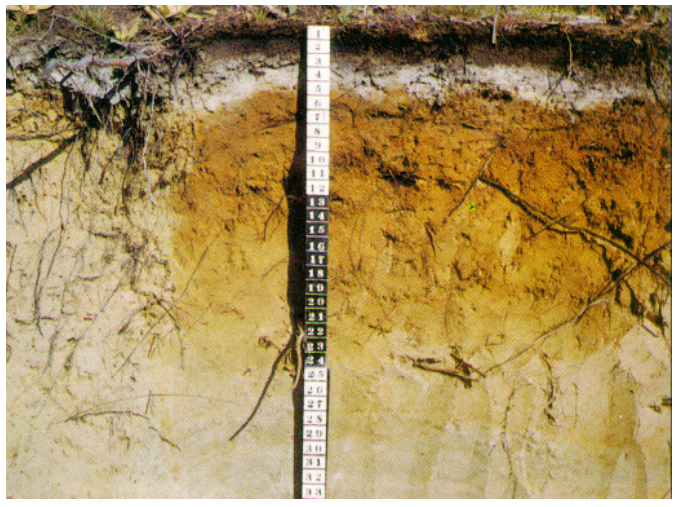

Figure 14. An Orthic Humo-Ferric Podzol Soil Profile. Soils of the Orthic Humo-Ferric Podzol Subgroup are common in northern Peterborough County where the materials are of a Precambrian origin. Under forest-these soils have organic surface layers derived from leaf litter designated L, F and H horizons. The L layer is relatively undecomposed, the H, black highly decomposed organic material. These are underlain by a gray or white, highly leached Ae horizon. The Bf horizon is reddish brown and contains accumulations of sesquioxides, mainly iron and humus. The B horizon gradually grades into the parent material which is noncalcareous.

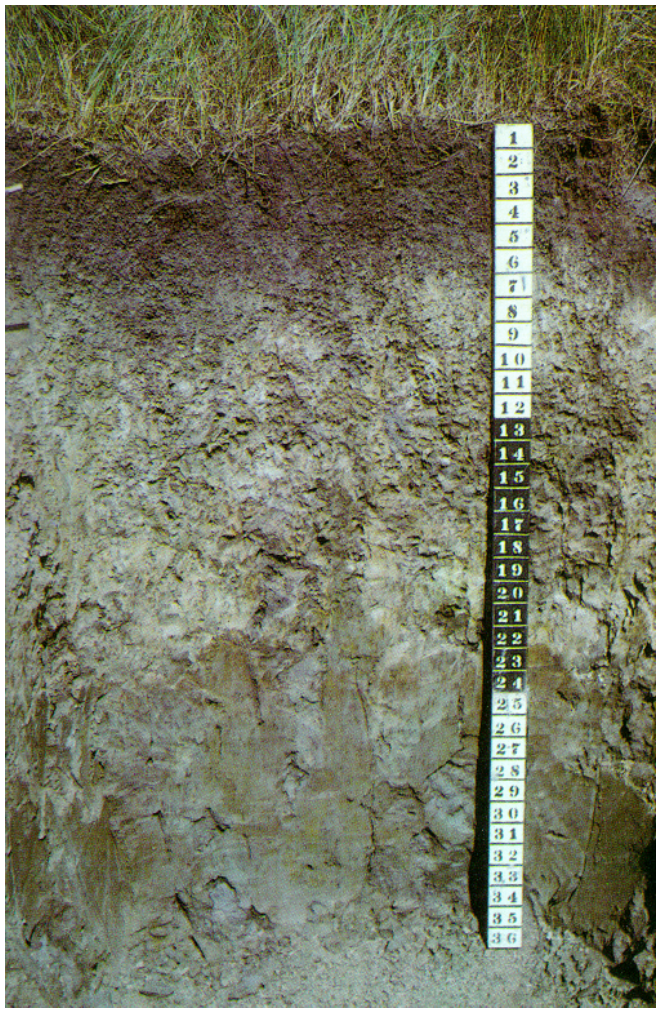

Figure 15. An Orthic Humic Gleysol Soil Profile. The Humic Gleysol soils are poorly drained and saturated with water for long periods of the year. They have a thick dark-colored organic rich Ah horizon. the Bg horizon is a gleyed grayish horizon usually with prominent yellow or yellowish red mottled zones. The C horizon is usually composed of calcareous materials.

Figure 16. Bondhead sandy loam. This profile is typical of a Brunisolic Gray Brown Luvisol soil with a wavy, textural B horizon.

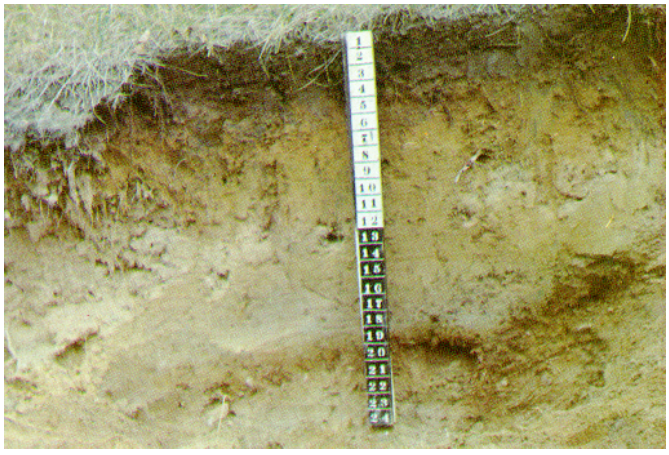

Figure 17. Dundonald sandy loam. The reddish brown Bt horizon occurs within the upper few inches of the sandy loam calcareous till. Note the pebble line in the Bt horizon.

Figure 18. Methuen sandy loam. These soils have developed in granite bedrock.

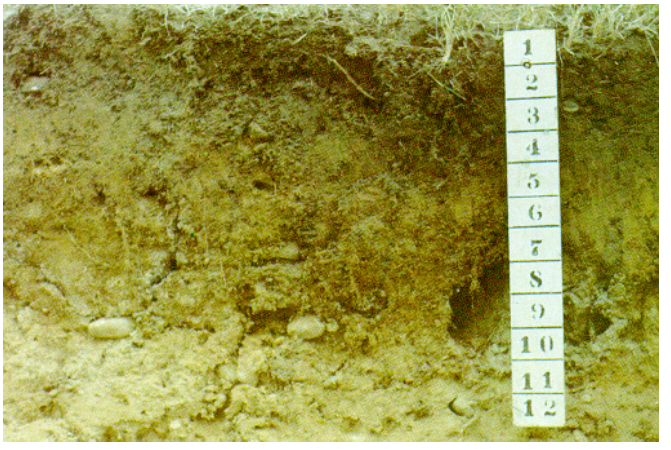

Figure 19. Otonabee loam. This weakly developed soil is an Orthic Melanie Brunisol.

Figure 22. A landscape with varying agricultural capabilities. The Otonabee soil in the foreground is class 2 land with a slight topographic limitation. The drainage channel across the center of the picture has a bedrock floor overlain by thin Farmington soils with class 6r capability for agriculture. The Otonabee soils on the moderately sloping land in the background have suffered moderate losses from erosion and are mainly in soil capability classes 2t and 3t.

Figure 20. Tweed sandy loam. These soils have developed in marble. Mica rich in bands in the tilted marble beds facilitate moisture penetration, and are more rapidly weathered than the areas of low mica concentration producing the platelike effect shown in the picture.

Figure 23. Simcoe map unit. These level lacustrine clay plains require tile drainage to increase their productivity. They are class 2w soils.

Figure 21. Class 1 land for agriculture. This field consisting mainly of Otonabee loam has no significant limitations to crop production.

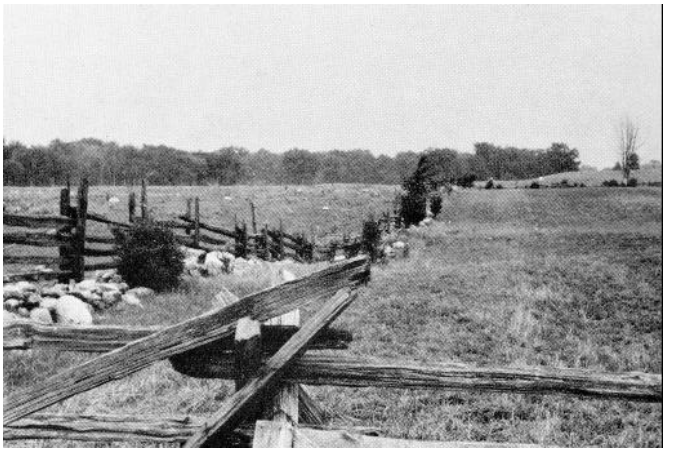

Figure 24. Unimproved and improved land classified as Dummer map unit. Stone removal has changed the soil capability of the improved areas from Class 5 to Class 3.

There are large amounts of well-preserved fiber whose botanical origin is readily identifiable; has a rubbed fiber content of more than 40% of the organic volume.

Mesic the intermediate stage of decomposition, has a rubbed fiber content between 10% and 40% of the organic volume.

Humic the most highly decomposed, has a rubbed fiber content less than 10% of the organic volume.

***Climate** refers to the climatic zone in which the soils are located.

Climatic category i - includes types 1G, 2G, 2H, 2F, 3F, 3G, 3H, 3K

Climatic category ii - includes types 2F, 3F, 4G, 4H, 4K

Climatic category iii - includes types 5G, 5H, 5K, 5L, 1C, 2C, 3L, 3M, 4F, 6G, 6H

** Climatic types (1G, 2G, etc.) are defined and mapped in The Climates of Canada for Agriculture, Report No. 3, ARDA, Ottawa, 1966.*

Wood Content wood located within 50 cm of the surface will probably interfere with cultivation practices. Wood in the profile affects the moisture regime.

Depth refers to the depth of organic material over sand, silt, loam, clay, marl or bedrock. Limitations occur when any of these materials occur within 160 cm of the surface.

Reaction refers to the acidity or alkalinity of the soil.

Substratum Texture refers to a generalized evaluation of the proportion of sand, silt and clay in the underlying mineral horizon if it is present in the control section.

The capability class of an organic soil can be determined using a penalty point system. Each physical feature has been assigned a penalty number. The letters in brackets refer to the appropriate subclass limitations.

Decomposition (K)	
Fibric	35
Mesic	0
Humic	20
Climate (C)	
Category i	0
Category ii	20
Category iii	35
Wood Content (L)**	
None	0
1-25%	5
26-50%	10
50%	20
Depth (H)	
Deep (160 cm)	0
Moderate (130-160 cm)	20
Shallow (90-130 cm)	35
Very Shallow (90 cm)	50
Reaction (F)	
pH less than 5.0	20
pH 5.0-7.0	0
pH more than 7.0	20
Substratum Texture	
Fine	0
Medium or Coarse	20

*** Expressed as a percentage of total material present within the control section (volume).*

In the capability classification of organic soils, intensive agricultural use is assumed, such as for vegetable production.

A description of the capability classes for organic soils follows:

Class 1 (100-85): Organic soils of this class have no water, topographical or pH limitations, and are deep and level. They are located in climate category 1 and are at an intermediate stage of decomposition.

Class 2 (80-70): Organic soils in class 2 have one limitation which restricts their use in a minor way. The limitation may be woodiness, reaction, flooding, topography, depth or climate.

Class 3 (65-55): Organic soils in this class have moderately severe limitations that restrict the range of crops, or that require special management practices.

Class 4 (50-40): Soils in this class have limitations which severely restrict the range of crops or which require special development and management practices. Reclamation and management costs will be high.

Class 5 (30-20): Soils of this class have such severe limitations that they are restricted to the production of perennial forage or other specially adapted crops. Large-scale reclamation is not feasible.

Class 6 (20-10): Class 6 organic soils are capable of producing only indigenous crops and improvement practices are not feasible.

Class 7 (less than 10): Organic soils of this class have no capability for agriculture.

Development of organic soils for agriculture use also depends on the feasibility of drainage and water level control. These factors also are taken into consideration in establishing the capability classification.

Forest Capability

The capability classification for forestry rates soils on their inherent ability to grow commerical forest. The system of capability classification for forestry in use in Ontario recognizes the close relationship between forest capability and forest site region (9). Peterborough County is situated in site regions 6E and 5E (10), the former occupying the area lying to the south of the Precambrian Shield, and the latter including the Precambrian Shield physiographic region.

Descriptions of the capability classes are as follows:

Class 1: LAND HAVING NO IMPORTANT LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Class 1 lands occur only in Site Region 6E in Peterborough County and include only the best soils with normal, or warmer than normal local climate. Soils of sandy loam, loam and well-structured clay loam textures, and with optimum moisture and nutrient supplies are rated in this class.

Class 2: LANDS HAVING SLIGHT LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Site Region 6E - This includes soils of loam, sandy loam and well-structured clay loam textures with a slight nutrient deficiency and a slight excess or deficiency of moisture. Many sands with underlying fine textures that hold supplementary moisture also fall into this class.

Site Region 5E - The soils included in this class are deep, loam or silty fine sand in texture with a balanced nutrient supply for tree crops. The moisture regime of these sites is fresh and the silty fine sand sites are commonly enriched with telluric water.

Class 3: LANDS HAVING MODERATE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Site Region 6E - The sites in this class consist of deep, dry, medium sands, and moist sands where limitations are imposed by a combination of limited fertility and either deficiency or excess of soil moisture.

Site Region 5E - A physiographic site type of this class is a deep loam soil with good internal drainage, a moist moisture regime, and low base status which provides a moderately good, balanced supply of nutrients for trees.

Class 4: LANDS HAVING MODERATELY SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Table 4. Main characteristics and capability classification of mineral soils for agriculture and forestry

Soil series and Phases	Texture	Surface soil reaction	Drainage class	Stoniness or rockiness	Soil depth	Agriculture capability for common field crops	Forestry capability Hardwood	Pine
Balmer	coarse	acid	good	rocky	1 m	6R, 7R*	4RF	4RF
Belmont	coarse	acid	good	rocky	1 m	7R	5RM	5RM
Bondhead	medium	neutral	good	slighty to moderately stony	1 m	7R	1	2L
0 - 5% slopes						1-2T		
6 - 9% slopes						3TP		
10 - 15% slopes						4T		
Brinco	coarse	slightly acid	good to excessive	stonefree	1 m	2F, 3P	3MF	3MF
Brooke	medium	neutral	poor	moderately stony	30 cm	6R	6R	6R
Chandos	coarse	acid	good to excessive	rocky	1 m	6R	4MF	4MF
Colborne	coarse	slightly acid	good to excessive	stonefree	1 m		3MF	2MF
0 - 5% slopes						2MF		
6 - 9% slopes						3T		
10 - 15% slopes						4T		
Cramahe	very coarse	alkaline	excessive	stony	1 m	4TP, 6P	5MF	5MF
Deloro	medium	alkaline	good	stony	1 m	4P, 5TP	2P	4PL
Douro	medium	alkaline	good	very stony	1 m	6RP, 7R	5R	5RL
Dummer	medium	alkaline	good	stony	1 m		3P	4PL
Stoniness 3						4P		
Stoniness 4						5P, 6PT		
Dundonald	medium	slightly acid	good	slightly stony	1 m	2F	2F	2F
Eldorado	medium	slightly acid	good	moderately stony	1 m	1, 4TP	1	2L
Emily	medium	neutral	imperfect	moderately stony	1 m	1	1	2L
Farmington	medium	alkaline	variable	slightly to moderately stony	30 cm	6R	6R	6R
Foxboro	coarse	neutral	poor to very poor	stonefree	1 m	2W	6W	6W
Franktown	medium	alkaline	imperfect	slighty to moderately stony	30 cm	6R	6R	6R
Galway	medium	acid	imperfect	rocky	1 m	6R	5R	5R
Granby	coarse	alkaline	poor	stonefree	1 m	4W	5W	6W
Harney	medium	alkaline	poor	stony	1 m	6R	5W	6W
Kenabeek	coarse	acid	poor	stonefree	1 m	6W	6W	6W
Long	medium	alkaline	good	moderately stony	1 m	4PR	4R	5L
Lyons	medium	alkaline	poor	stony	1 m	4W, 6P	5W	6W
Mallard	coarse	acid	imperfect	stonefree	1 m	4FM	2F	1
Methuen	coarse	acid	good	rocky	1 m	7R	5RM	5RM
Monteagle	coarse	acid	good	very stony and rocky	1 m	6RP	5RM	5RM
Otonabee	medium	alkaline	good to excessive	moderately stony	1 m		1	3L
0 - 5% slopes						2S		
6 - 9% slopes						3TP		
10 - 15% slopes						4T		
16 - 30% slopes						5T	5RM	5RM
Rockcroft	medium	alkaline	imperfect	very stony	1 m			
Stoniness 3						4P		
Stoniness 4						5P, 6R		
Rockland	coarse	acid	variable	exceedingly rocky	10 cm	7R	7R	7R
Simcoe	fine	neutral	poor	stonefree	1 m	2W	5W	6W
Solmesville	fine	neutral	imperfect	slightly stony	1 m	2W	3W	4W
St. Croix	medium	acid	poor	stonefree	1 m	6R	4W	5W
St. Peters	very coarse	acid	excessive	cobbly	1 m	4FM, 5R	5FM	5FM
Tecumseth	coarse	neutral	imperfect	stonefree	1 m	2F	4F	4F
Tioga	coarse	slightly acid	good to excessive	stonefree	1 m	4FM	4FM	4FM
Trent	coarse	neutral	imperfect	stonefree	1 m	1	1	1
Tweed	coarse	acid	good to excessive	rocky	1 m	7R	5RM	5RM
Waupoos	fine	neutral	good	slightly stony	1 m	1	2D	3D
Weymss	coarse	acid	imperfect	very stony	1 m	6P	4R	4R
Wendigo	coarse	acid	excessive	stonefree	1 m	5FM	5FM	3FM
White Lake	very coarse	acid	excessive	cobbly	1 m	5FM	5FM	5FM

* *Ranges in soil capability are due to differences in slope, drainage, stoniness or rockiness within a soil map unit.*

Site Region 6E - Sites in this class include shallow soils of fine sand or sandy loam texture (40- 100 cm) over somewhat broken limestone bedrock. They have a somewhat fresh moisture regime, and a fairly well-balanced nutrient supply.

Site Region 5E - A physiographic site type of this class is a shallow soil of silty, fine sand texture with dry to fresh moisture regime, and a very low base status which provides a moderately poor supply of nutrients for trees.

Class 5: LANDS HAVING SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Site Region 6E - Sites in this class include very shallow soils of fine texture (20-45 cm) over limestone bedrock, as well as poorly drained, well-decomposed organic soils.

Site Region 5E - A physiographic site type of this class is a deep soil of coarse and medium sand texture, with dry moisture regime, and very low base status which provides a poor supply of nutrients for trees.

Class 6: LANDS HAVING VERY SEVERE LIMITATIONS TO THE GROWTH OF COMMERCIAL FORESTS.

Site Region 6E - Sites in this class include very shallow soils (8-30 cm) over limestone bedrock, giving very severe limitations of rooting depth, moisture and nutrients.

Site Region 5E - A physiographic site type of this class is a deep soil of coarse and medium sand texture with a wet moisture regime, and a moderately poor supply of nutrients for trees.

Class 7: LANDS HAVING SEVERE LIMITATIONS WHICH PRECLUDE THE GROWTH OF COMMERCIAL FORESTS.

Site Region 6E - Sites in this class occupy extreme positions on the physiographic site classification and include bare rock and marshy areas of poorly decomposed organic soil.

Site Region 5E: Included in this class are very shallow soils of fine sand texture over bedrock which is resistant to weathering, or water saturated sites of poorly decomposed organic soil.

Subclasses indicate the kind of limitation for each class and are shown by letters which follow the capability class number. The subclass limitations which occur in Peterborough County are as follows:

Soil Moisture

M Denotes a soil moisture deficiency attributed to soil and land characteristics.

W Denotes a soil moisture excess other than that caused by inundation.

Permeability and Depth of Rooting Zone

D Physical restriction to rooting caused by structure or permeability of the soil.

R Restrictions of rooting zone by bedrock.

Soil Fertility or Toxicity

F Low natural soil fertility.

L Excessive levels of calcium.

Stoniness

P A limitation to growth because of stoniness.

The soil capability classifications for forestry for Peterborough County soils are given in Tables 4 and 5. Capability ratings for both hardwoods and conifers are given, with indicator species being Hard Maple, Red Maple, Red Pine and White Pine, respectively.

Figure 25. Dummer Map Unit. The grazing potential for this soil can be increased by weed control, scarification, fertilization and seeding. This is a class 5t soil for agriculture.

Table 5. Capability classification of organic soils

Soil series	Main characteristics	Agriculture	Forestry
Angers	Humic organic underlain by marl over clay at 90 cm.	5HF	5WL
Anson	Mesic organic underlain by limestone bedrock at 100 cm.	4H	6W
Bailey	Humic organic underlain by clay loam at 100 cm.	4HK	5w
Coates	Mesic organic, rapid subsidence. difficulty in re-wetting after drying, excessive permeability	1	6W
Colbar	Humic organic underlain by clay at 70 cm.	5HK	5W
Eels	Mesic organic underlain by loamy sand at 100 cm.	4H	5W
Hasty	Humic organic	4KF	5W
Loretto	Humic organic underlain by silt loam at 75 cm.	5HK	5W
Minden	Humic organic.	5HK	5W
Navan	Humic organic underlain by limestone bedrock at 100 cm.	5HK	5W
Pefferlaw	Humic organic underlain by sandy clay at 100 cm.	5HK	5W
Sheldrake	Humic organic underlain by clay loam at 75 cm.	5HK	5W
Severn	Humic organic underlain by fine sandy loam at 120 cm.	5HK	5W
Tallon	Mesic organic underlain by silt loam at 75 cm.	4H	6W
Uhthoff	Humic organic.	2K	5W
Vallentyne	Humic organic underlain by loamy sand at 120 cm.	5HK	5W
Vespra	Humic organic.	2K	5W
Washago	Humic organic underlain by loamy sand at 75 cm.	5HK	5W

Soil and Land Management

Agriculture

The world food shortage combined with the loss of good farmland in Ontario to urban development suggest the need for making better use of our farmland. Also, some soils need to be managed in a particular way to ensure that their use for agriculture will not lead to deterioration in their quality, or that of the associated water resources in the county.

Low levels of fertility and low water-holding capacity are associated with coarse textured soils. These two limiting factors can be corrected by irrigation and adequate applications of fertilizer supplements. Soils in the county that would respond to such treatment are the Brinco, Tioga, Trent, Colborne, and Tecumseth series.

The soils occurring on recessional moraine materials, namely the Dummer and Deloro series, are very stony and the landform is complex, moderately to steeply sloping. Much of the area has a low potential for crop production, but the carrying capacity of these soils can be increased with improved management such as weed eradication, the introduction of higher producing and more drought tolerant pasture species, and fertilization.

There are 10 900 ha of poorly drained soils in the county and the productivity of a large percentage of these soils, particularly occurring in the Simcoe and Foxboro map units, can be enhanced by tile drainage.

Soil erosion is a serious problem in Peterborough County. It results in a loss of soil productivity, as well as contributing sediments and nutrients to water courses resulting in the eventual deterioration of water quality. Almost 54 000 ha of land in the county are classified as the Bondhead and Otonabee series. These soils are predominantly on a drumlinized landform with slopes ranging from 2 to 20%. Active cultivation is presently occurring on slopes up to 12% on these soils. Productive soil depth on the side slopes has reached a critical level of 15 cm in most cases. Extreme care must be exercised in growing corn on slopes exceeding 5%, unless strip cropping or terracing practices are introduced to reduce the hazard of heavy summer rainstorms causing soil erosion. Many of the steeper slopes can become very productive pasture or hay land if seeded with good perennial grass- legume mixtures and fertilized. This will also afford protection to the soil from the devastating effects of erosion.

Most if not all of these improvements will be made as farm incomes increase.

Forestry

The calcareous till soils in the southern part of the county are most suited to the production of hardwoods.

Serious mortality losses are occurring in pine plantations in southern Ontario planted on Orthic Melanic Brunisol soils. Tree growth appears normal until age 30, at which time the trees become chlorotic and rapidly die. Studies have indicated that high levels of bicarbonate are produced in the upper soil horizon under the decomposing organic layer. The increasing bicarbonate level finally immobilizes iron and manganese resulting in the death of the trees. One such plantation in Peterborough County is in Otonabee township, Con. IX, Lot 29. Until effective treatment measures can be determined it would be wise not to plant pine on the Otonabee, Dummer, and Cramahe soils in this region of Ontario. However, the well- to moderately well-drained soils in the Ordovician limestone area developed on sandy outwash materials have good capability for conifers.

Many of the soils occurring in the Precambrian Shield portion of the county support a dominant deciduous forest of maple, oak, yellow birch, ash, poplar and basswood. However, they have pH levels which are suitable for pine. Both red and white pine are found on such soils as the Monteagle, Chandos, Wendigo, Mallard, Balmer and Tweed series.

The main limiting factor for tree growth in large areas of the northern part of the county is soil depth, and this is particularly true for soil complexes in which Monteagle, Balmer, Tweed and Chandos soils are the major components.

Table 6 presents data on forest productivity and production potential for the major soils of the county which are suitable for forestry use. In each case, red pine plantations or natural regenerated red pine stands were examined, the growth characteristics of the trees determined, and the soils identified and sampled. In each case, growth properties represent averages of five to six trees at each site.

Table 6. Growth characteristics and site index values for red pine, for some Peterborough county soils

Soil series	B.D.H. (cm)	Height (m)	Age (years)	Site index 50 yrs.
Balmer	22	15	69	42
Chandos	32	22	65	62
Chandos-Lithic Phase	28	19	67	55
Colborne	14	10	22	72
Galway	26	21	65	61
Mallard	21	20	37	80
Methuen-Shallow-Lithic Phase	19	14	40	53
Monteagle	31	23	80	60
Otonabee	17	13	29	60
Tweed	24	20	64	57
Wendigo	19	10	25	60
Wendigo-Shallow-Lithic Phase	17	17	37	67

Suitability of the Soils for Certain Engineering and Recreational Uses

A general assessment of the suitability of the soils of the county for certain engineering and recreational uses is given in Table 7. These soil interpretations are based upon soil and landscape characteristics obtained during the soil survey. They include properties such as soil texture, structure, consistency, drainage, depth to water table and its range of fluctuation, depth to impermeable layer and bedrock, stoniness, rockiness, topography, etc. Data on soil chemical and physical properties also were evaluated in assigning soils to various interpretive classes.

The basis used for engineering and recreation interpretations are those proposed by the Canada Soil Survey Committee (11).

The purpose of the interpretive classification which follows is to provide the engineer engaged in planning or construction and the recreational planner with a general evaluation of the suitability of the county soils for a number of engineering and recreational uses. The major limitations to be overcome are indicated. It should be stressed that this information is not intended to replace the need for on-site testing, but rather should guide the engineer or planner to where, and what type of additional testing is required to make final decisions on use or design for the site.

Some soil properties significant to engineering uses for the major soils of the county are given in the Appendix as a further aid to interpreting soil suitability for engineering uses.

Table 7. Suitability of Peterborough County soils for selected engineering and recreational uses

Map unit	Suitability for engineering uses				Roads	Shallow excavations and trenches	Suitability for recreation	
	Source of sand & gravel	Source of fill	Sanitary landfill sites	Septic tanks			Camping and campsites	Paths and trails
Angers	unsuited	unsuited	poor-high water table or flooded	poor	poor-fill situation, high water table, unstable organic materials	poor-high water table, unstable organic materials	poor-high water table throughout the year, poor trafficability	poor
Anson	unsuited	unsuited	poor-high water table and shallow to bedrock	poor	poor-fill situation, high water table, unstable organic materials	poor-high water table, shallow to bedrock	poor-high water table throughout the year, poor trafficability	poor
Bailey	unsuited	unsuited	poor-high water table or flooded	poor	poor-fill situation, high water table, unstable organic materials	poor-high water table, unstable organic materials	poor-high water table throughout the year, poor trafficability	poor
Balmer	poor	good	fair, but poor in areas complexed with rock		good, but poor in areas complexed with rock where blasting of bedrock may be necessary		good, fair on rock complexes	
Belmont	poor	poor-shallow to bedrock		poor-shallow to bedrock	poor-much blasting of bedrock required		fair-rocky	fair-rocky
Bondhead	poor, except for some gravel inclusions	good	good	good, but severe limitations on steeper slopes	good-generally cut and fill situation	good-walls stand almost vertically	good	good
Bottom Land	poor-subject to flooding		poor-subject to flooding		poor-subject to flooding		poor-subject to flooding	fair-
Brinco	good	fair-high permeability		good	good-low in fines	good-trench support or sloped walls necessary	good	good
Brooke	poor-shallow to bedrock		poor-shallow to bedrock		fair-fill situation, no major problems	poor-very costly blasting and dewatering	poor-seasonally wet	
Chandos	good	good-low in binder fines	poor-excessive permeability		good	fair-trench support or sloped walls required	good	good
Coates	unsuited	unsuited	poor-high water table or flooded		poor-fill situation high water table, unstable organic material	poor-high water table, unstable organic material	poor-high water table, poor trafficability	poor-high water table, poor trafficability
Colbar	unsuited	unsuited	poor-high water table or flooded		poor-fill situation high water table, unstable organic material	poor-high water table, unstable organic material	poor-high water table, poor trafficability	poor-high water table, poor trafficability
Colborne	good	good-low in binder fines	poor-high permeability		good	fair-trench support required	fair	good
Cramahe	fair-generally requires crushing	good-removal of boulders may be required	poor-high permeability		good-removal of cobbles and boulders, low fines	fair-numerous large cobbles and boulders	fair-coarse textures	fair-cobbly
Deloro	poor	poor-high silt content	good	good	fair-generally cut and fill situation	good	good	fair-may be slippery when wet

Table 7. Suitability of Peterborough County soils for selected engineering and recreational uses

Map unit	Suitability for engineering uses						Suitability for recreation	
	Source of sand & gravel	Source of fill	Sanitary landfill sites	Septic tanks	Roads	Shallow excavations and trenches	Camping and campsites	Paths and trails
Douro	poor-shallow to bedrock	fair-shallow to bedrock	poor-shallow to bedrock		fair-shallow to bedrock	poor-shallow to bedrock	good	good
Dummer	poor	good	good	fair to poor-acceptable on lower slopes	good-cut and fill required	fair-bouldery	fair-very stony in places	
Dundonald	fair to poor-shallow	good	good	good	good	good	good	good
Eels	poor-high water table, flooded, organic overburden		poor-high water table, flooded		poor-fill situation, high water table, unstable organic materials	poor	poor	poor
Eldorado	poor	fair-high silt content	good	good	fair-subject to frost heaving	good	good	good
Emily	poor	good, but seasonally wet	poor-seasonally high water table	fair-seasonally high water table	good-usually a fill situation	good	fair-seasonally wet	
Farmington	poor-shallow to bedrock		poor-shallow to bedrock		fair-shallow to bedrock	poor-shallow to bedrock	fair-seasonally wet	
Foxboro	poor-excessively wet and subject to flooding		poor-excessively wet and subject to flooding				poor-high water table	
Franktown	poor-shallow to bedrock		poor-shallow to bedrock		fair-usually a fill situation	poor shallow to bedrock	fair-seasonally wet	
Galway	poor-excessively wet and shallow to bedrock		poor-excessively wet and shallow to bedrock		fair-requires fill	poor-high water table		poor-high water table
Granby	poor-excessively wet and may be flooded		poor-excessively wet and may be flooded		poor-fill situation, excessively wet	poor-high water table, unstable in cuts	poor-wet for prolonged periods	
Harney	poor-excessively wet and shallow to bedrock		poor-excessively wet and shallow to bedrock		poor-fill situation, requires blasting of bedrock	poor-shallow to bedrock, high water table	poor-wet for prolonged periods	
Hasty	unsuited	unsuited	poor-high water table or flooded		poor-fill situation, high water table, unstable organic material	poor-high water table, unstable organic material	poor-high water table, poor trafficability	
Kenabeek	poor-high water table, may be flooded		poor-high water table, may be flooded		fair-high water table	poor-high water table, unstable in cuts	poor-wet for prolonged periods	
Long	poor	fair-removal of stones and boulders are required	poor-shallow to bedrock		good	fair-blasting probably required	good	good
Loretto	unsuited	unsuited	poor-high water table or flooded		poor-fill situation, high water table, unstable organic material	poor-high water table, unstable organic material	poor-high water table, poor trafficability	
Lyons	poor	poor-high water table, may be flooded			poor	poor	poor-wet for prolonged periods	

Table 7. Suitability of Peterborough County soils for selected engineering and recreational uses

Map unit	Suitability for engineering uses						Suitability for recreation	
	Source of sand & gravel	Source of fill	Sanitary landfill sites	Septic tanks	Roads	Shallow excavations and trenches	Camping and campsites	Paths and trails
Mallard	fair-seasonally high water table	fair-few fines, seasonally wet	poor-seasonally high water table		fair-fill situation	fair-trench support or sloped walls required	fair-seasonally wet	
Methuen	poor	fair-few fines, coarse, feldspar granites	poor-shallow to bedrock		fair-blasting generally required	poor-shallow to bedrock	fair-rough for walking, slippery outrcops	
Minden	unsuited	unsuited	poor-high water table or flooded		poor-fill situation, excessive wetness	poor-high water table, unstable organic materials	poor-high water table, poor trafficability	
Monteagle	poor	good, in deep till deposits	fair-in deep till deposits, otherwise poor		good-fair in areas complexed with rock		fair-steep and irregular slopes in many places	fair-stony
Navan	unsuited	unsuited	poor-high water table, and shallow to bedrock			poor-high water table, shallow to bedrock	poor-high water table and poor trafficability	
Otonabee	poor-except for occasional gravel inclusions	good	good	good-except on slopes greater than 6 percent	good-cut situation	good-wall stand almost vertically	good	good
Pefferlaw	unsuited	unsuited	poor-high water table, or flooded		poor	poor-high water table, unstable organic materials	poor-high water table and poor trafficability	
Rockcroft	poor	poor-shallow to bedrock		poor-shallow to bedrock	fair-involves removal of stones and boulders	poor-involves removal of stones and boulders, blasting of bedrock may be required	fair-very stony	fair-very stony
Rockland	poor	poor-shallow to bedrock		poor-shallow to bedrock		poor	poor-steep and irregular slopes	poor-steep slopes many outcrops
Severn	unsuited	unsuited	poor-high water table or flooded			poor-high water table, unstable organic materials	poor-high water table and poor trafficability	
Sheldrake	unsuited	unsuited	poor-high water table or flooded		poor-fill situation, high water table, unstable organic material	poor-high water table, unstable organic material	poor-high water table and poor trafficability	
Simcoe	poor	poor to fair-seasonally wet, some shrink-swell properties	poor-excessively wet, may be flooded		poor-generally a fill situation, excessively wet	poor-excessively wet	poor-wet for prolonged periods, slippery when wet	
Solmesville	poor	good-temporary wetness	fair-seasonally high water table		fair-generally a fill situation	good-some wet weather pumping may be required	fair-slippery when wet	

Table 7. Suitability of Peterborough County soils for selected engineering and recreational uses

Map unit	Suitability for engineering uses					Suitability for recreation	
	Source of sand & gravel	Source of fill	Sanitary landfill sites	Septic tanks	Roads	Shallow excavations and trenches	Camping and campsites	Paths and trails
St. Croix	poor-excessive wetness, shallow over bedrock				fair-a fill situation	poor-shallow to bedrock, wet	poor-wet for prolonged periods	
St. Peters	good	good	poor-excessive permeability		good	fair-trench support required	fair-tends to be droughty	good
Tallon	unsuited	unsuited	poor-high water table or flooded		poor-fill situation, high water table, unstable organic materials	poor-high water table, unstable organic materials	poor-high water table and poor trafficability	
Tecumseth	fair-seasonally high water table		poor-seasonally high water table, excessive permeability		good-generally a fill situation	fair-seasonally high water table, trench support required	fair-seasonally wet	
Tioga	good	good-low in fines	poor-excessive permeability		good	fair-trench support or sloping sides required	fair-tends to be droughty	good
Trent	poor	poor-susceptible to frost heaving, risk of flooding	poor-seasonally high water table, risk of flooding	fair-seasonally high water table, risk of flooding	fair-susceptible to frost heaving	fair-seasonally high water table	fair-seasonally wet	
Tweed	poor	poor-shallow to bedrock		poor	fair-some blasting required	poor-shallow to bedrock	fair-irregular and complex slopes	
Uhthoff	unsuited	unsuited	poor-high water table and shallow to bedrock		poor-fill situation, high water table, unstable organic materials	poor-high water table, shallow to bedrock	poor-high water table and poor trafficability	
Vallentyne	poor-high water tables, flooded, organic overburden		poor-high water table or flooded		poor-fill situation, high water table, unstable organic materials	poor-high water table, and unstable organic materials	poor-high water table and poor trafficability	
Vespra	unsuited	unsuited	poor-high water table or flooded		poor-fill situation, excessive wetness	poor-high water table, unstable organic material	poor-high water table, poor trafficability	
Washago	poor-high water table, flooded, organic overburden		poor-high water table or flooded		poor-fill situation, excessive wetness	poor-high water table, unstable organic material	poor-high water table, poor trafficability	
Waupoos	poor	good	fair-low permeability		good	good	fair-slippery when wet	
Wemyss	poor	fair-seasonally wet	poor-seasonally wet, may require blasting of bedrock	fair-seasonally high water table	fair-seasonally wet, stony	fair-seasonally high water table, stony	fair-seasonally wet	
Wendigo	good	good-low in fines	poor-excessive permeability		good	fair-trench support required	fair-tends to be droughty	good
White Lake	good	good-but few fines	poor-excessive permeability		good	fair-trench support required	fair-generally uneven and stony	fair-stony

Soil Properties Significant to Engineering

Soil Series	Soil Horizon	Location			pH	Texture USDA	% Fine Gravel 2-1.0 mm	% Coarse and Medium Sand 1-0.25 mm
		Township	Con.	Lot				
Bondhead	B	Otonabee	II	22	7.8	L	0	9
Bondhead	C	Otonabee	II	22	8.2	L-SL	4	12
Bondhead	B	Otonabee	III	17	7.9	L-SL	2	11
Bondhead	C	Otonabee	III	17	8.1	L-SL	3	15
Bondhead	C	Asphodel	V	6	8.1	SL-SCL	5	11
Brinco	B	Otonabee	XII	30	8.0	SL-LS	2	47
Brinco	C	Otonabee	XII	30	8.8	S	0	40
Brinco	C	Ennismore	VIII	6	8.5	LS	0	0
Brinco	B	Otonabee	V	17	6.4	S	0	2
Brinco	C	Otonabee	V	17	8.0	S	0	4
Brinco	B	Asphodel	X	15	6.7	S	0	10
Brinco	C	Asphodel	X	15	7.8	S	0	13
Chandos	B	Cavendish	IX	16	6.9	S	2	61
Chandos	C	Cavendish	IX	16	7.0	S	1	46
Chandos	B	Chandos	XII	20	7.1	S	1	26
Chandos	C	Chandos	XII	20	7.3	S	2	28
Chandos	B	Anstruther	I	34	7.1	S-LS	2	37
Chandos	C	Anstruther	I	34	7.9	S	29	64
Deloro	B	Belmont	IV	10	7.7	L	3	18
Deloro	C	Belmont	IV	10	8.1	L	10	23
Eldorado	B	Belmont	VI	8	7.5	L	2	8
Eldorado	C	Belmont	VI	8	8.4	SL	6	14
Methuen	C	Methuen	II	18	—	LS	17	65
Monteagle	B	Cavendish	II	3	—	LS	8	27
Monteagle	C	Cavendish	II	3	—	LS	7	27
Otonabee	C	Otonabee	IX	20	8.5	SL-L	7	16
Otonabee	B	Ennismore	IV	5	8.0	L-Sil	0	9
Otonabee	C	Ennismore	IV	5	8.5	L	6	12
Otonabee	C	Ennismore	II	3	9.1	LS	16	39
Otonabee	C	Smith	X	27	8.3	L-SL	8	17
Otonabee	C	Smith	XII	30	8.5	L-SL	5	16
Otonabee-rubbly	C	Dummer	VI	6	8.1	CL-SiCL	2	6
Otonabee	C	Douro	IV	1	8.5	L-SL	3	16
Simcoe	C	Otonabee	XI	20	8.1	SiCL	0	0
Tioga	B	Belmont	VIII	1	7.2	S	0	10
Tioga	C	Belmont	VIII	1	7.2	S	0	5
Tweed	B	Cavendish	XVII	7	7.0	S	2	17
Tweed	C	Cavendish	XVII	7	7.5	S	0	11
Wendigo	B	Chandos	VIII	24	6.3	S	0	13
Wendigo	C	Chandos	VIII	24	5.6	SL	1	26

% Fine and Very Fine Sand 0.25-0.05 mm	% Very Fine Sand & Silt 0.1-0.005 mm	% Silt 0.05-0.005 mm	% Clay <0.005 mm	% Passing Sieve		Unified Group Symbol	Liquid Limit	Plastic Limit	Plasticity Index
				4 (5mm)	200 (0.075mm)				
32	54	37	22	100	69	CL	36	20	16
34	47	31	19	78	44	CL-ML	18	12	6
30	48	34	23	89	55	CL	30	21	9
29	42	30	23	92	51	CL	22	13	9
24	40	29	31	83	52	CL	23	13	10
32	14	9	10	99	20	ML	22	21	1
52	10	4	4	100	10	SM	—	—	—
80	62	18	2	100	40	SM	—	—	N.P.
92	54	4	2	100	25	SM	—	—	N.P.
92	43	4	—	100	17	SM	—	—	N.P.
85	28	5	—	—	—	SM	—	—	N.P.
80	22	5	2	100	11	SM	—	—	N.P.
27	11	7	3	100	12	SM	—	—	N.P.
28	27	21	4	100	30	SM	—	—	N.P.
68	17	5	—	100	7	SP	—	—	N.P.
68	12	2	—	100	4	SP	—	—	N.P.
47	22	12	2	100	17	SM	—	—	N.P.
5	2	1	1	100	2	SP	—	—	N.P.
27	46	35	17	91	52	CL	31	21	10
17	44	35	15	73	36	CL	23	18	5
28	53	37	25	99	31	CL	31	19	12
20	50	40	20	83	53	CL	23	15	8
13	2	2	3	95	4	SP	—	—	N.P.
41	38	20	4	85	25	SM	—	—	N.P.
43	38	19	4	87	27	SM	—	—	N.P.
31	46	31	15	82	40	ML	14	22	2
17	49	43	31	98	75	ML-CL	34	23	11
23	50	35	20	78	48	ML	21	13	8
33	19	9	3	69	10	SM-SC	—	—	N.P.
25	42	31	19	70	35	ML	24	16	8
31	43	29	19	88	46	ML	16	12	4
11	42	37	44	91	74	CL	41	19	22
32	47	31	18	78	54	ML	15	11	4
6	38	35	59	100	96	CL	37	21	16
84	37	5	1	100	16	SM	—	—	N.P.
81	46	12	2	100	38	SM	—	—	N.P.
67	36	13	1	97	21	SM	—	—	N.P.
76	44	12	1	97	23	SM	—	—	N.P.
76	36	9	2	100	19	SM	—	—	N.P.
43	43	26	4	—	—	SM	—	—	N.P.

GLOSSARY

Alluvium — material deposited by rivers and streams, usually on riverbeds and floodplains.

Atterberg limits — the moisture contents of a soil at which changes of state or condition occur. Related terms include plastic limit, liquid limit, plasticity index and plastic range. (See this glossary.)

Bedrock — any solid rock exposed at the surface of the earth or overlain by unconsolidated material.

Channery — a thin, flat fragment of limestone, sandstone or schist up to 8 cm in diameter.

Chert — a compact, siliceous rock formed of microscopic grains of quartz and opal.

Cobbly — containing appreciable quantities of cobblestones which are rounded or partially rounded rock or mineral fragments between 8 and 25 cm in diameter.

Colluvium — soil material that has moved downhill and accumulated on lower slopes and/or at the bottom of the hill.

Complex slopes — slopes going in all directions, as in hummocky areas.

Contour plowing — plowing that approximately follows the contour of the land.

Dolomite — a mineral or rock composed of calcium magnesium carbonate $CaMg(CO_3)_2$.

Drumlin — a streamlined hill or ridge of glacial materials, with long axes paralleling direction of flow of former glacier.

End Moraine — a ridgelike accumulation of glacial materials which build along the margin of a glacier.

Esker — a narrow ridge of gravelly or glacial material, deposited by a stream in association with glacial ice.

Floodplain — nearly level land situated on either side of a channel which is subject to overflow flooding.

Fluted topography — land surfaces having smooth, straight, parallel channels, probably derived from glacial action.

Formation — a unit of geological mapping consisting of a large and persistent stratum of one kind of rock.

Free carbonates — carbonates of calcium and magnesium which occur uncombined with other elements. Their presence in soils is indicated by effervescence on addition of 0.1 normal HCL.

Free iron and aluminum — oxides and hydroxides of iron and aluminum that occur uncombined with other elements, generally of fine particle size and frequently occurring as coatings on primary and secondary minerals.

Glacial spillway — channel that carried water presumably derived from melting glaciers.

Gley conditions — soil conditions brought about by gleyzation, a soil-forming process operative under poor drainage, that results in reduction of iron and other elements, and in gray colors and mottles.

Hummocky — land surface having many low mounds or knolls.

Kame — a hill of stratified materials deposited, usually as a steep alluvial fan, against the edge of an ice sheet by streams of sediment-laden meltwater.

Kettle hole — bowl-shaped depression formed by a stranded ice block melting from a glacier.

Lacustrine plain — level or slightly depressed land area once occupied by a lake, containing lake-deposited sediments.

Landform — a distinguishable, natural land feature such as a floodplain, terrace, esker, etc.

Liquid limit — the water content, in percent, of the dry weight of the soil, at which a specific test procedure determines a change of state of the soil from a plastic to a liquid condition.

Loam — soil material that contains 7 to 27% clay, 28 to 50% silt, and more than 52% sand.

Loess — a deposit of wind-blown silt.

Made land — areas filled with earth, or with earth and trash mixed, usually by or under the control of man.

Meltwater — water resulting from the melting of snow or glacier ice.

Mixed grain — refers to growing of oats and barley together as a single crop.

Moraine — an accumulation of glacial materials built chiefly by the direct action of glacier ice.

Outcrop — usually an exposure of bedrock; sometimes refers to exposures of till formations, etc., on slopes.

Outwash — stratified materials deposited by meltwater streams beyond active glacier ice.

Overburden — usually refers to all unconsolidated materials (i.e., gravel, clay, etc.) that lie above bedrock.

Parent material — the unconsolidated, chemically weathered mineral or organic matter from which the solum of soils has developed. The C horizon may or may not consist of materials similar to those from which the A and B horizons developed.

Ped — a unit of soil structure such as a prism, block or granule, formed by natural processes.

Perched water table — water contained in porous soil materials overlying impervious materials, often far above the ordinary water table.

Permeability — capacity for transmitting a fluid. (In soil, the fluid may be air or water.)

Plasticity — the property possessed by a soil that allows it to be deformed permanently without rupture. (See also plasticity range and plasticity index.)

Plasticity index — the numerical difference between the plastic limit and the liquid limit. (See also plastic range.)

Plastic limit — the water content, in percent, of the dry weight of the soil that is considered as the lower limit of the plastic condition of the soil. A standard test procedure is used to determine this lower limit.

Plastic range — the range of water content within which a soil is considered to possess plasticity. (See also plasticity index.)

Pleistocene — the last two million years of time in the history of the earth.

Pothole — a hole generally with greater depth than width, worn into solid rock by sand, gravel, and stones being spun around by the force of the current at falls and strong rapids. In this report, it is also used to describe circular depressions that occur in soil materials that may or may not be kettle holes.

Regolith — the layer or mantle of loose, noncohesive rock material, of whatever origin, that nearly everywhere forms the surface of the land and rests on bedrock. It includes rock waste, soils and vegetative accumulations.

Scarp — an escarpment, cliff or steep slope along the margin of a valley.

Sediment — solid material in suspension, being transported, or that has been removed from its side of origin by air, water, gravity or ice, and has been deposited on the earth's surface either above or below sea level.

Soil — the unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. To many civil engineers, soil refers to all material between the upper surface of the bedrock, and the ground surface.

Soil amendment — any substance added to soil that alters its properties and makes it more suitable for plant production e.g., fertilizer, lime, etc.

Soil catena — a sequence of soils of about the same age, derived from similar parent materials and occurring under similar climatic conditions, but having different characteristics due to variations in drainage and relief.

Soil development — the process of formation of the solum, and differentiation of unconsolidated parent materials into soil horizons.

Soil horizon — a layer of soil or soil material approximately parallel to the land surface that differs from adjacent genetically related layers in properties such as color, structure, etc.

Soil mottling — the irregular marking of soil horizons with spots of color, usually due to impeded drainage.

Soil pH — a numerical measure of the acidity or hydrogen activity of a soil. All pH values below 7.0 are acid and all above 7.0 are alkaline.

Soil phase — a subdivision of a soil type, usually a variation in a property or characteristic such as degree of slope, stoniness, etc.

Soil profile — a vertical section of the soil through all its horizons, including C horizons.

Soil series — the basic unit of soil classification, consisting of soils that are essentially alike in all major profile characteristics except the texture of the surface.

Soil structure — the combination or arrangement of primary soil particles into secondary particles, units or peds.

Soil texture — the relative proportions of the various soil separates in a soil as decribed by the classes of soil texture shown below. When the percentage gravel by volume is between 20 and 50%, the textural class name is modified by "gravelly", e.g., gravelly sandy loam. When the gravel percentage is between 50 and 90, the textural class name is modified by "very gravelly", e.g., very gravelly sandy loam.

Soil tongues — wavy projections of A and/or B soil horizons into the underlying C horizons.

Soil type — a subdivision of a soil series and consisting of or describing soils that are alike in all characteristics including the texture of the A horizon, e.g., Otonabee loam, Otonabee sandy loam.

Solum — the upper horizons of a soil in which the parent material has been modified and within which most plant roots are confined. It consists usually of A and B horizons.

Soundness — the soundness of a stone is its ability to resist the action of weathering agents, particularly freezing and thawing, without disintegration.

Summer fallow — the tillage of uncropped land during the summer to control weeds and store moisture in the soil for the growth of a later crop.

Terrace — a level, usually narrow, plain bordering a river, lake or sea. Rivers sometimes are bordered by terraces at different levels.

Till — a sediment of diverse texture and structure deposited by direct glacier action; it is characteristically compact, poorly sorted and unstratified.

Tilth — the physical condition of soil as related to its ease of tillage, fitness as a seedbed, and its impedance to seedling emergence and root penetration.

Topography — the relief and contour of the land.

Translocation — refers to the movement, usually vertical, of elemental or fine material in soils, such as clay or free iron.

Unconsolidated materials — non-solid materials like sand, that are easily broken up, in contrast to bedrock, which is consolidated.

Varve — sedimentary bed or lamination that is probably deposited within one year's time.

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Appendix

Taxonomic Classification, Profile Description and Analytical Data

In this section, all the soil series mapped in Peterborough County are classified according to the System of Soil Classification for Canada (12). For each series, a profile from the type location that best embodies the central concept for that series has been classified, analyzed and described.

Terminology used in the detailed soil horizon descriptions is also from the system of Soil Classification for Canada. The horizon characteristics described are color, mottling, texture, structure, consistence, roots and pores, carbonates, stones and pebbles, reaction, horizon boundaries and thickness range.

Ammonium oxalate and sodium citrate-dithionite extractable iron and aluminum were determined by a procedure outlined by McKeague (13). The determinations were made with a Techtron AA-3 atomic absorption spectrophotometer. Total analysis of surface litter horizons also were done using the atomic absorption spectrophotometer.

Soil pH determinations were done using a 1:1 soil-water mixture and pH meter.

Organic matter was determined by the potassium dichromate method (modified Walkley-Black method) as given by McKeague (13).

Exchangeable cations, including calcium, magnesium and potassium, were measured on N NH_4OAc extracts using atomic absorption. Phosphorous was extracted with 0.5 N $NaHCO_3$ and measured by the autoanalyzer.

Particle size analyses were determined by the pipette method following the destruction of organic matter by hydrogen peroxide and dispersion by calgon. The size fractions determined were clay, less than 0.002 mm; silt, 0.002-0.05 mm; sand, 0.05-2 mm. The values reported are the percent by weight of sand, silt, and clay of the less than 2 mm size fraction only. The greater than 2 mm gravel fraction is reported in percent by weight of the whole soil fraction.

Engineering test data were obtained using analytical procedures outlined in the American Society for Testing and Materials Manual (14) as follows:

Particle Size Analyses	ASTM Designation D 422 - 63
Liquid Limit	ASTM Designation D 423 - 66
Plastic Limit and Plasticity Index	ASTM Designation D 424 - 59

Balmer Series

Location: Balmer Road, Chandos township, Con. VIII, Lot 14, Peterborough County
Parent Material: Stony, sandy loam noncalcareous till overlying amphibolite bedrock
Vegetation: Maple, balsam, birch, hemlock, etc.
Classification: Orthic Dystric Brunisol: Sandy-skeletal, mixed, shallow, acid, cool, humid
Landform: Undulating morainal veneer over bedrock

Horizon	Depth cm	Description
L	6 - 1	Loose leaf litter.
F	1 - 0	Decomposed organic material.
Bml	0 - 19	Dark reddish brown (5YR 3/4m)* sandy loam; fine weak granular; friable; plentiful fine roots; few stones; gradual boundary.
Bm2	19 - 45	Reddish brown (5YR 4/4m) sandy loam; weak, fine, granular; few fine roots; few stones; gradual boundary.
Bm3	45 - 50	Dark reddish brown (5YR 3/3m) loamy sand; very weak, fine, granular; friable.
C	50 - 75	Dark yellowish brown (10YR 4/4m) loamy sand; single grain; loose, moderately stony; noncalcareous.
R	75+	Amphibolite bedrock.

** Munsell color notation: m - moist color, d - dry color*

Balmer Sandy Loam

Site Location - Cavendish Township, Con. 1, Lot 9
BALMER SERIES

Horizon	Depth cm	Sand %	Silt %	Clay %	O.M. %	pH	Extractable Fe (%)		Extractable Al (%)	
							Oxalate	Dithionite	Oxalate	Dithionite
H	3-0					5.0				
Bm1	0-30	60	37	3.0	1.7	5.9	0.80	1.32	0.38	0.33
Bm2	30-60	67	31	2.0	0.04	6.0	0.64	1.16	0.38	0.26
Bm3	60-73	80	17	3.0	0.36	5.8	0.61	1.12	0.17	0.18
C	73+	82	17	1.0	0.04	5.9	0.41	0.71	0.13	0.09

Belmont Series

Location: Methuen Township, Con. 111, Lot 12, 1 mile south of Twin Lake, 100 yards east of road
Parent Material: Weathered gabbro
Vegetation: Mixed deciduous and coniferous
Classification: Orthic Dystric Brunisol: Sandy-skeletal, mixed, very shallow, acid, cool, humid
Landform: Undulating bedrock plain

Horizon	Depth cm	Description
Ah	0 - 5	Dark reddish brown (5YR 3/2m), very dark grayish brown (10YR 3/2d) sandy loam; weak, fine, granular; friable, abundant fine roots; few feldspar fragments; abrupt, smooth boundary; pH 6.1.
Bm1	5 - 20	Dark red (2.5YR 3/6m); reddish brown (5YR 4/4d); sandy loam; fine to medium granular; friable; plentiful fine roots; numerous small rock fragments; gradual, smooth boundary; pH 5.4.
Bm2	20 - 35	Dark reddish brown (2.5YR 3/4m), yellowish red (5YR 4/6d) sandy loam; weak, fine, granular and weak, medium, subangular blocky; friable; few roots; numerous small stone fragments; diffuse boundary; pH 5.5.
R	35+	Dusky red 2.5YR 3/2m); dark brown (7.5YR 4/4d) weathered gabbro rock.

BELMONT SERIES
Site Location - South of Twin Lakes, Methuen township, Con. III, Lot 8

Horizon	Depth cm	% Sand 2-1 mm	1-0.5 mm	0.5-0.25 mm	0.25-0.1 mm	0.1-0.05 mm	Total Sand 2.0-0.05 mm	% Silt 0.05-0.002 mm	% Clay 0.002 mm	Extractable Fe (%) Oxalate	Extractable Fe (%) Dithionite	Extractable Al (%) Oxalate	Extractable Al (%) Dithionite	% O.M.	pH
Ah	0-5	11.4	44.0	5.4	8.0	4.0	72.8	18.0	9.8	1.1	2.6	0.23	0.2	13.0	5.1
Bm1	5-15	16.0	47.7	7.4	7.6	3.1	81.8	12.3	5.9	1.3	2.6	0.30	0.3	2.2	4.9
Bm2	15-25	21.0	44.0	11.0	11.2	4.5	91.7	6.1	2.1	1.3	2.0	0.27	0.2	0.5	4.9
R	25 + rock														

Bondhead Series

Location: Otonabee township, Con. 111, Lot 16
Parent Material: Calcareous, moderately stony glacial till
Vegetation: Woodlot, maple, beech
Classification: Brunisolic Gray Brown Luvisol: loamy, mixed neutral, strongly calcareous, mild, humid
Landform: Rolling morainal

Horizon	Depth cm	Description
Ah	0 - 8	Dark gray (10YR 4/1d) sandy loam; weak, fine and medium, granular and subangular blocky; friable; numerous fine roots; few stones; clear, smooth boundary.
Ae1	8 - 25	Light yellowish brown (10YR 6/4d) sandy loam; very weak, fine, subangular blocky, friable; few roots; slightly stony.
Ae2	25 - 30	Very pale brown (10YR 7/4d) sandy loam; moderate, fine to medium, subangular blocky; friable; very few roots; slightly stony.
Bt	30 - 38	Reddish brown (5YR 4/3d) loam; moderate, medium subangular blocky; firm, irregular boundary; plentiful roots; moderately stony.
Ck	38 - 100	Very pale brown (10YR 7/3d) sandy loam; calcareous; moderately stony.

BONDHEAD SANDY LOAM
Site Location - Otonabee Township, Con. VII, Lot 14

Horizon	Depth cm	% Sand 2-1 mm	1-0.5 mm	0.5-0.25 mm	0.25-0.1 mm	0.1-0.05 mm	Total Sand 2.0-0.05 mm	% Silt 0.05-0.002 mm	% Clay 0.002 mm	Extractable Fe (%) Oxalate	Extractable Fe (%) Dithionite	Extractable Al (%) Oxalate	Extractable Al (%) Dithionite	% O.M.	pH
Ah	0-8	3.0	6.1	6.2	22.7	17.3	55.3	31.7	13.0	0.35	0.67	0.15	0.08	5.8	
Ae1	8-25	4.0	7.4	5.0	24.3	19.0	59.7	32.6	7.5	0.61	0.79	0.17	0.15	1.7	
Ae2	25-30	2.1	6.9	6.1	26.3	20.2	61.6	32.1	6.2	0.32	0.71	0.17	0.13	1.4	
Bt	30-38	2.3	6.7	6.1	23.5	17.0	55.6	23.4	20.9	0.38	1.1	0.21	0.15	1.0	
Ck	38-100	4.2	8.5	6.7	24.7	16.5	60.6	27.7	11.7	0.08	0.27	0.04	0.03	0.3	

Brinco Series

Location: Smith township, Con. VII, Lot 24
Parent Material: Calcareous sandy outwash
Classification: Brunisolic Gray Brown Luvisol: sandy, mixed, neutral, strongly calcareous, mild, humid
Landform: Undulating fluvial plain

Horizon	Depth cm	Description
Ah	0 - 5	Very dark grayish brown (10YR 3/2m) sandy loam; fine to medium; granular; friable; stone free; abrupt, smooth boundary.
Bm	5 - 15	Strong brown (7.5YR 5/8m) loamy sand; very weak, fine granular; very friable; gradual boundary.
Ae	15 - 50	Light yellowish brown (10YR 6/4m) loamy sand; single grain; loose; abrupt, wavy boundary.
Bt	50 - 60	Dark Brown (7.5YR 4/4m) sandy loam to loam; weak, fine subangular blocky; friable; abrupt, wavy boundary.
Ck	60+	Light brownish gray (10YR 6/2m) sand; single grain; effervescent.

Brooke Series

Location: Burleigh township, Con. IV, Lot 2
Parent Material: Thin glacial drift over limestone bedrock
Vegetation: Mixed softwood, cedar, balsam, soft maple, ash
Classification: Orthic Humic Gleysol: loamy-skeletal, mixed, neutral, very shallow, mild, subaquic
Landform: Level bedrock plain

Horizon	Depth cm	Description
Ah	0 - 13	Black (10YR 2/1m) loam; moderate, fine, granular, friable; numerous fine roots and decaying plant remains; clear, smooth boundary.
Bg1	13 - 20	Grayish brown (10YR 5/2m) loam; common, distint, dark yellowish brown (10YR 3/4m) mottles; medium subangular blocky; friable; few roots.
Bg2	20 - 30	Yellowish brown (10YR 5/4m) sandy loam; many, medium, distinct yellowish brown (10YR 5/6m) mottles; moderate medium subangular pseudo-blocky; abrupt; smooth boundary.
R	30+	Limestone bedrock.

Chandos Series

Location: Galway township, Con. IV, Lot 19
Parent Material: Outwash sand overlying calcite bedrock
Vegetation: Maple, birch, basswood
Classification: Orthic Dystric Brunisol: sandy, mixed, shallow, neutral, cool, humid
Landform: Undulating, veneered bedrock plain

Horizon	Depth cm	Description
L	1 - 0	Loose leaf litter.
Ah	0 - 5	Black (10YR 2/1m) loamy sand; weak, fine, granular; friable; plentiful, fine and medium, roots; clear, smooth boundary.
Bm1	5 - 13	Brown (7.5YR 4/4m) loamy sand; weak, fine, granular; friable; abundant, fine roots; diffuse boundary.
Bm2	13 - 38	Brown (7.5YR 5/4m) sand; single grain; loose; plentiful roots; diffuse boundary.
Bm3	38 - 70	Dark brown (7.5YR 3/2m) sand; very weak, fine, granular; friable; few roots.
R	70+	Weathered calcite or calcareous amphibolite.

CHANDOS SAND
Site Location - Chandos Township, Con. XI, Lot 17

Horizon	Depth cm	Sand %	Silt %	Clay %	O.M. %	pH	Extractable Fe (%)		Extractable Al (%)	
							Oxalate	Dithionite	Oxalite	Dithionite
Ah	0-10	91	6.0	3.0	5.3	2.5	0.48	0.50	0.32	0.18
Bm1	10-25	96	2.0	2.0	6.0	1.0	0.29	0.27	0.46	0.22
Bm2	25-43	98	1.5	0.5	6.1	0.36	0.10	0.13	0.21	0.10
C	43-68	98	1.4	0.6	6.2	0.45	0.10	0.14	0.16	0.10
R	68+									

Colborne Series

Location: Douro township, Con. VII, Lot 5
Parent Material: Sandy outwash overlying calcareous coarse gravel
Vegetation: Pasture
Classification: Brunisolic Gray Brown Luvisol: sandy-skeletal, mixed, strongly calcareous, mild, humid
Landform: Undulating fluvial plain

Horizon	Depth cm	Description
Ah	0 - 8	Very dark grayish brown (10YR 3/2m) sandy loam; weak, fine granular; very friable; clear, smooth boundary.
Bm	8 - 15	Yellowish red (5YR 4/6m) sandy loam; weak, fine granular; very friable; numerous fine roots; clear, smooth boundary.
Ae	15 - 25	Very pale brown (10YR 7/3d) loamy sand; single grain; loose; few roots; clear, irregular boundary.
Bt	25 - 30	Reddish brown (5YR 4/3d) sandy loam; weak, fine subangular blocky; friable; stony; clear; irregular boundary with some tongues into underlying horizon.
Ck	30 - 100	Grayish brown (10YR 5/2m) sand and gravel, strong effervescence.

Cramahe Series

Location: Asphodel township - Con. III, Lot 17
Parent Material: Calcareous, coarse gravel
Vegetation: Pasture
Classification: Orthic Melanic Brunisol: sandy-skeletal, mixed, strongly calcareous, mild, humid
Landform: Ridged glaciofluvial, very strong slopes

Horizon	Depth cm	Description
Ah	0 - 8	Very dark gray (10YR 3/1d) gravelly sandy loam; weak, fine granular; friable; numerous fine roots; clear, smooth boundary.
Bm	8 - 20	Brown (7.5YR 4/6d) gravelly sandy loam; moderate, medium subangular blocky; friable; cobbly; numerous roots.
Ck	20 - 100	Cobbly, poorly sorted, calcareous, sand and gravel.

Deloro Series

Location: Belmont township, Con. III, Lot 12
Parent Material: Calcareous, very stony, red, shaly till
Vegetation: Pasture
Classification: Orthic Melanic Brunisol: loamy-skeletal, mixed, strongly calcareous, mild, humid
Landform: Hummocky, moraine

Horizon	Depth cm	Description
Ah	0 - 15	Dark reddish brown (5YR 3/2d) gravelly loam; fine, moderate, subangular blocky; friable; exceedingly stony; clear, smooth boundary.
Bm	15 - 30	Dark reddish brown (5YR 3/4d) gravelly loam; fine, moderate, subangular blocky; friable, shaly; clear, smooth boundary.
Ck	30 - 100	Dark reddish brown (5YR 3/3d) gravelly loam; fine and medium, subangular pseudo blocky; friable; very stony and flaggy.

DELORO GRAVELLY LOAM

Horizon	Depth cm	Gravel %	Sand %*	Silt %*	Clay %*	pH in $CaCl_2$	O.M. %	$CaCO_3$ %	Extractable Fe (%) Oxalate	Extractable Fe (%) Dithionite	Extractable Al (%) Oxalate	Extractable Al (%) Dithionite
Ahk	0-15	46.9	37.0	42.3	20.7	7.2	5.3	1.5	0.37	1.01	0.19	0.08
Bm	15-30	34.2	42.3	41.0	16.7	7.4	1.9	neg.	0.41	0.98	0.21	0.08
Ck	30-100	38.6	54.1	21.3	24.6	7.4	1.5	neg.	0.41	1.16	0.23	0.09

* Expressed on the basis of 2 mm fraction

Douro Series

Location: Douro township, Con. IV, Lot 12
Parent Material: Shallow, calcareous stony till overlying limestone bedrock
Vegetation: Pasture
Classification: Orthic Melanic Brunisol: loamy-skeletal, mixed, very shallow, strongly calcareous, mild, humid
Landform: Veneered bedrock plain

Horizon	Depth cm	Description
Ah	0 - 10	Very dark gray (10YR 3/1d) loam; fine, weak, granular and subangular blocky; friable; very stony (numerous surface boulders).
Bm1	10 - 30	Brown (10YR 4/3d) loam; weak, medum, subangular blocky; friable; numerous roots; stony.
Bm2	30 - 45	Dark yellowish brown (10YR 4/4d) sandy loam; weak, fine, subangular blocky; friable; stony.
R	45+	Limestone bedrock.

Dummer Series

Location: Smith township, Con. XIII, Lot 22
Parent Material: Very stony, calcareous glacial till
Vegetation: Maple, beech
Classification: Orthic Melanic Brunisol: loamy-skeletal, mixed, strongly calcareous, mild, humid
Landform: Hummocky moraine

Horizon	Depth cm	Description
Ahk	0 - 10	Very dark gray (10YR 3/1d) loam; fine, weak, granular and subangular blocky; friable; very stony (numerous surface boulders).
Bmk1	10 - 30	Brown (10YR 4/3d) loam; weak, medium, subangular blocky; friable; numerous roots; stony
Bmk2	30 - 45	Dark yellowish brown (10YR 4/4d) sandy loam; weak, fine, subangular blocky; friable; stony.
Ck	45 - 100	Light brownish gray (10YR 6/2d) sandy loam; calcareous; very stony.

Dundonald Series

Location: Monaghan township, Con. XI, Lot 7
Parent Material: Sandy outwash overyling calcareous till
Vegetation: Grass
Classification: Brunisolic Gray Brown Luvisol: sandy over loamy skeletal, mixed, strongly calcareous, mild, humid
Landform: Undulating veneered moraine

Horizon	Depth cm	Description
Ah	0 - 8	Very dark brown (10YR 2/2m) sandy loam; weak, fine, subangular blocky and granular; friable; stone free; clear, smooth boundary.
Bm	8 - 20	Strong brown (7.5YR 5/8m) sandy loam; weak, fine subangular blocky; friable; stone free; gradual boundary.
Ae	20 - 45	Yellowish brown (10YR 5/4m) sandy loam; single grain; loose; stone free.
Bt	45 - 50	Yellowish red (5YR 5/6m) loam; medium subangular blocky; friable; few stones.
IICk	50+	Light brownish gray (10YR 6/2m) loam; calcareous; moderately stony glacial till.

Eldorado Series

Location: Belmont township, Con. VI, Lot 17
Parent Material: Calcareous, red, shaly till
Vegetation: Cultivated
Classification: Orthic Gray Brown Luvisol: loamy, mixed, moderately weakly calcareous, mild, humid
Landform: Undulating moraine

Horizon	Depth cm	Description
Ah	0 - 15	Dark reddish brown (5YR 3/3d) loam; fine, moderate subangular blocky; friable; few stones; clear smooth boundary; pH 6.8.
Ae	15 - 30	Reddish brown (5YR 5/3d) loam; fine, weak, platy; friable; few stones; clear, wavy boundary.
Bt	30 - 45	Dark reddish brown and reddish brown (5YR 3/3m, 4/3d) clay loam; strong, medium and coarse, subangular blocky; firm, few stones; clear, wavy boundary; pH 7.4.
Ck	45 - 100	Reddish brown and light reddish brown (5YR 4/3m, 6/4d) gravelly loam; subangular pseudo-blocky; firm; hard; moderately stony; calcareous; pH 7.4.

ELDORADO LOAM

Horizon	Depth cm	Gravel %	Sand %*	Silt %*	Clay %*	pH in $CaCl_2$	O.M. %	$CaCO_3$ %	Extractable Fe (%)		Extractable Al (%)	
									Oxalate	Dithionite	Oxalate	Dithionite
Ah	0-15	5.7	30.4	52.1	17.5	7.0	4.5	—	0.27	0.76	0.13	0.08
Ae	15-30	10.6	34.7	52.0	13.3	6.6	0.8	—	0.31	0.80	0.13	0.09
Bt	30-45	3.2	23.3	39.6	37.1	6.0	1.2	—	0.51	1.80	0.25	0.15
Ck	45-100	41.9	44.4	38.4	17.2	7.3	neg.	16.2	0.24	0.67	0.11	0.05

* Expressed on the basis of 2 mm fraction

Emily Series

Location: Ennismore township, Con. VI, Lot 10
Parent Material: Moderately stony, calcareous till
Vegetation: Cultivated hay
Classification: Gleyed Melanic Brunisol: loamy, mixed strongly calcareous, mild, humid
Landform: Undulating moraine

Horizon	Depth cm	Description
Ap	0 - 20	Dark gray (10YR 4/1d) loam; fine, moderate, subangular blocky; friable; many roots; few stones.
Bmgj	20 - 30	Yellowish brown (10YR 5/4d) loam; few, faint mottles (10YR 5/8d); weak, fine, subangular blocky; friable; few roots; moderately stony.
BC	30 - 45	Pale brown (10YR 6/3d) loam; common, medium, distinct brownish yellow (10YR 6/4d) mottles; numerous small stones; weak effervescence.
Ck	45+	Light brownish gray (10YR 6/2d) loam; strongly effervescent; moderately stony till.

Farmington Series

Location: Douro township, Con. IV, Lot 3
Parent Material: Thin glacial drift over limestone bedrock
Vegetation: Pasture
Classification: Orthic Melanic Brunisol: coarse loamy, mixed, very shallow, neutral, mild, humid
Landform: Veneered bedrock plain

Horizon	Depth cm	Description
Ap	0 - 15	Very dark grayish brown (10YR 3/2m) loam; moderate, fine and medium, granular; friable; abrupt, smooth boundary.
Bm	15 - 30	Dark yellowish brown (10YR 3/4m) loam; weak, medium, granular; friable; abrupt, smooth boundary.
R	30+	Limestone bedrock.

Foxboro Series

Location: Douro township, Con. X, Lot 4.
Parent Material: Calcareous alluvial fine sands and silts
Vegetation: Under cultivation
Classification: Orthic Humic Gleysol: coarse-silty, mixed; weakly calcareous, mild, aquic
Landform: Level fluvial plain

Horizon	Depth cm	Description
Ap	0 - 18	Very dark grey (10YR 3/1m) silt loam; moderate, medium subangular blocky; friable.
Bgl	18 - 35	Grayish brown (10YR 5/2m) silt loam; common, medium, prominent yellowish brown (10YR 5/6m) mottles; medium, moderate, subangular blocky; friable; gradual boundary.
Bg2	35 - 70	Light yellowish brown (10YR 6/4m) silt loam with sand lenses; many, distinct, medium and coarse mottles (7.5YR 5/6m); weak, medium, subangular blocky; friable; gradual boundary.
Ckg	70 - 100	Grayish brown (10YR 5/2m) fine sand and silt; amorphous; friable; moderately effervescent.

FOXBORO SILT LOAM

		% Sand			% Silt	% Clay	Extractable Fe (%)		Extractable Al (%)	
Horizon	Depth cm	0.25-0.10 mm	0.10-0.05 mm	2.0-0.05 mm	0.05-0.002 mm	0.002 mm	Oxalate	Dithionite	Oxalate	Dithionite
Ap	0-18	6.6	16.6	27.6	56.0	16.4	0.18	1.1	0.15	0.13
Bg_1	18-35	4.5	15.8	22.8	66.1	11.1	0.10	1.1	0.08	0.11
Bg_2	35-70	5.4	21.5	29.6	62.5	7.8	0.07	0.9	0.06	0.07
Ckg	70-100	4.1	9.6	18.0	70.8	11.2	0.14	0.6	0.08	0.05

Franktown Series

Location: Harvey township, Con. 111, Lot 19
Parent Material: Less than 30 cm of glacial till over limestone bedrock
Vegetation: Pasture
Classification: Gleyed Melanic Brunisol: coarse loamy, mixed, very shallow, weakly calcareous, mild, subaquic
Landform: Veneered bedrock plain

Horizon	Depth cm	Description
Ah	0 - 13	Very dark brown (10YR 2/2m) loam; moderate, fine granular; friable; few stones; pH 6.8.
Bmg	13 - 25	Brown (7.5YR 5/4m) loam, mottled with yellowish brown (10YR 5/4m); very weak, medium, subangular blocky; friable; few stones; pH 7.0.
R	25+	Limestone bedrock.

Galway Series

Location: Cavendish township, Con. XIV, Lot 16
Parent Material: Alluvial fine sands and/or silts overlying marble bedrock
Vegetation: Mixed deciduous and coniferous
Classification: Gleyed Dystic Brunisol: coarse loamy, mixed, shallow, acid, cool, subaquic
Landform: Undulating veneered bedrock plain

Horizon	Depth cm	Description
A	0 - 8	Black (10YR 2/1m) sandy loam; weak, fine, subangular blocky; friable; numerous roots; abrupt, smooth boundary.
Bm	8 - 23	Yellowish brown (10YR 5/4m) sandy loam, weak, fine granular and fine subangular blocky; friable; few roots; gradual, smooth boundary.
Cgj	23+	Yellow (10YR 7/6m) sandy loam; few, fine prominent, yellowish red (5YR 5/6m) mottles; weak, fine subangular pseudo blocky; very friable.
R		Marble bedrock, at variable depth ranging from 30-90 cm.

Granby Series

Location: Smith township, Con. VII, Lot 25
Parent Material: Outwash sand
Vegetation: Mixed woodlot
Classification: Orthic Humic Gleysol: sandy, mixed, weakly calcareous, mild, aquic
Landform: Level fluvial plain

Horizon	Depth cm	Description
Ah	0 - 15	Very dark grayish brown (10YR 3/2m) sandy loam; weak, medium granular; very friable, plentiful fine roots; clear, smooth boundary; pH 7.0.
Bg	15 - 45	Light yellowish brown (10YR 6/4m) sandy loam; common, medium, distinct yellowish brown (10YR 5/6m) mottles; single grain; loose; abrupt, wavy boundary.
Ckg	45 - 100	Light gray (10YR 7/2m) sand; common, medium, prominent yellowish brown (10YR 5/6m) mottles; weak, effervescence.

Harney Series

Location: Douro township, Con. I, Lot 25
Parent Material: Shallow, calcareous till overlying limestone bedrock
Vegetation: Woodlot
Classification: Orthic Humic Gleysol: loamy-skeletal, mixed, shallow calcareous, mild, aquic
Landform: Undulating veneered bedrock plain

Horizon	Depth cm	Description
Ah	0 - 10	Black (10YR 2/1m) loam; fine granular; friable; abundant fine roots; clear, smooth boundary; pH 7.2.
Bg	10 - 30	Grayish brown (10YR 5/2m) loam; many prominent yellowish brown (10YR 5/6m) mottles; weak, medium subangular blocky; friable; gradual boundary; pH 7.2.
Ckg	30 - 45	Pale brown (10YR 6/3m), very stony loam calcareous till, moderate effervescence.
R	45+	Limestone bedrock.

Kenabeek Series

Location: Anstruther township, Con. XIV, Lot 25
Parent Material: Noncalcareous glacial fluvial sand
Vegetation: Grass
Classification: Orthic Humic Gleysol: sandy, mixed, acid, cool, aquic
Landform: Level fluvial plain

Horizon	Depth cm	Description
Ah	0 - 10	Very dark brown (10YR 6/2m) sandy loam; fine granular; friable; pH 5.2.
Bg	10 - 50	Light brownish red (10YR 6/2m) sand; many medium prominent yellowish red (5YR 5/8m) mottles; single grain; loose; pH 5.3.
Cg	50 - 100	Yellowish brown (10YR 5/6m) sand; single grain; loose; pH 5.5.

Long Series

Location: Douro township, Con. 11, Lot 8
Parent Material: Stony, calcareous, loam till over limestone
Vegetation: Grass
Classification: Orthic Melanic Brunisol: loamy-skeletal, mixed, shallow, strongly calcareous, mild, humid
Landform: Undulating veneered bedrock plain

Horizon	Depth cm	Description
Ah	0 - 10	Very dark grayish brown (10YR 3/2d) loam; weak, fine, granular; friable; stony; abrupt, smooth boundary; pH 7.2.
Bm	10 - 23	Brown (10YR 5/3d) loam; weak, fine, subangular blocky; friable; stony; abrupt smooth boundary; pH 7.4.
Ck	23 - 40	Light brownish gray (10YR 6/2m) loam; stony, calcareous till, strongly effervescent; pH 8.2.
R	40 - 100	Limestone bedrock.

Lyons Series

Location: Smith township, Con X, Lot 23
Parent Material: Calcareous stony till
Vegetation: Cedar, balsam, soft maple
Classification: Orthic Humic Gleysol: loamy-skeletal, mixed, strongly calcareous, mild, aquic
Landform: Undulating moraine

Horizon	Depth cm	Description
Ah	0 - 15	Black (10YR 2/1m) loam; weak, medium, granular; friable; moderately stony; abrupt, smooth boundary; pH 7.3.
Bg	15 - 30	Pale brown (10YR 6/3m) loam, common medium, prominent yellowish brown (10YR 5/6m) mottles; weak, medium subangular blocky; friable; moderately stony; abrupt, smooth boundary; pH 7.2.
Ckg	30 - 100	Grayish brown (10YR 5/2m) loam; calcareous till, strongly effervescent; very stony; some large boulders; pH 8.0.

Mallard Series

Location: Belmont township, Con. XII, Lot 3
Parent Material: Noncalcareous, sandy outwash
Vegetation: Grass
Classification: Gleyed Humo-Ferric Podzol: sandy, mixed, acid, cool, subaquic
Landform: Level fluvial plain

Horizon	Depth cm	Description
Ah	0 - 5	Black (10YR 2/1m) sandy loam; weak, fine granular; friable; plentiful fine roots; pH 3.9.
Ae	5 - 13	Light gray (7.5YR 7/0m) sand; single grain; loose; friable; few roots; clear, wavy boundary with some fine tongues into underlying horizons; pH 4.4.
Bfgj	13 - 18	Reddish brown (5YR 4/4m) loamy sand; common fine distinct strong brown (7.5YR 5/6m) mottles; weak, fine and medium, subangular blocky; friable; clear, wavy boundary; plentiful, fine roots; pH 4.5.
Bgj	18 - 45	Reddish brown (5YR 5/6m) sand; single grain; loose; common fine; faint, strong brown (7.5YR 5/6m) mottles; few, fine, roots; smooth, gradual boundary; pH 5.2.
BC	45 - 65	Brownish yellow (10YR 6/6m) sand; single grain; loose; smooth, gradual boundary; pH 5.8.
C	65 - 100	Light yellowish brown (10YR 6/4m) sand; single grain; loose; pH 5.6.

MALLARD SANDY LOAM
Site Location - Belmont Township, Con. XII, Lot 3

Horizon	Depth cm	Sand %	Silt %	Clay %	O.M. %	pH	Extractable Fe (%)		Extractable Al (%)	
							Oxalate	Dithionite	Oxalate	Dithionite
Ah	0-5	—	—	—	3.9	—	0.07	0.16	0.08	0.11
Ae	5-13	87	10	3	4.4	2.4	0.13	0.41	0.03	0.04
Bfgj	13-18	84	11	5	4.5	5.5	0.95	1.21	0.45	0.54
Bgj1	18-30	96	4	—	5.2	2.8	0.16	0.78	0.3	0.27
Bfj2	30-45	94	5	1	5.2	1.8	0.13	0.3	0.26	0.17
BC	45-65	98	1	1	5.3	1.3	0.11	0.21	0.2	0.11
C1	65-70	99	1	—	5.8	0.9	0.05	0.13	0.13	0.07
C2	70+	99	1	—	5.6	0.6	0.03	0.13	0.11	0.07

Monteagle Series

Location: Galway township, Con. III, Lot 7, forest access road
Parent Material: Very stony, noncalcareous till
Vegetation: Deciduous with some pine, spruce and balsam
Classification: Orthic Humo-Ferric Podzol: sandy-skeletal, mixed, acid, cool, humid
Landform: Hummocky veneered bedrock

Horizon	Depth cm	Description
L-H	5 - 0	Black (10YR 2/1m) semi-decomposed organic matter; abundant fine roots; smooth boundary.
Ah	0 - 5	Black (7.5YR 2/0m) sandy loam; moderate, fine to medium, granular; plentiful fine roots; very stony; abrupt, smooth boundary; pH 4.9.
Ae	5 - 8	Light gray (10YR 6/1m) loamy sand; single grain; loose; few, fine and medium roots; clear, smooth boundary; pH 4.3.
Bf1	8 - 18	Reddish brown (5YR 4/4m) sandy loam; weak, fine and medium, granular; friable; plentiful fine roots; very stony; gradual boundary; pH 5.2.
Bf2	18 - 35	Reddish brown (5YR 4/3m) sandy loam; friable; few, fine and medium roots; very stony; smooth gradual boundary; pH 5.3.
Bm	35 - 48	Reddish brown (5YR 4/4m) sandy loam; weak, medium granular and subangular blocky; friable; very stony; smooth gradual boundary; pH 5.7.
C	48 - 100	Yellowish brown (10YR 5/4m) loamy sand; very stony till; pH 5.7.

MONTEAGLE SANDY LOAM
Site Location - Cavendish Township, Con. III, Lot 5

Horizon	Depth cm	Sand %	Silt %	Clay %	O.M. %	pH	Extractable Fe (%)		Extractable Al (%)	
							Oxalate	Dithionite	Oxalate	Dithionite
Ah	0-3	—	—	—	4.9	3.2	0.24	0.57	0.12	0.10
Ae	3-6	71	25	4	4.3	2.6	0.87	0.72	0.06	0.07
Bf1	6-16	53	43	4	5.2	6.1	0.34	1.6	0.81	0.51
Bf2	16-30	62	35	3	5.3	2.2	0.93	1.8	0.93	0.45
Bm	30-50	59	38	3	5.7	0.9	0.64	1.6	0.46	0.33
C	50-100	79	20	1	5.7	0.08	0.35	0.11	0.32	0.13

Otonabee Series

Location: Douro township, Con. X, Lot 4
Parent Material: Calcareous, moderately stony loam till
Vegetation: Pasture
Classification: Orthic Melanic Brunisol: loamy, mixed, strongly calcareous, mild, humid
Landform: Rolling moraine

Horizon	Depth cm	Description
Ah	0 - 10	Very dark brown (10YR 2/2m) loam; weak, fine subangular blocky; friable; numerous, fine roots; abrupt, smooth boundary.
Bm	10 - 20	Brown (10YR 5/3m) sandy loam; weak, medium, subangular blocky; friable, few stones.
BC	20 - 30	Brown (10YR 4/3m) sandy loam; weak, fine subangular blocky; friable; moderately stony; moderate effervescence; gradual, smooth boundary.
Ck	30 - 100	Light brownish gray (10YR 6/2d) sandy loam; moderately stony; calcareous.

OTONABEE LOAM
Site Location - N. Monaghan Township, Con. III, Lot 5

Horizon	Depth cm	% Sand						% Silt 0.05-0.002 mm	% Clay 0.002 mm	Extractable Fe (%)			Extractable Al (%)	
		2-1 mm	1-0.5 mm	0.5-0.25 mm	0.25-0.1 mm	0.1-0.05 mm	2.0-0.05 mm			O.M. %	Oxalate	Dithionite	Oxalate	Dithionite
Ah	0-10	5.7	9.5	5.1	16.2	12.8	49.3	36.6	14.1	8.0	0.29	0.85	0.15	0.11
Bm	10-20	4.4	9.7	5.3	19.6	13.5	52.5	30.1	17.4	2.4	0.23	0.95	0.16	0.12
BC	20-30	2.9	9.0	6.5	22.7	13.1	54.2	28.1	12.7	2.3	0.23	0.90	0.16	0.12
C	30-100	7.3	11.5	9.1	23.7	13.9	65.5	22.7	11.8	1.0	0.03	0.25	0.04	0.02

Rockcroft Series

Location: Dummer township, Con. III, Lot 13
Parent Material: Shallow, calcareous stony till overlying limestone bedrock
Vegetation: Pasture
Classification: Gleyed Melanic Brunisol: loamy-skeletal, mixed, very shallow, strongly calcareous, mild subaquic
Landform: Hummocky veneered bedrock plain

Horizon	Depth cm	Description
Ah	0 - 8	Very dark brown (10YR 2/2m) sandy loam; moderate, fine granular; friable; stony; abundant, fine roots; abrupt, smooth boundary.
Bmgj	8 - 20	Dark yellowish brown (10YR 4/4m) loam; few, medium faint, pale brown (10YR 6/3m) mottles; weak, fine, subangular blocky; friable; stony.
Ckgj	20 - 38	Grayish brown (10YR 5/2m) loam; few, medium, faint light brownish gray (10YR 6/2m) mottles; stony, faint mottles; strong effervescence.
R	38 - 100	Limestone bedrock.

Simcoe Series

Location: Otonabee township, Con. XII, Lot 21
Parent Material: Lacustrine clay
Vegetation: Cultivated
Classification: Orthic Humic Gleysol: fine-clayey, mixed, weakly calcareous, mild, aquic
Landform: Level lacustrine plain

Horizon	Depth cm	Description
Ap	0 - 18	Very dark gray (10YR 3/1m) clay loam; moderate, fine to medium, subangular blocky (cloddy); friable; stone free.
Bg1	18 - 43	Grayish brown (10YR 5/2m) clay loam; common medium prominent reddish brown (5YR 4/4m) mottles; medium blocky; plastic, sticky; stonefree.
Bg2	43 - 60	Grayish brown (10YR 5/2m) clay; few, fine prominent strong brown (7.5YR 5/6m) mottles; weak, medium blocky; plastic, sticky.
Ckg	60 - 100	Light brownish gray (10YR 6/2m) clay; strongly effervescent; stone free.

Solmesville Series

Location: Ennismore township, Con. IV, Lot 9
Parent Material: Shallow lacustrine over calcareous till
Vegetation: Cultivated
Classification: Gleyed Gray Brown Luvisol: clayey over loamy-skeletal, mixed, weakly calcareous, milk, subaquic
Landform: Undulating, veneered moraine

Horizon	Depth cm	Description
Ap	0 - 15	Very dark brown (10YR 2/2m) silty clay loam; fine, moderate, subangular blocky; friable; clear, smooth boundary; stone free.
Aegj	15 - 23	Dark grayish brown (10YR 4/2m) silty clay loam; common strong brown (7.5YR 5/6m) mottles; fine, moderate subangular blocky; firm; clear smooth boundary; stone free.
Btgj	23 - 35	Very dark grayish brown (10YR 3/2m) silty clay loam; strong brown mottles as above; moderate, medium subangular blocky; firm; stone free.
IICk	35 - 100	Grayish brown (10YR 5/2m) loam; stony; strongly effervescent glacial till.

St. Croix Series

Location: Galway township, Con. II, Lot 4, Mississauga Forest access road
Parent Material: Alluvial silt deposits
Vegetation: Elm, soft maple, hemlock
Classification: Orthic Gleysol: loamy, mixed, shallow, neutral, cool, aquic
Landform: Level veneered bedrock

Horizon	Depth cm	Description
Ah	0 - 3	Very dark gray (10YR 3/1m) silt loam; medium to coarse granular; friable; numerous roots; stone free; clear, smooth boundary.
Bj	3 - 40	Dark gray (10YR 4/1m) silt loam, uniform dull color; weak, fine to medium, subangular blocky; friable; few roots; diffuse, smooth boundary.
Cg	40+	Gray (10YR 5/1m) uniformly colored, fine sandy loam; structureless; stone free; wavy boundary.
R	variable	Marble bedrock

ST. CROIX SILT LOAM

Horizon	Depth cm	% Sand 2.0-0.05 mm	% Silt 0.05-0.002 mm	% Clay 0.002 mm	pH in $CaCl_2$	O.M. %	$CaCO_3$ %	Extractable Fe (%)		Extractable Al (%)	
								Oxalate	Dithionite	Oxalate	Dithionite
Ah	0-3	—	—	—	5.9	12.4	—	0.52	0.84	0.44	0.18
Bg	3-40	31.2	55.8	13.0	6.2	3.8	—	0.37	1.37	0.29	0.21
Cg	40+	38.2	49.2	12.6	6.3	1.4	neg.	0.28	0.76	0.21	0.07

St. Peter's Series

Location: Anstruther township, Con. 1, Lot 33
Parent Material: Noncalcareous outwash gravel
Vegetation: Old meadow, partly reforested
Classification: Orthic Humo-Ferric Podzol: sandy-skeletal, mixed, acid, cool, humid
Landform: Undulating fluvial plain

Horizon	Depth cm	Description
Ap	0 - 13	Dark brown (10YR 3/3d) loamy sand; weak, fine, granular; friable; few small stones; pH 5.5.
Ae	13 - 18	Light brownish gray (10YR 6/2m) sand; single grain; loose, partially destroyed by cultivation; few roots; clear, smooth boundary.
Bf	18 - 25	Yellowish brown (10YR 5/6d) loamy sand; containing large, discontinous, weakly cemented yellowish brown (10YR 5/4d) aggregates; clear, smooth boundary; pH 5.5.
Bm	25 - 40	Yellowish brown (10YR 5/8d) sand; single grain; loose, few weak cemented concretions as in horizon above; smooth, clear boundary; pH 5.6.
C	40 - 100	Multi-colored gravelly sand outwash; pH 5.6.

ST. PETER'S LOAMY SAND
Site Location - Burleigh Township, approx. 1 mile southwest of Apsley

Horizon	Depth cm	% Sand 2.0-0.05 mm	% Silt 0.05-0.002 mm	% Clay 0.002 mm	O.M. %	Extractable Fe (%)		Extractable Al (%)	
						Oxalate	Dithionite	Oxalate	Dithionite
Ap	0-13	78	18	4	4.0	0.23	0.98	0.41	0.27
Bf	13-20	82	16	2	3.8	0.43	1.3	0.48	0.64
Bm1	20-25	92	7	1	2.4	0.24	0.59	0.13	0.35
Bm2	25-35	96	3	1	1.5	0.29	0.28	0.13	0.15
BC	35-48	99	1	—	0.9	0.15	0.41	0.07	0.17
C1	48-58	99	1	—	0.8	0.12	0.36	0.07	0.15
C2	58-100	99	1	—	0.3	0.08	0.25	0.03	0.13

Tecumseth Series

Location: Douro Township, Con. II, Lot 5
Parent Material: Calcareous, sandy outwash
Vegctation: Hay
Classification: Gleyed Brunisolic Gray Brown Luvisol: sandy, mixed, weakly calcareous, mild, humid
Landform: Level fluvial plain

Horizon	Depth cm	Description
Ap	0 - 15	Very dark gray (10YR 3/1m) sandy loam; weak, fine, granular; friable; abrupt, smooth boundary; pH 7.2.
Bm	15 - 25	Yellowish brown (10YR 5/6m) sandy loam; weak, fine, granular; friable; diffuse boundary; pH 7.0.
Aegj	25 - 48	Pale brown (10YR 6/3m) loamy sand; few, medium, faint yellowish brown (10YR 5/4m) mottles; single grain; loose; clear smooth boundary; pH 6.9.
Btj	48 - 53	Brown (10YR 3/2m) sandy loam; moderate, medium subangular blocky; friable; irregular, abrupt boundary.
Ck	53-100	Very pale brown (10YR 7/2d) loamy sand; structureless; moderately effervescent.

Trent Series

Location: N. Monaghan township, Con. X, Lot 10
Parent Material: Calcareous fine sand
Classification: Gleyed Brunisolic Grey Brown Luvisol: coarse-silty, mixed, weakly calcareous, mild, subaquic
Landform Undulating fluvial plain

Horizon	Depth cm	Description
Ap	0 - 15	Very dark grayish brown (10YR 3/2m) fine sandy loam; weak granular; friable; abrupt smooth boundary; pH 6.8.
Ae	15 - 23	Brownish yellow (10YR 6/6m) fine sandy loam; weak, fine, granular; friable; diffuse boundary; pH 6.6.
Aegj	23 - 40	Light yellowish brown (10YR 6/4m) fine sandy loam; few, fine prominent reddish yellow (5YR 6/8m) mottles; very weak granular; friable; abrupt boundary; pH 6.9.
Btgj	40 - 50	Reddish brown (5YR 4/3m) silt loam; few, fine, distinct, strong brown (7.5YR 5/8m) mottles; weak, subangular blocky; friable; abrupt boundary; pH 7.3.
Ck	50 - 100	Light gray (10YR 7/1d) fine sand; structureless; calcareous.

Tioga Series

Location: North Monaghan township, Con. VIII, Lot 3
Parent Material: Calcareous outwash sand
Vegetation: Grass
Classification: Brunisolic Gray Brown Luvisol: sandy, mixed, weakly calcareous, mild, humid
Landform: Undulating glaciofluvial plain

Horizon	Depth cm	Description
Ah	0 - 5	Very dark brown (10YR 2/2m) sandy loam; fine, weak granular; friable; abundant fine roots; abrupt, smooth boundary.
Bm	5 - 18	Reddish brown (5YR 4/4m) sandy loam; weak, fine, granular; very friable; plentiful fine roots; clear, smooth boundary.
Ae	18 - 50	Ligh brown (7.5YR 5/6m) loamy sand; single grain; loose; few roots; clear, wavy boundary.
Bt	50 - 55	Yellowish red (5YR 4/8m) loamy sand; weak, fine, subangular blocky; very friable; clear, wavy boundary.
Ck	55 - 100	Light yellowish brown (10YR 6/4m) sand; single grain, loose; weakly effervescent.

Tweed Series

Location: Cavendish township, Con. XVI, Lot 14
Parent Material: Shallow soil materials overlying weathered marble
Vegetation: Aspen, spruce, pine
Classification: Orthic Melanic Brunisol: sandy, micaceous, shallow, weakly calcareous, cool humid
Landform: Undulating veneered bedrock

Horizon	Depth cm	Description
Ah	0 - 10	Dark grayish brown (10YR 4/2d) sandy loam; weak, fine granular; friable.
Bm1	10 - 20	Dark brown (7.5YR 4/4d) sandy loam, very weak, fine subangular blocky; friable; few roots.
Bm2	20 - 38	Dark yellowish brown (10YR 4/4d) sandy loam; weak, fine subangular blocky; friable.
Ck	38 - 60	Sand; crumbling, weathered calcite with large amounts of mica, gradual, irregular boundary.
R	60+	Dense unweathered marble.

TWEED SANDY LOAM
Site Location - Burleigh Township - Con. X, Lot 3, Peterborough Game Reserve

Horizon	Depth cm	% Sand 2.0-0.05 mm	% Silt 0.05-0.002 mm	% Clay 0.002 mm	pH in $CaCl_2$	O.M. %
Ah	0-10	53.2	33.4	13.4	5.7	14.4
Bm	10-25	62.6	32.6	4.8	7.1	1.7
Ck	25-45	88.8	8.1	3.1	6.9	0.2

Waupoos Series

Location: Smith township, Con. II, Lot 16
Parent Material: Shallow lacustrine over calcareous till
Vegetation: Under cultivation
Classification: Orthic Gray Brown Luvisol: fine silty, mixed, strongly calcareous, mild, humid
Landform: Undulating veneered moraine

Horizon	Depth cm	Description
Ap	0 - 15	Very dark grayish brown (10YR 3/2m) silty clay loam; fine, moderate, subangular blocky; friable; abrupt, smooth boundary; stone free.
Ae	15 - 25	Brown (10YR 4/3m) silty clay loam; fine, moderate, subangular blocky; friable; abrupt, smooth boundary; stone free.
Bt	25 - 45	Dark brown (10YR 3/3m) silty clay; moderate, medium, subangular blocky; firm; stone free.
IICk	45 - 100	Grayish brown (10YR 5/2m) loam; stony, calcareous till.

Wendigo Series

Location: Haliburton County, Glamorgan township, Con. I, Lot 24. Highway 507 approx. 8 km south of Gooderham, 27 km north of Highway 36
Parent Material: Noncalcareous outwash sand
Vegetation: Red pine plantation
Classification: Orthic Humo-Ferric Podzol: sandy, mixed, acid, cool, humid
Landform: Level fluvial plain

Horizon	Depth cm	Description
L-H	2 - 0	Dark brown (7.5YR 3/2m) humified needles and leaves, friable; abrupt, irregular boundary.
Ae	0 - 5	Light gray (10YR 7/2m) loamy sand; weak, fine granular; friable; broken boundary.
Bf	5 - 15	Dark reddish brown (5YR 3/4m) sandy loam; weak, fine granular; friable abundant roots; clear smooth boundary.
Bm1	15 - 35	Reddish brown (5YR 4/4m) loamy sand; weak, fine granular; few roots; gradual, smooth boundary.
Bm2	35 - 55	Strong brown (7.5YR 5/6m) sand; single grain; loose; few roots; gradual, smooth boundary.
C	55 - 70	Light yellowish brown (10YR 6/4m) sand; single grain; loose.

Wemyss Series

Location: Peterborough game reserve, Burleigh township, Con. XIV, Lot 5
Parent Material: Very stony noncalcareous till
Classification: Gleyed Humo-Ferric Podzol: sandy-skeletal, mixed, acid, cool, humid
Landform: Undulating moraine

Horizon	Depth cm	Description
H	3 - 0	Black (10YR 2/1m) decomposed organic matter.
Ah	0 - 3	Very dark brown (10YR 2/2m) sandy loam; fine, weak, granular; plentiful, fine roots and fungi; abrupt, smooth boundary.
Ae	3 - 8	White (10YR 6/1m) sand; single grain; loose; few roots.
Bf	8 - 15	Reddish brown (5YR 4/4m) sandy loam; weak, fine and medium, granular; friable; few, fine roots; moderately stony; gradual boundary.
Bmgj	15 - 35	Brown (7.5YR 4/4m) sandy loam; few, fine, distinct yellowish brown (10YR 5/4m) mottles; weak, fine granular; few roots; moderately stony.
C	35 - 100	Light olive brown (2.5YR 5/4m) sandy loam; very stony till.

White Lake Series

Location: Smith township, Con. VIII, Lot 22
Parent Material: Poorly sorted gravel of mixed Precambrian and Ordovician origin
Vegetation: Grass
Classification: Luvisolic Humo-Ferric Podzol: sandy-skeletal, mixed, acid, cool, humid
Landform: Hummocky glaciofluvial plain

Horizon	Depth cm	Description
Ah	0 - 5	Very dark grayish brown (10YR 3/2d) sandy loam; fine, weak, granular; very friable; numerous fine roots; abrupt, smooth boundary.
Ae	5 - 10	Light gray (10YR 7/2d) sand; single grain; loose; few roots; abrupt, smooth boundary.
Bf	10 - 30	Brown (10YR 5/3d) sandy loam; fine, weak granular; abundant roots; gradual, smooth boundary.
Ae	30 - 50	Pale brown (10YR 6/3d) loamy sand; single grain; loose; abrupt smooth boundary.
Bt	50 - 63	Very dark brown (10YR 2/2d) gravelly sandy loam; weak, fine, subangular blocky; very friable; stony.
IICk	63 - 100	Multicolored coarse, cobbly gravelly sand.

WENDIGO SANDY LOAM

Horizon	Depth cm	% Sand 2.0-0.05 mm	% Silt 0.05-0.002 mm	% Clay 0.002 mm	pH in $CaCl_2$	O.M. %
L-H and Ae	0-5	65.1	21.1	13.7	5.3	9.7
Bf	5-15	66.9	27.1	5.9	5.6	5.3
Bm1	15-35	70.0	26.4	3.6	5.4	3.2
Bm2	35-55	83.7	14.2	2.0	5.6	0.9
C	55-70	86.1	11.7	2.2	5.7	0.5