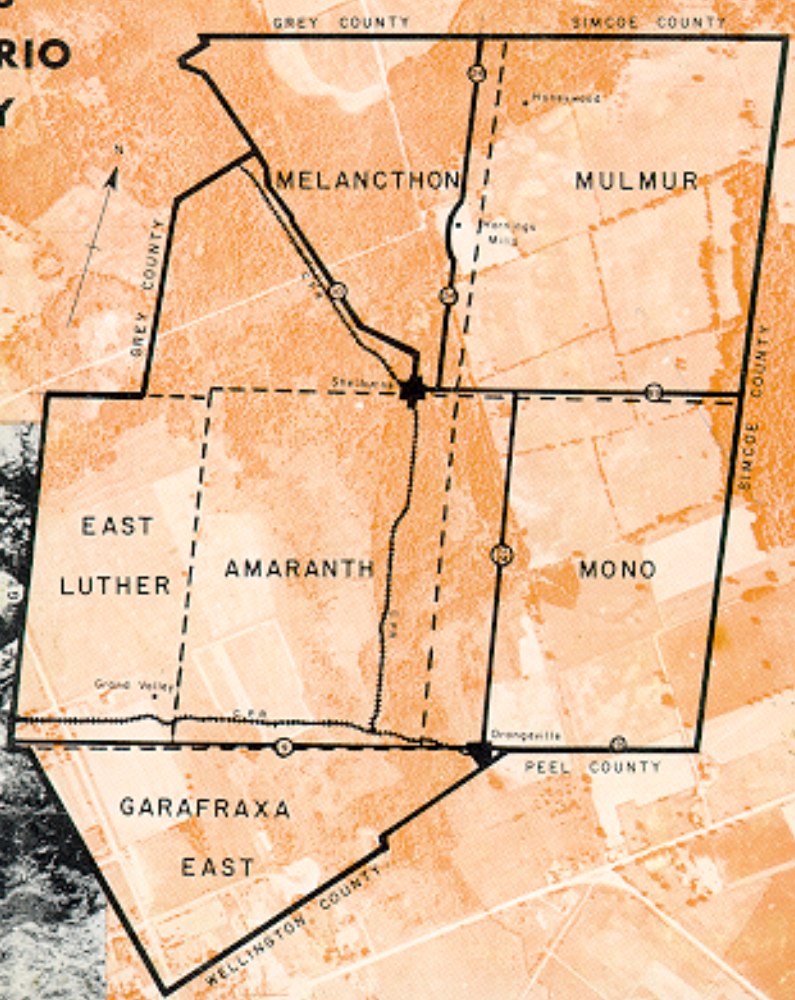
SOIL SURVEY OF DUFFERIN COUNTY ONTARIO

REPORT No. 38
OF THE ONTARIO
SOIL SURVEY



Prepared jointly by the Research Branch, Canada Department of Agriculture and the Ontario Agricultural College.

CANADA DEPARTMENT OF AGRICULTURE, OTTAWA
ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO

SOIL SURVEY
of
DUFFERIN COUNTY
Ontario

by

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GUELPH, ONTARIO
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RESEARCH BRANCH,
CANADA DEPARTMENT OF AGRICULTURE
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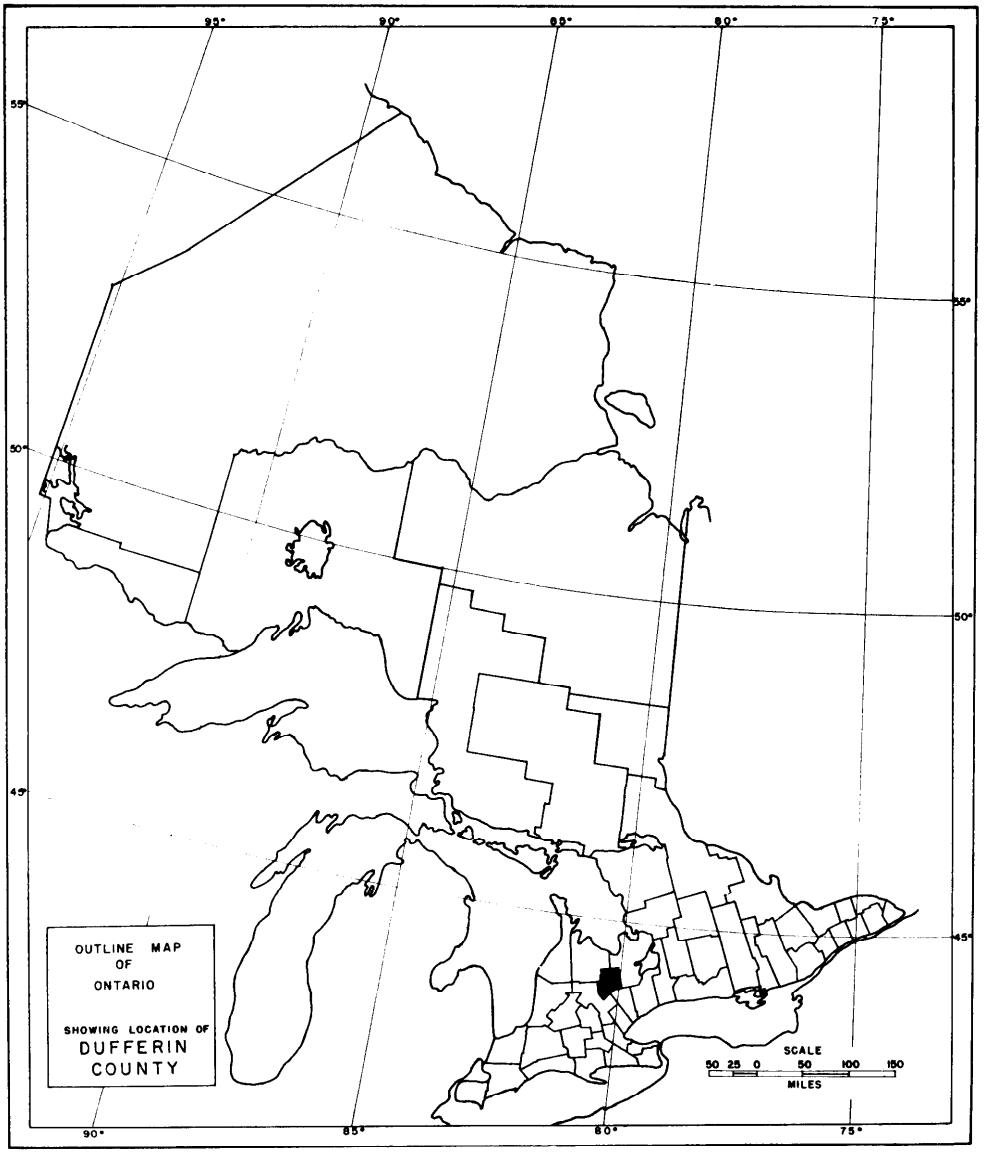


Figure 1 — Outline Map of Ontario Showing Location of Dufferin County

SOIL SURVEY REPORT OF DUFFERIN COUNTY, Ontario

by

D. W. Hoffman, R. E. Wicklund, and B. C. Matthews

INTRODUCTION

The survey of the soils of Dufferin County was conducted in 1958 and the final checking and correlation was completed in 1961. The objective of the survey was to classify and describe the soils and to prepare a map showing the location and area of the different soil types. The results of the survey are presented in this report and on the accompanying soil map.

There is considerable variation in the soils in the county. The relief varies from depressional to very hilly and, except for a few small areas near the top of the Niagara Escarpment, the soil deposits are deep. Almost all of the soils in the county can be cultivated although they usually require some improvement. Such improvements may consist of fertilizer applications, installation of drains, irrigation, practices to reduce erosion, or stone removal.

Mixed farming and livestock raising are most common and the sale of agricultural products from cattle, chickens, swine and sheep provide a large part of the farm income. The county is not well known for the production of a wide range of cash crops. However, large acreages of potatoes are grown in the vicinity of Honeywood and Redickville and flax is an important crop in a few places.

This report deals with the origin and natural characteristics of the soils as well as their capabilities and limitations for agricultural use. Each soil type is described in detail and its location is shown on the soil map.

A section on soil management and a rating of the soils according to their suitability for various crops is included in the report. Sources of additional information with regard to crops and fertilizer practices are listed.

GENERAL DESCRIPTION OF THE AREA

Location

Dufferin County is bounded on the west by Wellington and Grey Counties, on the south by Wellington and Peel, on the east by Simcoe and on the north by Simcoe and Grey Counties.

The total land area is 356,400 acres (557 square miles) of which 309,992 acres (84 per cent) is occupied farm land.

Principal Towns

Orangeville with a population of close to 4,000 and situated on the Peel-Dufferin County boundary is the county seat. The office of the Agricultural Representative is located there as are the offices of those concerned with the municipal government. The two villages in the county are Shelburne (pop. 1300) twelve miles north of Orangeville and Grand Valley (pop. 655) eleven miles west of Orangeville.

Population

In 1961 according to the Census of Canada, the total population of Dufferin County was 15,569. Approximately 67 per cent (10,437) of the people were rural dwellers but only 53 per cent lived on farms.

The trend in population from 1871 to 1956 is shown in Table 1. From 1891 to 1941 there was a loss in population and over this fifty-year period more than 8,000 people left the county. However, there was a slight growth in population from 1941 to 1956 but most of this occurred in the urban centres.

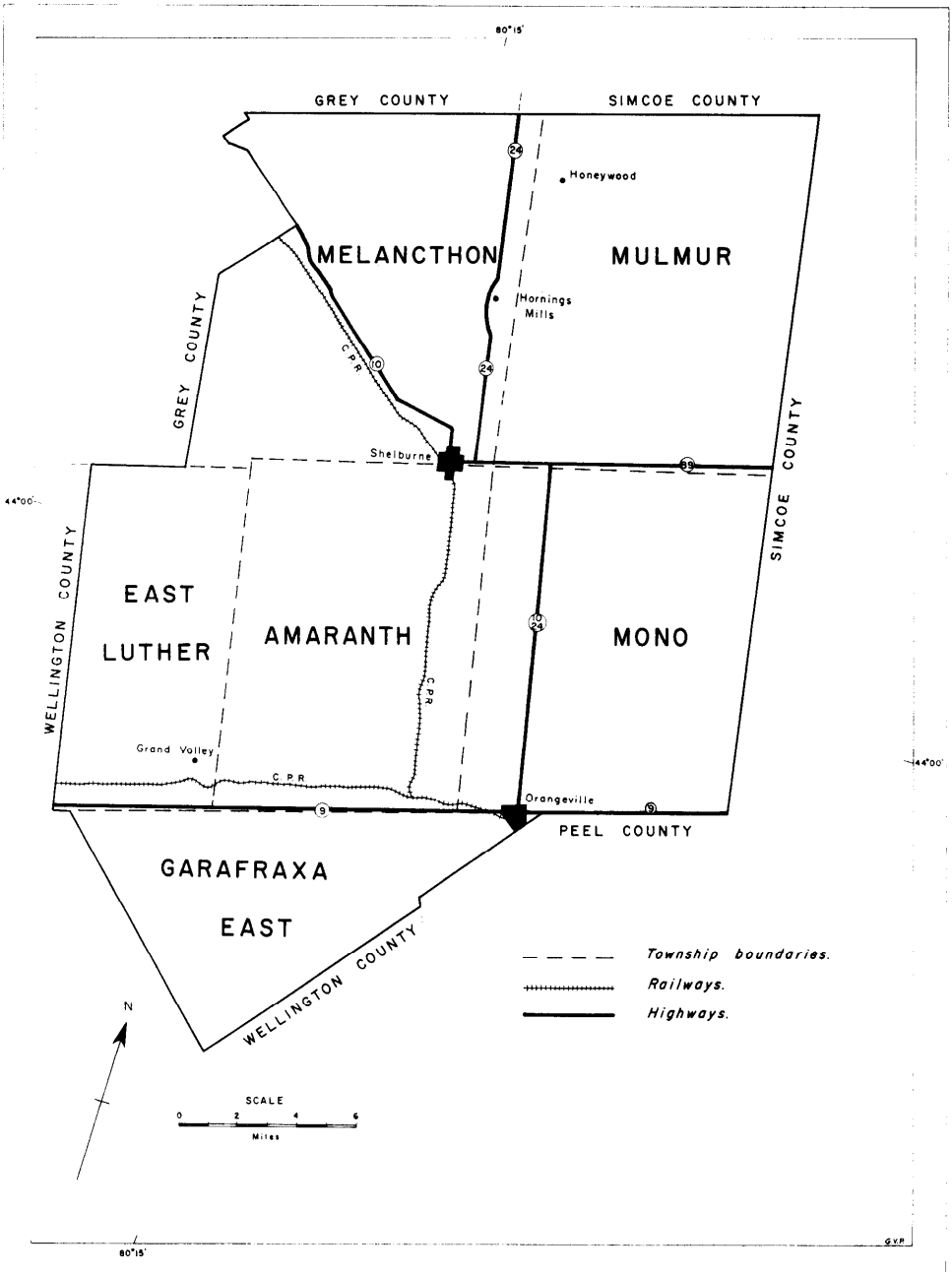


Figure 2 — Townships, Principal Towns, Highways and Railways in Dufferin County

TABLE 1
TREND IN TOTAL POPULATION

Year	*Popluation*	*Year*	*Popluation*
1871	16,689	1921	15,415
1881	22,084	1931	14,892
1891	22,332	1941	14,075
1901	21,036	1951	14,566
1911	17,740	1961	15,569

Transportation

Good roads and railways traverse the county, connecting it with the main marketing centres in the Province. All of the highways, except No. 89 highway which links Shelburne and Alliston, pass through Orangeville. Highway No. 10 joining Owen Sound and Toronto and Highway No. 24 running from Collingwood to Guelph pass through the middle of the county in a north-south direction. From east to west in the southern part of the County is Highway 9. In addition to these highways there is a good network of county and township roads.

Rail service is provided by the Canadian Pacific Railway which has two lines passing through Orangeville, one leading west via Arthur and the other going north through Shelburne.

Geology of the Underlying Rocks

This portion of Ontario has been subjected to repeated glaciations and the rock is covered by glacial drift that varies from a few inches to several hundred feet in thickness. The soils have developed directly from the deposits of drift and the extent to which the underlying bedrock has contributed to the composition of the soils is difficult to assess.

Dufferin County is underlain by sedimentary strata of Ordovician and Silurian ages (Figure 3). The line of contact between the Ordovician and Silurian rocks is well defined by the Niagara Escarpment. The Ordovician rocks lie to the east and the Silurian rocks to the west of the Escarpment. Of the Silurian rocks the uppermost strata consist of dolomite, shale and sandstone of the Medina formation. These rocks are underlain by gray and buff dolomites of the Lockport and Guelph formations. These three formations are the only ones of Silurian age occurring in the county.

Only the upper formations of the Ordovician age occur in the area. Uppermost and adjacent to the Escarpment are the reddish shales of the Queenston formation. Below this formation lie the grayish shales of the Dundas and Meaford formations. These latter formations occupy but a small part of the underlying rocks on the eastern side of the county.

Surface Deposits

The unconsolidated surface deposits in Dufferin County are of glacial origin and are the parent material from which the soils have developed. The variations that occur in texture, relief and drainage of soils are a result of differences in the nature of these deposits as described in Table 2 and distributed as shown in Figure 4.

The surface deposits are commonly referred to as till, outwash, kame, esker, deltaic, and lacustrine which denote the mode of deposition and, to some extent, the textural composition of the deposit. Glacial till is non-sorted material, a mixture of broken rock fragments and soil particles that range in size from sand to clay. Glacial till covers a large part of Dufferin County.

Gently undulating till plains cover most of Amaranth, East Garafraxa, East Luther and Melancthon Townships. The main part of this area is a fluted till plain bounded on the east by moraines. Most of the area has a surficial deposit of silt,

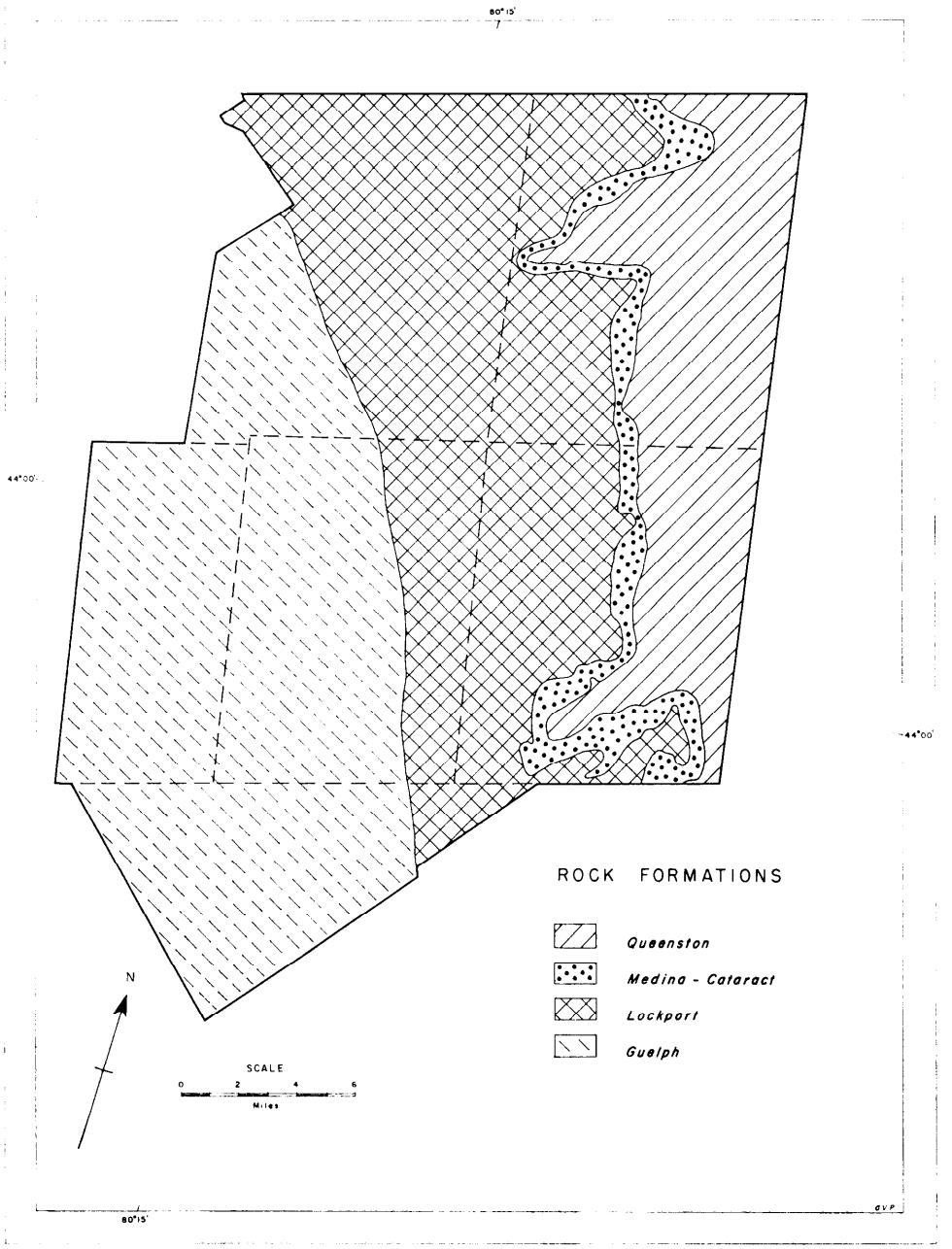


Figure 3 — Outline Map Showing Rock Formations in Dufferin County

probably windblown and comparable to the much more abundant "loess" of the Mississippi valley. The silt covering is thinnest near the west side of the county and is thickest (4 to 5 feet) in the area between Shelburne and Honeywood. Although the till is usually loam in texture, fairly large areas of clay loam till occur in East Garafraxa Township and some areas of clay till are found near the Escarpment northeast of Shelburne.

A part of the Port Huron morainic system forms the core of the region included in most of Mulmur and Mono Townships. This region consists mainly of kame moraines which are very hilly, and stony. The moraines are a complex mixture consisting largely of sands and gravel materials, but with clay till, coarse, stony, sandy loam till and loam till, often covered by two or three feet of silt or fine sandy loam, in association with the sand and gravel.

Between the hills of the moraines there are valleys or spillways in which the soil materials are mainly gravel often covered by three or four feet of fine sand. Although isolated deposits of these materials occur throughout the county, the principal areas of such materials are north of Orangeville and in the Grand River valley. Small areas of outwash sand occur in various sections of the county. Eskers which are gravel deposits in the form of long, narrow, winding ridges also occur in some parts of the area. Two or three good examples may be found east and north of Shelburne.

Lacustrine deposits are sorted fine textured materials laid down in still or very slowly moving waters. The lacustrine deposits in Dufferin County are probably due to local ponding as they are comparatively small and occur mainly in the low areas between the hills.

Swamps are common in low lying areas where the water has been impounded. In such places organic materials have accumulated. Organic deposits are scattered throughout the county, the largest of which is the Luther Marsh.

TABLE 2

SURFACE DEPOSITS OCCURRING IN DUFFERIN COUNTY

1.	GLACIAL TILL:	
	Ground Moraine	Generally unsorted material. Topography is characterized by a succession of low knolls and depressions. Textures are loam to clay loam — contains stones and boulders.
	Terminal Moraine	Often modified or resorted materials, sandy loam to loam, more stones than in ground moraine. Topography is rough to hilly.
	Drumlin	Elongated hill, long axis in the direction of ice advance, materials usually unsorted, loam to clay loam with stones and boulders.
2.	GLACIO-FLUVIAL:	
	Outwash Plain	Sandy and gravelly materials, cobbly but boulder-free occurring on a nearly level plain; a few enclosed depressions and incised ravines.
	Kame	Small hill of sand and gravel — may contain resorted till; some stones and boulders.
3.	LACUSTRINE	Clays, silts and sands laid down in glacial lakes. Topography is usually very gently sloping, although moderately steep slopes encountered in some areas. Stones are few to absent except in areas where thin lacustrial deposits are underlain with till.
4.	RECENT ALLUVIAL	Post-Glacial deposits of sands, silts and clays along streams, meadows, slough and marshes. Also includes mucks and peats. Soils are immature; topography is nearly level to depressional. Stones are rare.

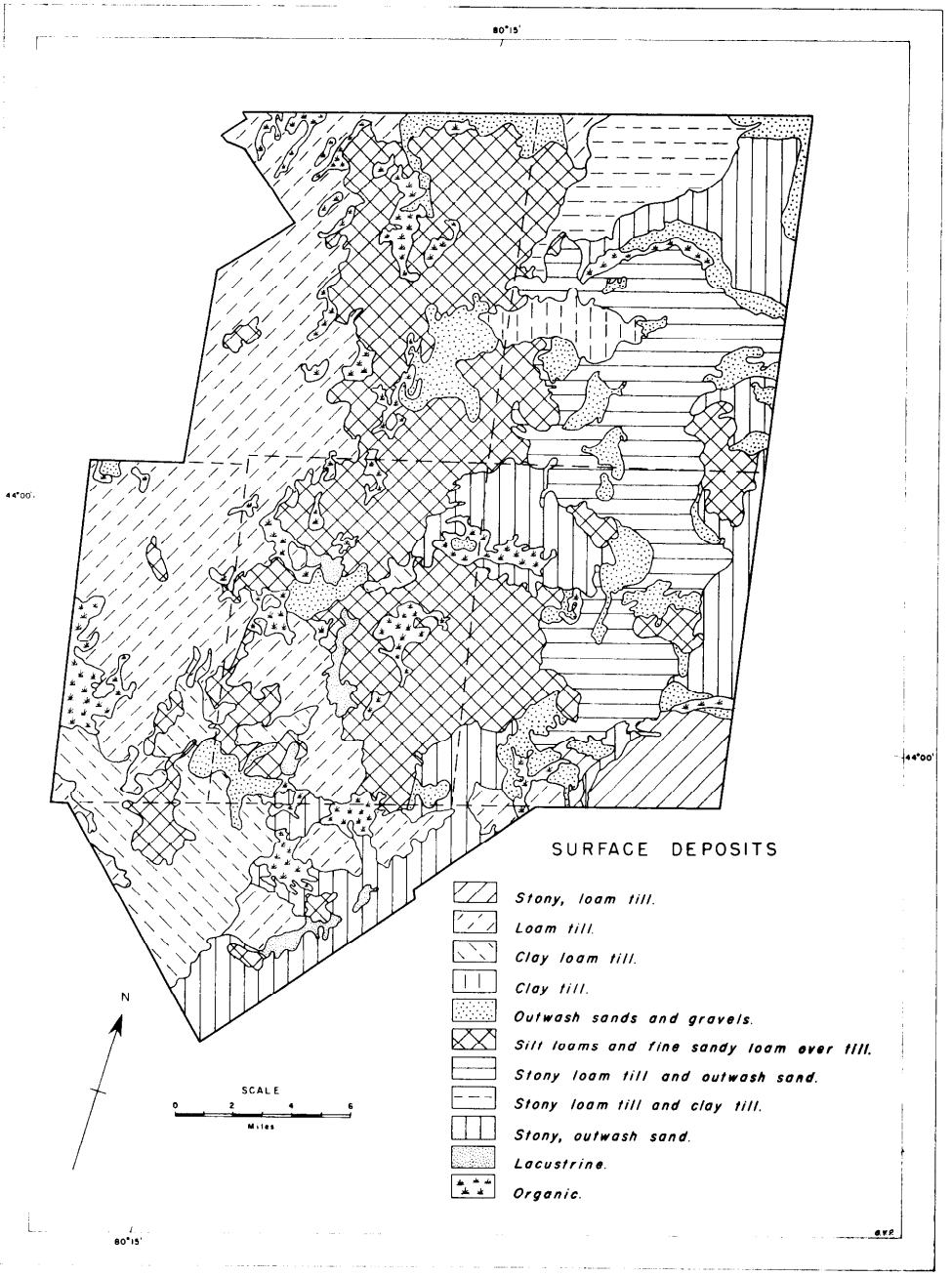


Figure 4 — Outline Map Showing Surface Deposits in Dufferin County

Vegetation

The natural vegetation found in an area is determined largely by climate and soil. Vegetation, in turn, exerts considerable influence on the development of a soil and therefore is an important factor in soil formation. The extent to which it influences soil development varies with the type of vegetation.

Since vegetation is one of several inter-related soil-forming factors, it is difficult to measure the exact effect that it has on the detailed profile features which are used to make soil type separations. A survey of the vegetation shows, in a general way, what tree associations most commonly occur on some of the more important soils.

The most commonly occurring trees are sugar maple, red maple, elm, basswood, yellow birch, red and white oak, ironwood, beech, white and black ash, aspen, and white birch. Conifers grow throughout the county in no great quantity, except in reforested areas, and consist of white and red pine, white spruce, balsam fir, and hemlock.

Climate

Meteorological stations are located in Dufferin County at Grand Valley, Shelburne and Redickville. In the surveyed area, the mean winter temperatures are 19 to 20 degrees F. and the mean summer temperatures are 64 to 65 degrees F. The average frost-free period varies from place to place, being 112 days at Grand Valley, 129 days at Shelburne and 108 days at Redickville. The growing season is about 189 days duration.

The average annual precipitation varies from 30 inches on the east side of the county to 34 inches in the west. Snowfall ranges from 80 to 100 inches also being heaviest on the western side of the county. Heavy snowfall in combination with imperfectly and poorly drained soils result in delayed seeding because of prolonged wet soil conditions.

Relief and Natural Drainage Systems

Most of the county consists of gently undulating ground moraine but large continuous areas or rugged relief associated with the kame moraines are found in Mulmur, Mona, and the southern part of East Garafraxa Townships.

On the west side of the Niagara Escarpment, the land slopes southward from 1,750 feet above sea level in the north to about 1,550 feet above sea level in the south. East of the Escarpment the land slopes mainly to the east but also to the north. In the southeast corner of the county the altitude is 1,250 feet above sea level and in the northeast corner it is 850 feet above sea level.

Some of the external drainage features within the county are shown in Figure 5. This region forms the watershed from which issue the headwaters of the Grand and Nottawasaga River systems. The Grand River, which drains a total area of 2,600 square miles and occupies the largest catchment basin in southwestern Ontario, drains the western half of Dufferin County. In the extreme upper reaches there has been little valley cutting. Grades are low and deepening of the main valley is restricted by bedrock. Drainage is poorly established on the plain north of Grand Valley; hence swamps are prevalent. From Grand Valley to Elora the valley varies from 60 to 100 feet in depth.

The Nottawasaga River system drains the eastern half of Dufferin County. Two if its tributaries, the Pine River and the Boyne River, rise in the high plains west of the Niagara Escarpment and flow in an easterly direction to join the main river. These and a number of smaller tributaries flow down the escarpment in deeply cut rock valleys with gradients often more than 100 feet per mile. The upper branch of the Nottawasaga makes its way from the escarpment through the Hockley valley noted for its rugged scenery and challenging ski trails.

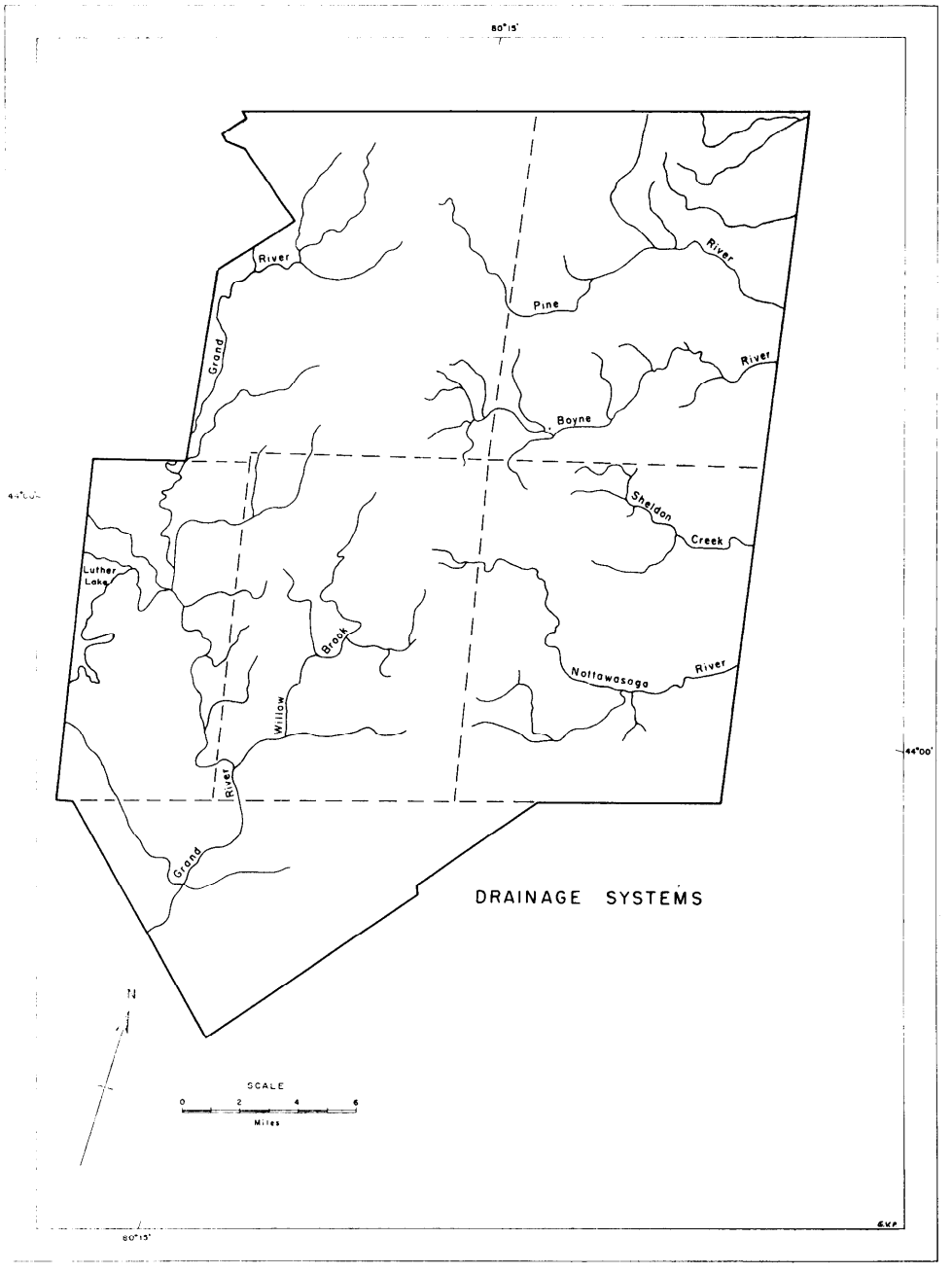


Figure 5 — Outline Map Showing Drainage System of Dufferin County

THE CLASSIFICATION AND DESCRIPTION OF THE SOILS

The surface geological deposits previously described are the parent materials from which the soils of the county have developed. Several different kinds of soil occur as a result of the differences in the parent materials as well as the differences in drainage and in vegetation.

A vertical cut through soil to a depth of three feet exposes a sequence of layers (horizons) that differ in color, texture, structure or thickness. This sequence of horizons is called the *soil profile*. The different layers of the soil are often referred to as surface soil, subsurface soil, subsoil and parent material. However, it is convenient to use the specific pedological terms A horizon, B horizon, and C horizon. Subdivisions within each major horizon are shown by lower case suffixes. Definitions of the major horizons and the lower case suffixes are given in a glossary at the back of this report.

The A horizon is the surface horizon and in many soils can be subdivided into Ah and Ae. The Ah horizon contains the largest amounts of organic matter and is underlain by the Ae, a horizon from which clay and bases, especially calcium, have been leached by percolating rainwater. Some of the materials leached from the Ae accumulate in the B horizon. The B horizon is often finer in texture and more compact as a result of the accumulation of clay and other fine materials carried down from the A horizon. Underlying the B horizon is the C horizon, i.e. parent material which may be unaltered or only slightly altered by the soil-forming processes.

Poorly drained soils, in which the ground water table is near the surface for an appreciable part of the year, are *gleyed*. The "gley" horizon is bluish gray, brownish gray or gray with brownish splotches and contains iron concretions.

Soils are classified on the basis of kind of horizons which constitute the soil profiles. Forty-three soil series were recognized and mapped in the county. The soil series differ from one another in one or more of the following features of the soil profile - number, color, thickness, texture, structure or chemical composition of the horizons, drainage, or depth to bedrock. Variations in stoniness and slope within a series were also shown on the soil map.

Some soil series, however, have certain features in common. These form Great Groups. The Great Groups in Dufferin County are Brown Forest, Grey-Brown Podzolic, Podzol, Dark Grey Gleysolic and Organic. An idealized description of a soil profile characteristic of each Great Group is given below.

The Brown Forest soils occur on highly calcareous materials. These soils have a dark brown surface. (Ah) horizon high in organic matter with a neutral or mildly alkaline reaction. The Ah horizon which is about 4 inches thick is underlain by a brown B horizon containing some concentration of sesquioxides and occasionally a concentration of clay. In general, the B horizon is uniformly brown down to the parent material at 18 inches. The base saturation of all horizons is 100 per cent.

The Grey-Brown Podzolic soils have a dark grayish brown Ah horizon, 3 inches thick and relatively high in organic matter, underlain by a yellowish brown Ae horizon that becomes lighter in color with depth. The B horizon is brown and finer in texture than other horizons in the profile. It contains accumulations of clay and sesquioxides. The calcareous parent material occurs at 20 to 30 inches.

Soils of the Brown Forest Great Group have shallow profiles and a brownish color in the subsoil.

The Podzol soils have an organic (0) horizon, 1 to 2 inches thick, underlain by a gray or white Ae horizon, 1 to 2 inches thick. The B horizon is reddish brown and contains concentrations or sesquioxides or organic matter or both and is usually divisible on the basis of color difference into two sub-horizons. Most of the Podzols in the county have an additional B horizon containing an accumulation of clay as well as sesquioxides. This B horizon occurs at depths of 24 to 36 inches and is similar to the B horizon of the Grey-Brown Podzolic soils.

Many of the soils of Dufferin County have developed under poorly drained conditions and therefore are classified in Dark Grey Gleysolic and Organic Great Groups.

The Dark Grey Gleysolic soils have a very dark gray Ah horizon generally 7 to 8 inches thick and high in organic matter. The Ah horizon is underlain by a dark

Grey-Brown Podzolic Soil Profile

gray to grayish brown “gley” horizon with yellow and orange mottling. The parent material occurs immediately below the gley horizon.

The Organic soils have a layer of organic matter accumulation more than 12 inches thick. This layer is underlain by a strongly gleyed mineral soil or rock. The surface layer varies with the type of vegetation from which the organic matter was fermed and on the degree of decomposition of the organic material.

Series, Types and Complexes

The units by which soils are mapped and described are designated as series, types and phases. The principal mapping unit is the series which may consist of two or more types or phases. All soils included in a series are relatively similar in their profile development and in their management requirements. A soil series may be subdivided into soil types on the basis of the texture of the surface soil. The

A Dark Grey Gleysolic Profile

full name of the soil type is a combination of the series name and the surface texture, for example, Guelph loam.

Soil complexes are mapping units that are a combination of two or more soil types. A soil complex is used as a mapping unit where two or more soil types occur in such an intricate pattern that they cannot be delineated separately on the map. In naming each complex, the names of the dominant soil types are used. The characteristics of each type are the same as in the areas in which they occur alone.

Soil Catena

Soil series developed on similar parent material but differing in characteristics of the profile above the parent material due to differences in drainage comprise a soil catena. The soil catenas of Dufferin County are shown in Table 3.

TABLE 3

CATENARY RELATIONSHIP OF DUFFERIN COUNTY SOILS

Catena Name	*Catena Members*		
	Drainage		
	Good	*Imperfect*	*Poor*
Bennington	Bennington	Tavistock	Maplewood
Brant	Brant	Tuscolo	Colwood
Brantford	Brantford	Beverly	Toledo
Bondhead	Bondhead	Guerin*	Lyons*
Bookton	Bookton	Berrien*	Wauseon
Burford	Burford	Brisbane	Gilford
Caledon	Caledon	Camilla	
Donnybrook	Donnybrook		
Dumfries	Dumfries	Killean*	Lily*
Dundonald	Dundonald	Edenvale*	
Dunedin	Dunedin	Craigleith*	Morley*
Fox	Fox	Brady	Granby
Guelph	Guelph	London	Parkhill
Harriston	Harriston	Listowel	Parkhill
Harkaway	Harkaway	Wiarton	Parkhill
Hillsburgh	Hillsburgh		
Honeywood	Honeywood	Embro	Crombie
Huron	Huron	Perth	Brookston
Schomberg	Schomberg*	Smithfield	Simcoe*
Tioga	Tioga	Alliston	Granby
Whitfield	Whitfield		

*These soils have not been mapped in Dufferin County.

SOIL KEY

A. Soil Developed on Glacial Till

I. Stony, calcareous loam parent material

(a) Well drained

1. Dumfries loam (G.B.P.) 2,800

II. Gray, calcareous sandy loam parent material

(a) Well drained

1. Bondhead sandy loam (G.B.P.) 400

III. Pale brown calcareous loam parent material

(a) Well drained

1. Guelph loam (G.B.P.) 3,500

(b) Imperfectly drained

1. London loam (G.B.P.) 2,100

(c) Poorly drained

1. Parkhill loam (D.G.G.) 18,500

IV. Yellowish brown, calcareous loam parent material

(a) Well drained

1. Harriston loam (G.B.P.) 17,300
2. Harriston silt loam (G.B.P.) 3,800
3. Harkaway loam (B.F.) 5,200

(b) Imperfectly drained

1. Listowel loam (G.B.P.) 12,900
2. Listowel silt loam (G.B.P.) 1,700
3. Wiarton loam (B.F.) 2,900

V. Calcareous clay loam parent material

(a) Well drained

1. Huron loam (G.B.P.) 13,800
2. Huron silt loam (G.B.P.) 1,700

(b) Imperfectly drained

1. Perth loam (G.B.P.) 3,800
2. Perth silt loam (G.B.P.) 700

(c) Poorly drained

1. Brookston loam (D.G.G.) 900
2. Brookston silt loam (D.G.G.) 100

VI. Calcareous clay parent material

(a) Well drained

1. Dunedin clay 7.200

B. Soils Developed on Outwash

1.	**Calcareous sand parent material**	
	(a) Well drained	
	1. Fox sandy loam (G.B.P.)	900
	2. Tioga loamy sand (P)	3,800
	3. Tioga fine sandy loam (P)	1,000
	(b) Imperfectly drained	
	1. Brady sandy loam (G.B.P.)	1,400
	2. Alliston sandy loam (P)	400
	(c) Poorly drained	
	1. Granby sandy loam (D.G.G.)	3,300
II.	**Loam material overlying gravel**	
	(a) Well drained	
	1. Burford loam (G.B.P.)	7,400
	(b) Imperfectly drained	
	1. Brisbane loam (G.B.P.)	500
	(c) Poorly drained	
	1. Gilford loam (D.G.G.)	1,100
III.	**Fine sandy loam material overlying gravel**	
	(a) Well drained	
	1. Caledon sandy loam (G.B.P.)	6,300
	2. Caledon fine sandy loam (G.B.P.)	14,900
	(b) Imperfectly drained	
	1. Camilla fine sandy loam (G.B.P.)	400
	2. Camilla silt loam (G.B.P.)	800
IV.	**Calcareous fine sand parent material**	
	(a) Well drained	
	1. Hillsburgh fine sandy loam (G.B.P.)	11,000
	2. Hillsburgh sandy loam (G.B.P.)	18,600
V.	**Coarse gravel in kames and eskers**	
	(a) Well drained	
	1. Donnybrook sandy loam (G.B.P.)	2,300
VI.	**Medium sand material overlying clay**	
	(a) Well drained	
	1. Bookton sandy loam (G.B.P.)	1,400
	(b) Poorly drained	
	1. Wauseon sandy loam (D.G.G.)	200
VII.	**Medium sand material overlying loam till**	
	(a) Well drained	
	1. Dundonald sandy loam (G.B.P.)	400

C. Soils Developed from Loess or Alluvium.

1.	**Fine sandy loam and silt loam material overlying loam till**	
	(a) Well drained	
	1. Honeywood silt loam (G.B.P.)	33,100
	2. Honeywood fine sandy loam (G.B.P.)	12,100
	(b) Imperfectly drained	
	1. Embro silt loam (G.B.P.)	1,800
	2. Embro fine sandy loam (G.B.P.)	3,900
	(c) Poorly drained	
	1. Crombie silt loam (D.G.G.)	4,900
	2. Crombie fine sandy loam (D.G.G.)	300
11.	**Fine Sandy loam and silt loam material overlying clay loam till.**	
	(a) Well drained	
	1. Bennington silt loam (G.B.P.)	1,300
	2. Bennington fine sandy loam (G.B.P.)	9,500
	(b) Imperfectly drained	
	1. Tavistock silt loam (G.B.P.)	4,300
	2. Tavistock fine sandy loam (G.B.P.)	1,200
	(c) Poorly drained	
	1. Maplewood fine sandy loam (D.G.G.)	1,400
III.	**Fine sandy loam overlying limestone bedrock.**	
	(a) Well drained	
	1. Whitfield fine sandy loam (G.B.P.)	600

D. Soils Developed on Lacustrine Deposits.

I.	**Calcareous, fine sandy loam and silt loam parent materials.**	
(a)	Well drained	
	1. Brant fine sandy loam (G.B.P.)	1,700
(b)	Imperfectly drained	
	1. Tuscola silt loam (G.B.P.)	1,200
	2. Tuscola fine sandy loam (G.B.P.)	100
(c)	Poorly drained	
	1. Colwood silt loam (D.G.G.)	900
	2. Colwood fine sandy loam (D.G.G.)	5,500
II.	**Calcareous silty clay loam and clay loam parent materials.**	
(a)	Well drained	
	1. Brantford silt loam (G.B.P.)	600
(b)	Imperfectly drained	
	1. Beverly silt loam (G.B.P.)	1,000
(c)	Poorly drained	
	1. Toledo clay loam (D.G.G.)	1,000
	2. Toledo silty clay loam (D.G.G.)	500

Soil Complexes		
	1. Dumfries loam — Hillsburgh fine sandy loam	7,300
	2. Dumfries loam — Hillsburgh sandy loam	24,100
	3. Tioga loamy sand — Bondhead loam	17,700
	4. Tioga loamy sand — Bondhead sandy loam	800
	5. Osprey loam — Dunedin clay	8,400
Miscellaneous		
	1. Escarpment	800
	2. Muck	31,100
	3. Peat	2,500

GREAT GROUPS

B.F. — Brown Forest
D.G.G. — Dark Grey Gleysolic
G.B.P. — Grey-Brown Podzolic
P. — Podzol

DUMFRIES SERIES

The Dumfries soils, which occur mainly in Mono Township, have developed from stony calcareous loamy soil material largely derived from limestone. Free carbonates can be found at depths of 18 to 24 inches except in places of severe erosion where they occur in the surface soil.

The topography is hilly; slopes are steep, irregular and short; depressions or "potholes" are common. Water runs rapidly off the steep slopes or readily percolates through the stony materials; hence the Dumfries soils are well drained. However, within the areas shown on the soil map as Dumfries soil there are often areas of poorly drained soils in depressions too small to be delineated. These potholes contain water during a large part of the year, cannot be easily drained and therefore are not arable.

Surface erosion has occurred on most of the cultivated slopes. Indeed, the soil loss has been so great on many of the knolls that the whole profile has been removed and the light gray parent materials are exposed. Stones and boulders are numerous both on the surface and throughout the soil mass.

The Dumfries soil is classed as Grey-Brown Podzolic, having a dark gray sandy loam or loam Ah horizon, a yellowish brown Ae horizon which becomes lighter in color with depth and a dark brown B horizon which contains more clay than any other horizon in the profile. Although this is the general appearance of the soil profile, one or more of the horizons may have been removed by erosion. In addition there is considerable variation from place to place in the thickness of the horizons and the number of stones in the Dumfries soils.

Most of the Dumfries soil areas have been cleared and are used for livestock

Hills and Rough Surface Areas in the Dumfries Series

raising and dairying. Because of steep slopes and excessive stoniness somewhat less than 30 per cent of the land is used for cultivated crops, chiefly spring grain, winter wheat, silage corn and mixed hay. Pastures and woodlots make up the remaining 70 per cent. Pastures on the Dumfries soils are often weedy and thin.

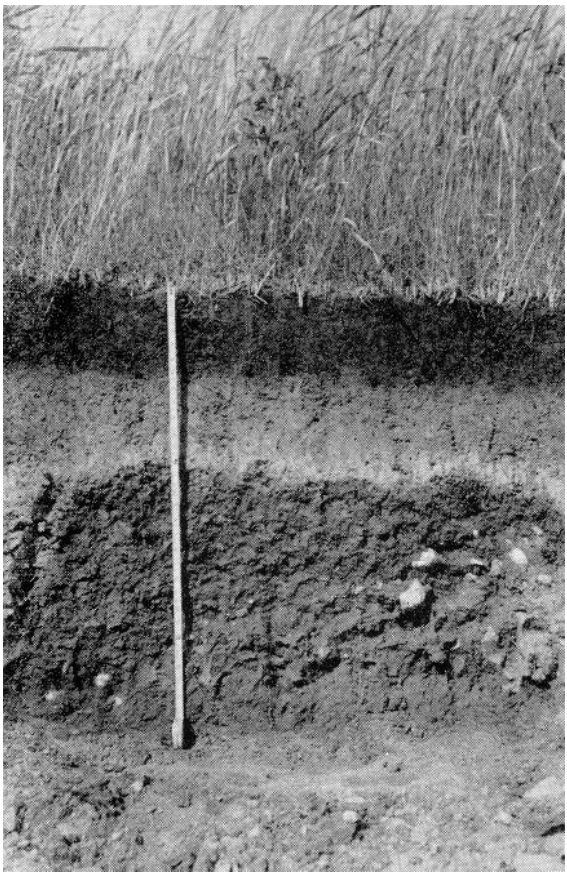
Pasture improvement on the smoother slopes and reforestation of the steep areas are the keys to better land use in the Dumfries area. Hardwoods, especially sugar maple and beech, do grow well. More attention could be paid to the wildlife potential in areas occupied by the Dumfries soils.

BONDHEAD SERIES

The Bondhead soils occupy a small area in the southeast corner adjacent to the Simcoe County boundary. Slopes are gentle (erosion hazard is slight) and there are few stones to interfere with cultivation.

The soils are well drained and belong to the Grey-Brown Podzolic great group. The surface soil is dark grayish brown loam or sandy loam, moderately high in organic matter. A brown Ae horizon which becomes lighter in color with depth underlies the surface layer. This is followed by a dark brown Bt horizon which contains more clay than the layers above and below it. The parent material is a calcareous, gray sandy loam till derived mainly from a limestone and it occurs at a depth of approximately 24 inches.

Dairying and livestock raising are the major farm enterprises on the Bondhead soils. The main crops grown are mixed grains, oats, winter wheat, hay pasture and silage corn. Yields are above the provincial average but could be increased by applying more commercial fertilizers.



A Guelph loam profile

GUELPH SERIES

The Guelph soils occur on the gently rolling hills in the vicinity of Orangeville. The soil parent material is gray-brown calcareous loam till derived from gray and brown limestones of the underlying rock strata. Although the till does not contain a large number of stones it is commonly gravelly.

In general there are very few field stones or boulders. The soils are well drained both internally and externally but retain adequate amounts of moisture for the needs of agricultural crops.

The surface soil is dark grayish brown loam, moderately high in organic matter. Below the surface layer is a brown Ae1 horizon which grades to the Ae2 horizon which is lighter in color. The Bt horizon is dark brown to dark yellowish brown containing more clay than the layers above or below it. The depth of soil to the unaltered parent material is approximately 24 inches except where water erosion has removed the upper portion of the soil. The Guelph soils are classified in the Grey-Brown Podzolic great group.

The Guelph loam soils are among the best agricultural soils in the province. Dairying and livestock raising have been the major farm enterprises on the Guelph soils. The main crops grown are pasture, hay, mixed grains, oats, winter wheat and silage corn. Yields of most crops are well above the provincial average but could be economically increased by applying commercial fertilizers at somewhat higher rates than are currently used.

A hay crop on London loam

LONDON SERIES

The London soils occur in association with the Guelph Series. They are imperfectly drained soils on gently undulating upland areas where surface runoff is slow and internal drainage is moderate. The material from which these soils have been derived is the same as that of the Guelph series and they therefore have the same potential for agricultural production if they are artificially drained.

The dark colored loam surface horizon is commonly one or two inches thicker than the same horizon in Guelph soils, and one or two per cent higher in organic matter content. The average organic matter content for cultivated surface soils is over five per cent. The layers below the surface are duller in color than those of the Guelph soils and are not as easy to differentiate. Mottles or blotches of orange and yellow colours appear in the subsoil and in the parent material, indicating that the water table is high at certain periods of the year. The accumulation of clay in the subsoil (Bt) horizon is not as great as it is in that of the Guelph soils.

The London soils are capable of producing arable crops and good pastures in support of mixed farming, livestock raising or dairying. The high water table delays seeding operations in the spring, may adversely affect the growth of alfalfa, or reduce the yield of winter wheat by winter-killing. However, when artificially drained the London soils have a higher potential than the Guelph soils, mainly because of their smoother topography; a factor contributing to easier management.

PARKHILL SERIES

These poorly drained soils cover 18,500 acres in the county and occur in depressions in association with the Guelph, London, Harriston, Listowel, Hark-

A Parkhill loam profile

away, and Wiarton soil series. Although these soils are wet for the major part of the year, there are periods, generally late in the summer, when they are free from excess water.

In contrast to the associated upland soils, the Parkhill soils have a much darker and thicker surface soil. The black organic matter from the decaying leaves, stems and roots of plants tends to accumulate and becomes mixed with the mineral soil by worms and by cultivation, to produce a thick, black surface soil. Some of the dark surface has also resulted from the accumulation of surface soil carried down the adjacent slopes by water.

In the Parkhill soils the surface layer is underlain by two gray layers that differ from each other in intensity of color and in structure. Usually the upper layer is darker gray than the layer below it. However, in some places the upper layer is the lighter gray. The subsoil layers may be distinctly yellowish where these soils occur in association with the Harriston, Listowel, Harkaway, and Wiarton soils due to the yellowish brown of the parent materials. The subsoil layers are profusely mottled.

The surface soil is generally neutral; the subsoil becomes more alkaline with depth. Free carbonates are commonly present at 24 inches or less.

The Parkhill soils are often too wet for regular cultivation and therefore are used for pasture and hay crops. These soils may be included with the regular cropland if they are artificially drained. Artificial drainage may be difficult to install because of the lack of a suitable outlet.

HARRISTON SERIES

Except for two large areas in the vicinity of Orangeville the Harriston soils occur mainly in Melancthon, Luther and Amaranth Townships. They occur on moderately to gently rolling topography and are well drained. The soil parent material is a calcareous loam till that has been derived from soft yellowish brown limestones that form the underlying rock strata. Except for the occasional stone on the surface, the upper part of the soil profile is stonefree. The limestones weather and disintegrate readily and those that remain occur mainly in the lower subsoil and in the parent material. When rubbed between the fingers, the weathered surface of these stones crumbles to a soft flour consisting mainly of particles of silt size. Although most of the soils are loam the silt content is rarely below 45 per cent, in contrast to the Guelph soils in which the silt content is commonly below 45 per cent.

The Harriston soils have the same number and sequence of layers as the Guelph soils and therefore are included in the same great group — Grey-Brown Podzolic. However, they differ from the Guelph soils in color, composition of the parent materials, and to a lesser extent texture and stoniness. The most striking feature is the pale yellowish brown color and the presence of the soft limestones in the parent materials. The yellowish cast is a feature of the whole profile.

These are among the best agricultural soils in Southern Ontario and the only handicap to cultivation is the frequency and steepness of the slopes. Where little or no erosion has taken place the depth of soil to unaltered parent material is approximately 24 inches. The surface soil is slightly acid in reaction and is easily worked.

On the Harriston soils livestock raising and dairying are the common farm enterprises. Hay, pasture, mixed grains and oats are the main crops grown. Winter wheat, barley, silage corn and turnips are important crops on some farms. Without fertilizer the average yield of oats is about 60 bushels per acre while that of hay is about two tons per acre. These yields can be increased profitably by using fertilizer.

LISTOWEL SERIES

Imperfectly drained soils that have developed from the same parent material as the Harriston series are classified as the Listowel series. The Listowel soils occur on gently undulating upland areas where surface runoff is slow and internal drainage is moderate.

These soils remain saturated for a portion of the year and mottles or blotches of yellow and orange are present in the subsoil. The over-all colors of the subsoil layers are somewhat duller than those of the same layers in the well drained soils.

The Listowel soils have a dark colored silt loam surface horizon which has an average organic matter content of over five per cent. This surface soil is underlain by a light yellowish brown mottled Ae horizon which rests on a mottled brown Bt horizon. Although the Bt horizon contains more clay than the layer above the clay accumulation is not as great as it is in the Bt horizon of well drained soils. Calcareous parent material occurs at an avearge depth of 20 inches.

These soils support mixed farming and livestock enterprise. Cereal grains, hay and pasture are the main crops grown; winter wheat is grown but yields may be reduced by winterkilling. Silage corn is also grown, yields averaging 14 tons per acre.

HARKAWAY SERIES

The Harkaway soils occur in the northern part of Melancthon Township. They are developed from light yellowish brown loam till, which is derived from limestone.

The Harkaway loam is well drained. Water runs rapidly off the rolling slopes and the portion that enters the soil percolates readily through the porous soil materials. In the uncultivated state the soil has a relatively deep, dark colored surface layer but in cultivated fields much of it has been lost by erosion and the underlying lighter colored material is exposed particularly on the steeper slopes. As the finer materials are removed by erosion, the surface layer becomes more stony.

The soil profile has some of the characteristics of both the Brown Forest and Grey-Brown Podzolic soils. The Ae horizon of the Grey-Brown Podzolic soil is often lacking but a fairly well developed textural Bt horizon is nearly always present. The thin solum is also one of the distinguishing characteristics of this soil compared with soils of similar texture in other parts of the province. The soil profile has a very dark brown Ah horizon that rests on an olive-brown B horizon. The B horizon becomes somewhat darker in color with depth and contains more clay than the layers above or below it. The parent material occurs at depths of 12 to 18 inches. The profile is moderately stony and may be calcareous throughout.

This soil is used for growing oats, mixed grains, hay and pasture. The surface soil is friable, possesses a granular structure and is easy to cultivate as long as the stones do not interfere. Mixed farming with the main income being dervied from livestock is the chief type of farming on the Harkaway soils. Good drainage and high lime content make this soil especially suitable for alfalfa.

WIARTON SERIES

Wiarton soils which occur chiefly in Melancthon Township have developed from a pale yellow, calcareous loam till containing a comparatively large amount of silt. The topography is gently undulating. Because the slopes are gentle, soil losses due to erosion are slight.

Very little water runoff occurs and, in addition, water percolates slowly through the soil since the till is somewhat compacted. As a result these soils are imperfectly drained. Stones are common both on the surface and throughout the soil profile but usually do not occur in sufficient numbers to interfere seriously with cultivation.

The Wiarton series is the imperfectly drained member of the Harkaway catena. The profile of the Wiarton soil is typically Brown Forest with a very dark brown, slightly alkaline Ah horizon. The Ah horizon rests on a light olive-brown, mottled B horizon which contains little or no accumulation of clay. This horizon is usually calcareous and is underlain by pale yellow to yellowish brown till at a depth of about 14 inches.

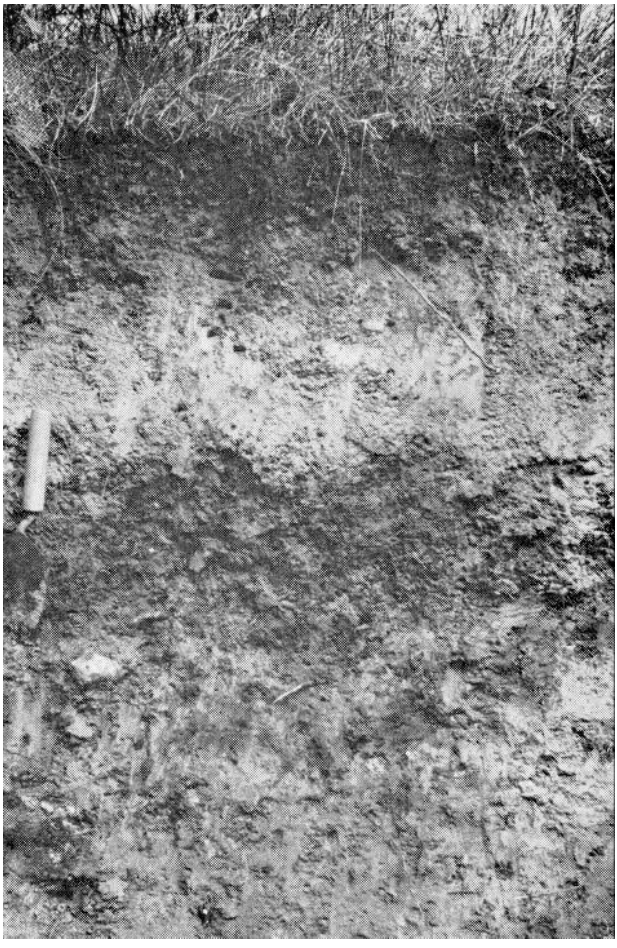
All of these soils are cleared except for a few areas. The soils usually support dairying and general farming, but, because they tend to be somewhat cold and wet, hay and pasture are the main crops grown. Oats, mixed grains and silage corn are grown in some areas and yields are good in dry years. Wiarton soils could be made more reliable for crop production if tile drains were installed to remove the excess water.

HURON SERIES

Huron soils are found extensively in the northern part of Garafraxa and the southern part of Luther Township.

The soil parent material is grayish brown calcareous clay or silty clay loam composition. The topography is generally gently rolling with steep slopes occurring along the sides of the larger creeks and rivers. Slopes are short and irregular. The Huron soils are moderately well drained.

The surface soil is usually loam in texture; hence in some areas Huron soils have a thin silt loam surface deposit. The surface horizon is underlain by a yellow-



A Huron Loam Profile

ish brown clay loam Ae horizon that becomes very pale brown to light gray when the soil is dry. This horizon is not as thick as it is in the coarser textured soils nor is it as easily subdivided into two layers on the basis of color. The browner upper part of this horizon is either thin or entirely lacking. A dark brown blocky Bt horizon containing more clay than the layers above occurs below the Ae horizon. The blocky aggregates and their natural fracture lines probably make the soil more permeable than would be expected in clay or clay loam materials. The Huron soils belong to the Grey-Brown Podzolic Great Group of soils. The soil profile is well developed and has an average thickness of 20 inches.

Most of these soils have been cleared for farming. Hay, pasture and cereal grains are the principal crops and for these the Huron soils rank among the best in the county. They are easy to cultivate except when the upper loamy horizons have eroded away, leaving the clayey subsoil. In general the farm economy is based on beef cattle and hogs, with dairying being important in some areas. Corn for silage is grown on many farms; winter wheat is often the main cash crop. Crop yields are high except where the sticky brown clay or grayish parent material has been exposed.

A Perth Loam Profile

PERTH SERIES

The Perth soils which occur in association with the Huron soils have the same grayish brown calcareous clay parent materials but are imperfectly drained. They occupy the lower slopes of hills and large portions of gently undulating ground moraine. The Perth soils usually have sufficient slope to permit some of the surface water to drain away, but much of the rainfall enters the soil. Because the underlying materials are fine textured, the movement of soil water through the soil is slow.

The Perth soils have a Grey-Brown Podzolic type of profile but are somewhat thinner in profile depths than the better drained soils, The depth of the profile to parent material ranges from 13 to 18 inches, The surface soil is thicker and darker than that of the Huron soil but has the same textural range, loam to silt loam. The subsoil horizons are similar to those of the Huron except for the presence of mottled colors and a much thinner subsoil horizon, In some locations the thin gray subsoil layer has been mixed with the surface layer by cultivation and is no longer evident.

These soils are ideal for the production of cultivated hay and cereal crops. However, for certain crops, especially alfalfa, they need artificial drainage. Tile drains are installed in some areas of Perth soils and each year more are being laid. Drainage outlets are readily available in the municipal ditches. The high moisture content of these soils at certain times of the year probably has advantages as well as disadvantages. Half of the cultivated acreage is used for seeded hay and improved pasture. For these crops moisture reserves are important during the dry period of the year from July through August. During the years when the spring rainfall is heavy, these soils become wet and sticky and seeding is delayed.

BROOKSTON SERIES

The Brookston soils have developed from clay loam till similar to that of the Huron and Perth soils but under poor drainage in level to depressional areas.

The Brookston soils have a dark loam or silt loam surface layer high in organic matter content, of friable granular structure and neutral reaction. Underlying the surface layer is a gray mottled horizon which may be subdivided into two layers on the basis of slight differences in color and structure and rests on the calcareous parent material which, in Dufferin County, usually occurs at depths of 18 to 24 inches.

The surface soil varies from loam to silt loam, in contrast to the Brookston soils mapped in some other counties, particularly Essex and Lambton, where surface soil is dominantly clay and clay loam. The reaction is neutral on the surface and becomes more alkaline with depth.

Because Brookston soil areas in Dufferin County are mainly small, scattered and wet, many of them are not cleared. If cleared, the Brookston soils are used chiefly for pasture. In southwestern counties where Brookston soils occur in larger blocks drainage has been improved; they are used for grain, corn, soybeans, burley tobacco and canning crops.

In Dufferin County drainage improvement on the Brookston soils is difficult to implement since the areas in which they occur are catch basins for runoff water from adjacent slopes; few outlets are available.

DUNEDIN SERIES

The soils of the Dunedin series occur around the Niargara Escarpment in Mulmur Township. Only 7,200 acres of these soils could be shown on the soil map. The remaining acreage is included in the Osprey-Dunedin complex, which is discussed later in this report.

The face of the escarpment in Nottawasaga and Mulmur Townships where the Dunedin soils occur is comparatively steep, rising in some places 400 feet in less than half a mile. Because of many deep gullies and stream beds, the topography is rugged and the slopes are short and steep. The Dunedin soils have developed from dark reddish brown till materials containing over 60 per cent of clay. They are very slowly permeable to water, and therefore internal drainage is very slow. External drainage over the steep slopes is, of course, very rapid.

The profile of the Dunedin soil has features of both Grey-Brown Podzolic and Brown Forest soils. The solum is thin as in Brown Forest soils but the Bt horizon common to the Grey-Brown Podzolic soils always occurs. The soil has a dark brown clay Ah horizon about four inches thick which may rest on a reddish brown Ae horizon or a B horizon. The B horizon, underlying the Ae (if present) is slightly darker but has the same blocky structure as the Ae. The B horizon contains more clay than the Ae. The calcareous parent material occurs at an average depth of about 14 inches.

Because of the steep slopes and the clay texture most of these soils should be considered non-agricultural. However, there are a few areas, especially northwest of Mansfield, where the topography is moderately rolling; hence land can be used for crops, usually grasses and clovers.

FOX SERIES

The Fox soils occur in only a few small areas widely scattered throughout the county, a typical area of Fox sandy loam being located around Peepabun.

The soil parent material is calcareous sand, deposited as glacial outwash, and in most cases is found beside present-day streams. Although the deposits are dominantly medium sand, fine sands and course sands and even gravel sometimes occur as strata with the medium sands. In general the Fox soils have a gently undulating topography with smooth slopes. Steep slopes may also occur near the

banks of some of the streams where these soils are found. Internal drainage is rapid because of the open nature of these sandy materials.

The Fox soils in Dufferin County have well expressed Grey-Brown Podzolic characteristics. The surface horizon is thin, very dark grayish brown, slightly acid and rests on yellowish brown subsurface Ae horizon that may vary from 5 to 30 inches in thickness over a distance of a few feet. The dark brown B horizon although its thickness is relatively uniform is irregular or wavy. Because the B horizon contains the highest clay content of the horizons in the profile it also has the highest moisture holding capacity. It is possible that the amount of moisture available to the growing plant is dependent on the proximity of this textural horizon to the surface. The closer the horizon is to the surface, the more moisture is available for plant use.

The Fox soils in Dufferin County are used mainly for growing hay and pasture crops, although winter wheat, oats, mixed grains and silage corn can be grown. Low water holding capacity and a low natural fertility restrict crop production. Productivity can be increased considerably by applying commercial fertilizer.

TIOGA SERIES

Soils of the Tioga series which occur along parts of the eastern boundary of Dufferin have developed on calcareous outwash sands and are usually stonefree. In general, the topography is gently undulating and slopes are long and smooth. The Tioga soils are well drained and have a low moisture holding capacity.

The profile has the characteristics of Podzol soils with evidence of Grey-Brown Podzolic development occurring in the lower part, i.e. a thin, weakly developed B horizon that contains more clay than the layers above or below it. The Tioga profile has a very dark, grayish brown Ah horizon about one inch thick which rests on a light gray to white Ae horizon. The Ae horizon is thin and strongly acid. It is underlain by a yellowish brown Bhf horizon which becomes lighter in color with depth. This layer rests on the thin, brown wavy Bt horizon. Usually this Bt horizon occurs at depths of 36 to 48 inches but, because of its wavy nature, it may be found at any depth between 18 inches and 72 inches. It is commonly two inches thick but may also be four inches thick or consist of numerous strands of ½ to ¼ inch thickness separated by lighter colored sandy material. Pale brown calcareous sand parent material usually occurs immediately below the Bt horizon.

The Tioga soils are low in natural fertility and have a low moisture holding capacity but they warm up early in the spring and are easily worked. When adequately fertilized and watered these soils produce high yields of cash crops such as fruits, vegetables, and tobacco. In Dufferin County, however, much of the Tioga Soil is in pasture, often weedy and sparse.

BRADY SERIES

The Brady soils are imperfectly drained soils developed from calcareous sand deposits similar to those from which the Fox soils developed. They occupy smooth, nearly level areas.

The horizons of the soil profile have a more uniform thickness than those of the Fox soils, and have mottled colors. The Ah horizon is dark gray-brown or black, underlain by a thin light grayish brown Ae horizon. The B horizon is yellowish brown and has only slightly greater clay content than that of the other horizons of the profile. Occasionally a cemented "pan" layer is present. Carbonates are present at an average depth of 18 inches.

The surface soil is very dark grayish brown or black and is about six inches thick. The soil reaction is neutral in the surface soil and only slightly acid in the subsurface horizon. Occasionally the lower subsoil horizons are cemented to form a pan which is generally discontinuous.

Most areas of Brady soil have been cleared and are being cultivated. They are easily worked but are lacking in natural fertility.

A Granby Sandy Loam Profile

ALLISTON SERIES

The Alliston soils are imperfectly drained soils associated with the Tioga soils and commonly occupy the more level parts of the sandy outwash plain near the Pine River.

The profile of the Alliston soils is similar to that of the Tioga soils but is mottled in the upper part. The profile has a thin black Ah horizon underlain by a light gray Ae horizon. The Ae horizon rests on a yellowish brown, mottled Bhf horizon which becomes lighter in color with depth and is underlain by another slightly darker, mottled Bt horizon at a depth of about 30 inches which contains more clay than the layers above or below it. Pale brown, calcareous sand parent material occurs at a depth of about 32 inches.

Although the Alliston soils have an agricultural potential in Dufferin County they are presently under trees.

GRANBY SERIES

The Granby soils are the poorly drained associates of the Fox and Tioga soils but they also occur in depressional areas in association with soils developed on glacial till. The Granby soils have developed from calcareous outwash sand. Since they occur in depressions, the soils are saturated with water for the greater part of the year.

The soil profile is typically Dark Grey Gleysolic. In the uncultivated state an 8-inch surface horizon high in organic matter is always present. Under cultivation this dark surface soil becomes mixed with the underlying horizon, resulting in a

thicker surface layer. The subsoil horizon is strongly mottled, gray, and in some instances can be differentiated into two layers differing in darkness of gray color and intensity of mottling. The calcareous sand is generally present at about 18 inches.

The Granby soils are rarely cultivated but are covered by small bushes and trees. The trees have little economic value except where there are large numbers of white cedar which may be marketed as posts and poles. When cleared the Granby soils are used as pasture or grazing land.

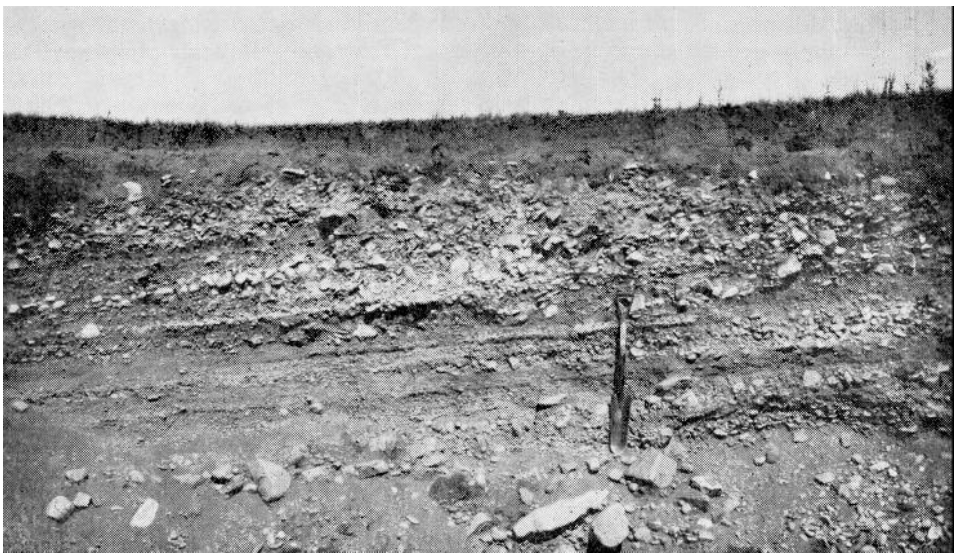
BURFORD SERIES

The Burford soils are well drained, consisting of loamy material overlying gravel. The gravel was deposited by glacial meltwaters, the most extensive deposits being on the terraces that border the Pine River. The deposits are stratified. The materials vary in size from fine sand to cobbles and where these deposits occur adjacent to the stony gravel of the Donnybrook soils, some strata of large stones may be found.

The topography is gently undulating except along the edges of the terraces where slopes are often steep. Gravel, stones, and cobbles occur on the soil surface and within the soil profile but they usually do not interfere with cultivation.

The Burford soils are classified as Grey-Brown Podzolic and have a very dark grayish brown surface soil about four inches thick. Immediately below the surface is a yellowish brown Ae horizon which is thin and slightly acid. As in many Grey-Brown Podzolic soils, this horizon is browner in the upper portion than in the lower. However, in cultivated fields the brown layer is often absent and the horizon is a uniform color. The B horizon is always located immediately above the calcareous gravel. It is dark brown and contains a considerable concentration of translocated clay. The depth of the profile to the underlying gravel varies from 12 to 30 inches.

The Burford soils are used for spring grains, winter wheat, hay, pasture and silage corn. They are suitable for orchards and certain canning crops but are not being used for these crops to any great extent. The underlying gravel is suitable for road construction and as building material. Because of the open nature of the Burford soils, moisture deficiencies exist during every growing season. The Burford soils also have a low to medium content of the essential plant nutrients.



Stratified Gravel Underlying the Burford Loam Profile

BRISBANE SERIES

The Brisbane soils are imperfectly drained. They have developed on materials similar to those of the Burford soils and occur in association with them.

The Brisbane soils have level topography and slow external drainage. Internal drainage is also slow because of the presence of a high water table. The surface soil is very dark gray to black and commonly contains more than five per cent organic matter. The Ae and B horizons are mottled. The B horizon is not as well developed nor as wavy as in the Burford soils. The depth to the calcareous gravel is fairly uniform, being an average of 18 inches.

The Brisbane soils are not intensively cultivated but are used mostly for pasture or grazing lands. Certain areas are used for growing spring grain and occasionally some corn is grown for fodder. However, many farmers avoid using these soils in their rotation because of the excess moisture which often delays seeding.

GILFORD SERIES

The Gilford soils are found on outwash materials in depressional areas in association with Burford and Brisbane soils.

These soils are water-saturated except during the later part of the summer. However, even at its lowest level the water table is often within six to eight feet of the surface. This wet condition gives rise to the thick black surface soil of high organic matter content that is typical of most of the poorly drained soils in Southern Ontario.

The soil profile has a black surface layer about eight inches thick underlain by strongly mottled, gray subsoil horizons. The subsoil horizons often contain lenses of silt and clay. The lower of the two subsoil layers may be more mottled than the layer above it. Calcareous gravel usually occurs at 24 inches.

Gilford soils are essentially non-arable soils but in some cases can be used as pasture land. The majority of these soils are covered with bush that provides excellent cover for wildlife.

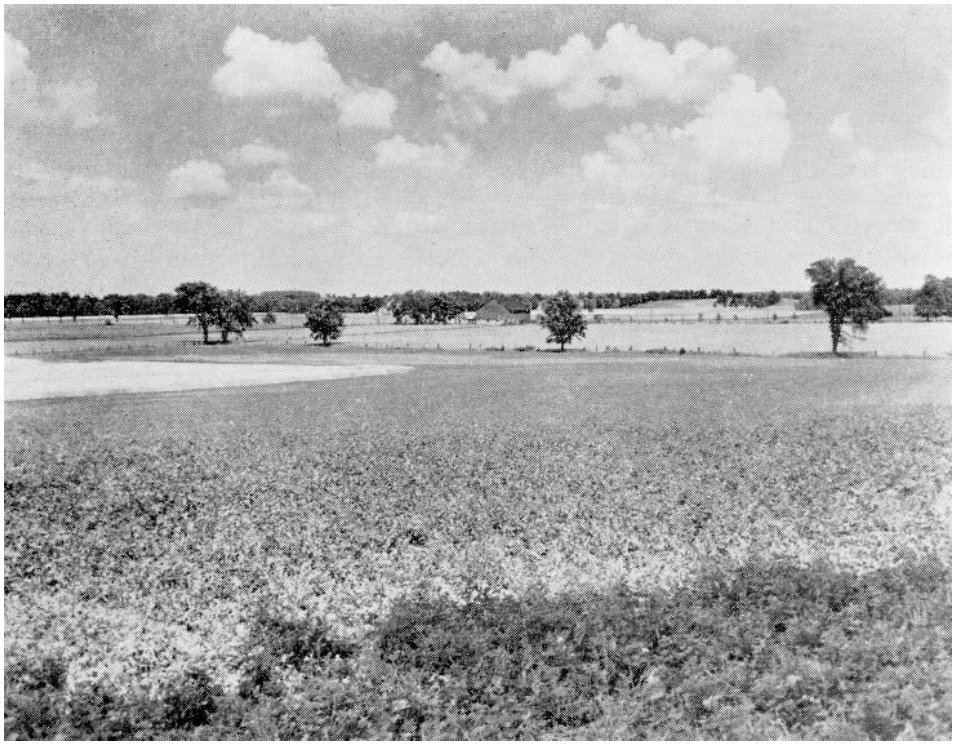
CALEDON SERIES

The Caledon soils are well drained and have developed on gravelly materials that are similar to those of the Burford soils. However, the materials overlying the gravel are stonefree fine sands.

Caledon soils occur principally in Mulmur and Mono Townships on gently undulating landscapes where external drainage is moderate and internal drainage is rapid. Slopes are long and smooth in contrast to the short, steep slopes of the Caledon soils in Peel County.

Grey-Brown Podzolic soil characteristics are well expressed in the Caledon soils. The surface soil is very dark grayish brown about three inches thick in uncultivated areas. On being cultivated a part of the subsurface is mixed with the surface to form a thicker and lighter surface layer. The Ae horizon is about 24 inches thick, the yellowish brown color becoming lighter with depth. The Bt horizon is dark brown and is located immediately above the calcareous gravel. The thickness of the profile is remarkably uniform at 36 to 40 inches. Gravel and cobblestones occur only in the subsoil. Except for the occasional field stone on the surface, the remainder of the soil profile is stonefree.

The Caledon soils are similar to the Burford soils for crop production.



Mixed Farming on Caledon Fine Sandy Loam

CAMILLA SERIES

The Camilla soils are imperfectly drained and occur in association with the Caledon soils mainly in the area a few miles north of Waldemar.

These soils have level topography and their external drainage is slow. Internal drainage is slow because of the presence of a high water table or an impermeable layer. The surface soil is a very dark gray or black fine sandy loam or silt loam which commonly contains five to eight per cent organic matter.

The Camilla soils classified as Grey-Brown Podzolic have profile features similar to the Caledon series except that the subsoil horizons are mottled and the B horizon is not as pronounced as in the Caledon. The depth to calcareous gravel is fairly uniform, being an average of 26 inches.

The Camilla soils are not intensively cultivated but are used mostly for pasture or grazing lands. Certain areas are used for growing spring grain but most farmers avoid using these soils for arable crops because excess moisture often delays seeding.

HILLSBURGH SERIES

The Hillsburgh soils are well drained soils in the southern end of Dufferin County developed from sandy soil materials on rough topography. The steepest slopes are those north of Orton but knobby hills are general. Although slopes are commonly short and irregular there are some places where they are long and smooth. These soils have developed from fine sands which are intermixed with and overlie the coarse, stony till of the Dumfries soils. In most instances the till occurs at such a depth that it has little or no effect on soil development. These

Gully Erosion on Hillsburgh Soils

soils are very susceptible to wind erosion; small stones often appear at the surface in areas where soil loss has been severe. Both external and internal drainages are rapid.

The soil profile has the characteristics of the Grey-Brown Podzolic Great Group. The surface soil consists of a thin dark brown fine sandy loam or sandy loam. The development of the B horizon is irregular and the great variability in the thickness of the Ae horizon gives this profile an appearance much like that of the Fox soils.

Many soil areas shown on the soil map contain small inclusions of other soils. These small areas are not delineated because of their size. This situation is particularly true of soils such as the Hillsburgh that are developed on kame moraines. Each area of Hillsburgh soil shown on the map includes some Donnybrook, Brant or Granby soils. In every case, however, these soils make up less than 15 per cent of the area.

The Hillsburgh soils are excellent potato soils except on the steeper slopes which are droughty and erosive. Beef cattle and hogs constitute the main animal production on these soils. Hay and pasture occupy a large part of the farm acreage. Cereal grains and fodder corn are also grown.

The steep slopes and the knobby hills are usually not cultivated. Some of these areas are covered by grass and others have been reforested. However, erosion even on some of the grassed areas indicates need for further reforestation.

DONNYBROOK SERIES

The Donnybrook soils are gravelly soils occurring in hills and ridges that are more specifically designated as kames and eskers. One of the best examples of an esker on which Donnybrook soils have developed is two miles north of Jessopville. Other eskers cross the plain east of Corbetton. Although these soils do not occur in large continuous blocks, but are small and scattered through the county, they occupy a total of 2,300 acres.

The topography is hilly and slopes are steep. The soil materials consist of

stratified sands and gravels mixed with stones. As may be expected with coarse materials having steep slopes, both external and internal drainage is rapid; crops frequently suffer from the lack of moisture.

The soil profile is thin, rarely exceeding 12 or 18 inches. The Donnybrook soils are classified as Grey-Brown Podzolic. A dark grayish brown surface horizon about three inches thick and a yellowish brown Ae horizon overlie the dark brown B horizon. When seen in cross section the lower boundary of the B horizon occurs as tongues extending into the underlying calcareous gravel. All horizons of the profile are very stony.

These soils are non-arable and where the deposits are not being taken for road materials they are covered by trees or grass. When they occur near the stream terraces of the Burford and Caledon series, eskeroid deposits are not so highly regarded as a source of gravel.

BOOKTON SERIES

The Bookton soils are developed from well drained sands overlying calcareous clay on gently rolling topography.

These soils are characteristic of the Grey-Brown Podzolic Great Group. The sand usually is between 18 and 30 inches deep over the clay. The profile has a dark gray Ah horizon about three inches thick. It rests on a yellowish brown Ae horizon which is usually quite thick — about 20 inches. The Ae horizon becomes lighter in color with depth and rests on a somewhat darker colored Bt horizon. The Bt contains more clay than the layers above it although it is a sandy loam texture. In some places the Bt has developed in the clay materials and only the A horizons are formed in the sand. The underlying clay is light brownish gray and calcareous.

In Dufferin County the Bookton soils are used chiefly for hay, pasture and cereal grains. The Bookton soils are stonefree, early and easy to work.

WAUSEON SERIES

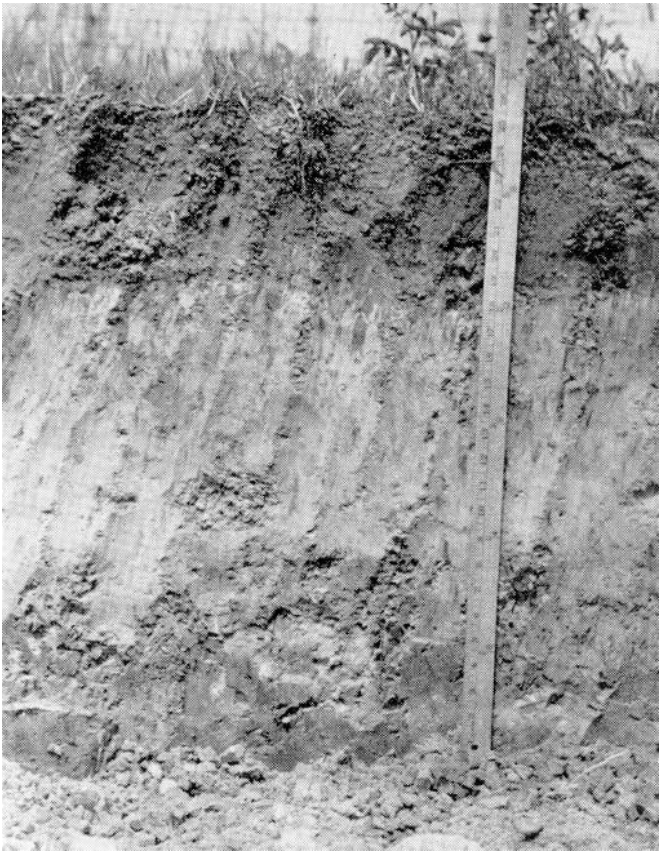
The soils of the Wauseon series are the poorly drained members of the Bookton catena and are usually found in depressional areas where shallow deposits of sand overlie calcareous clay at 18 to 30 inches.

These soils occupy the slightly depressional areas surrounded by more rolling soils and are therefore the catch basins for the water and eroded soil that runs down from the adjoining slopes. These soils being saturated with water for a large part of the year have a deep, dark surface layer. The subsoil is a gray and mottled and lacks the horizon development characteristic of the better drained soils. These soils are classified as Dark Grey Gleysolic. The profile has a very dark brown to black Ah horizon about eight inches thick which is underlain by a mottled, grayish Bg horizon. The Bg horizon shows no evidence of clay accumulation and rests on calcareous clay. The clay occurs at depths of 18 to 30 inches.

Under their present drainage conditions, Wauseon soils do not produce satisfactory yields of most farm crops. When cleared, Wauseon soils are used for pasture. However many areas remain in woodland. Drainage improvement is problematical because of difficulty in finding drainage outlets. These soils should remain as pasture or woodland.

DUNDONALD SERIES

The Dundonald soils are developed in sandy outwash materials overlaying calcareous loam or sandy loam till. They are well drained and have gently to moderately rolling topography. The soil development is characteristic of the Grey-Brown Podzolic Great Group. The profile has a dark grayish brown Ah horizon about three inches thick which rests on a yellowish brown Ae horizon. The Ae horizon is medium acid in reaction and becomes lighter in colour with depth. Below the Ae is a brown Bt horizon which contains more clay than the layers above it.



A Wauseon Sandy Loam Profile

The Bt horizon usually rests directly on gray calcareous loam or sandy loam till. There is considerable variation in the depth of the sandy overburden which ranges from 18 to 34 inches.

Most of the land has been cleared except for woodlots in which beech and maple are the dominant species. These soils are used chiefly for mixed farming and such crops as oats, mixed grains, hay and pasture are the main ones grown.

HONEYWOOD SERIES

The Honeywood soils are found in most of the townships in the county but occur chiefly through the central portion from Honeywood to Orangeville. The largest continuous area is located between Honeywood and Shelburne. These soils occupy 45,200 acres — almost 13 per cent of the total county area.

The Honeywood soils are well drained and have developed in wind-deposited silt loam or fine sandy loam materials which are underlain by calcareous loam till at two to four feet. The till appears to be similar to that of the Harriston soils. The materials overlying the till are remarkably uniform, maintaining an average thickness of three feet even where the topography is rough and short steep slopes prevail. In general, the silty overburden is thicker on the eastern side of the county.

These soils occur principally on gently undulating topography except for steeper slopes in an area south of Stanton. The soil surface is usually stonefree but ice-rafted boulders are numerous in a few fields. External drainage is moderate and internal drainage is medium.

Grey-Brown Podzolic characteristics are well expressed in the Honeywood soils. The surface soil is a very dark grayish brown silt loam or fine sandy loam about four inches thick in uncultivated areas. On being cultivated part of the subsurface is mixed with the surface to form a thicker, lighter colored surface layer. The Ae horizons are about 30 inches thick, their yellowish brown color becoming lighter with depth. The Bt horizon is dark brown and is located immediately above the calcareous loam till. Stones occur only in the till.

The Honeywood soils are among the best agricultural soils in Southern Ontario and are capbale of producing all crops adapted to the area. In Dufferin County these soils are used mainly for livestock raising, dairying and potato growing. Cereal grains, hay, pasture and some silage corn are grown. Large acreages of potatoes are grown in the region around Redickville and Honeywood.

The surface soil is friable, easily worked and contains a good reserve of plant nutrients. These soils drain rapidly and have a sufficiently high moisture holding capacity to supply plants with moisture even during the dry period of the year.

EMBRO SERIES

Embro soils are imperfectly drained and occur on gently undulating topography. The soil material is similar to that from which the Honeywood soils developed, i.e. about three feet of silt loam or fine sandy loam materials overlying calcareous, loam till.

The Embro soil is Grey-Brown Podzolic and the profile is like that of the Honeywood except for the mottling and somewhat duller colors in the Ae and Bt horizons. The surface and Ae horizons are silt loam or fine sandy loam but the Bt horizon is a silty clay loam. The calcareous loam till occurs at an average depth of 24 inches.

The Embro soils are used mainly for the production of hay and pasture. Some grains are grown when spring seeding is not delayed by excess moisture.

CROMBIE SERIES

The Crombie series includes the poorly drained soils that have developed from soil materials that in better drained positions have given rise to the Honeywood and Embro. These soils are found in the depressions associated with the more rolling Honeywood soils. As in the case of the Embro soils the materials are wind-deposited and of silt loam or fine sandy loam texture.

The soils are classified as Dark Grey Gleysolic. The surface soil is black silt loam or fine sandy loam about eight inches thick. The subsurface horizon is grayish brown and mottled, indicating that the water table is high during most of the year. The underlying horizon is light grayish brown, strongly mottled and usually has a coarser structure than the horizon above. The depth to the calcareous loam till is about 20 inches.

The agricultural utilization of these soils is limited because of poor drainage. At present they are used chiefly for pasture.

BENNINGTON SERIES

The Bennington soils are similar to the Honeywood soils except that the till underlying the wind-deposited silt loam and fine sandy loam is clay loam much like the till of the Huron soils. Like the Honeywood soils these are well drained and have developed in wind-deposited silt loam or fine sandy loam. The underlying till, however, is clay loam and appears to be of similar composition to that of the Huron soils.

The Bennington soils are found chiefly in Amaranth and East Luther Townships and occupy 10,000 acres or about three per cent of the county. The largest areas occur in the vicinity of Black's Corners.

The Bennington soils occur on gently rolling landscapes. The surface soil is stonefree and is easily worked. External drainage is moderate and internal drainage is medium.

A Bennington Silt Loam Profile

Grey-Brown Podzolic characteristics are well expressed in the Bennington soils. The surface soil is dark gray silt loam or fine sandy loam about four inches thick in uncultivated areas. On cultivation a part of the subsurface is mixed with the surface to form a thicker, slightly browner surface layer. The Ae horizons are about 20 inches thick, their yellowish brown color becoming lighter in depth. A horizon which has characteristics of both the A and B horizons underlies the Ae horizons. This is about 10 inches thick, light brown in color and is called the A/B horizon. The Bt horizon is dark brown, contains more clay than any other horizon in the solum and is located immediately above the clay loam till. The till is calcareous and occurs at a depth of about 32 inches.

The Bennington soils are used chiefly for livestock raising and dairying. Cereal grains, hay and pasture are the main crops grown and yields are high where soil fertility is maintained.

TAVISTOCK SERIES

The Tavistock soils, imperfectly drained associates of the Bennington soils, occur on gently undulating areas where surface runoff is low and permeability is slow. The material from which these soils have been derived is the same as that of the Bennington series.

The profile of the Tavistock soil is similar to that of the Bennington except that the horizons are not as well developed and the soil colors are somewhat duller. Like the Bennington, the A and B horizons of the Tavistock soils have developed in silt loam or fine sandy loam materials and are underlain by calcareous clay loam till. The wind-deposited materials are about 24 inches deep, somewhat less than that of the Bennington soils. The imperfect drainage is indicated by mottles or blotches of orange and red colors in the subsoil horizons. The Tavistock soil profiles are relatively uniform, the thickness, color and structure of the horizons being almost the same wherever these soils occur. These soils are classified as Grey-Brown Podzolic.

Most of the Tavistock soils are cleared and used for hay, cereal grains and pasture. Seeding operations may be delayed in the spring by an excess of water.

MAPLEWOOD SERIES

Like the Tavistock soils the Maplewood soils are developed from the same materials as the Bennington soils and usually occur in association with them. The Maplewood soils occur in depressional areas where water tends to accumulate and the soils remain wet for most of the year.

Like many poorly drained soils the Maplewood soil has a very dark gray or black surface about eight inches thick. Below the surface is a gray layer which becomes lighter in color and coarser in structure with depth. This gray layer is mottled but the mottles are concentrated in a zone immediately above the clay loam till.

The Maplewood soils are stonefree and easily worked but because of their wetness are not usually cultivated. They are used for pasture. A much wider range of crops could be grown if these soils were drained.

WHITFIELD SERIES

The Whitfield soil is mapped in just four locations — one just north of Camilla, two others about two miles east of Whitfield and one east of Orangeville. It is developed in wind-deposited fine sandy loam which is underlain by limestone bedrock at depths of 24 to 30 inches. In other words the Whitfield soil is similar to the Honeywood and Bennington soils except that the underlying deposit is rock rather than loam or clay loam till.

It is a Grey-Brown Podzolic soil having a very dark gray surface horizon about four inches thick which is underlain by Ae and Bt horizons. The Ae is yellowish brown and becomes lighter in color with depth. The Bt horizon is dark brown, contains more clay than any of the other horizons in the profile, and rests directly on limestone bedrock.

The Whitfield soil is well drained and occurs on gently undulating landscapes. Although it tends to be more droughty than the Honeywood or Bennington soils, it is used for the same purposes. Cereal grains, hay and pasture are the main crops grown for a livestock enterprise.

BRANT SERIES

The Brant soils are well drained soils developed from calcareous water-laid fine sands and silt. The soil materials are often warved and consist of alternate layers of silt loam and fine sand. The topography is gently rolling. Both external and internal drainages are moderate.

The soil profile has the characteristics of the Grey-Brown Podzolic Great Group. The surface soil is very dark grayish brown about five inches thick in uncultivated locations. The Ae horizons are yellowish brown and show some variation in thickness because of the wavy nature of the Bt horizon. A dark brown color, well expressed blocky structure, and concentration of clay make the subsoil (Bt horizon) easy to identify. This horizon is ordinarily 10 inches thick. The over-all thickness of the profile varies from 24 to 30 inches.

A Colwood Silt Loam Profile

The Brant soils are susceptible to erosion but soil losses have usually not been large. However, a complete soil cover is desirable all seasons of the year, particularly during the fall and spring. These soils are capable of producing all crops suitable to the area. Oats, barley and silage corn are grown but since livestock raising and dairying are the principal enterprises, much of the land is used for growing cultivated hay and pasture.

TUSCOLA SERIES

The Tuscola soils are imperfectly drained soils developed from materials similar to those of the Brant soils. They occur on gently undulating topography. The topographic position of these soils suggests that they represent temporary lacustrine basins since they do not occur is association with other lacustrine deposits but rather with morainic deposits. The composition of the soil material and its origin is assumed to be the same as that which produced the Brant soils. The difference between the two series is primarily that of drainage and topography.

The soil profile is like that of the Brant soils except for the presence of mottling and somewhat duller colors in the Ae and B horizons. The surface and Ae horizons are silt loam or fine sandy loam but are underlain by a silty clay loam layer. The calcareous parent material occurs at 20 to 24 inches.

The Tuscola soils are used mainly for the production of hay and pasture. Some grains and silage corn are grown when spring seeding is not delayed by excess moisture.

COLWOOD SERIES

The Colwood series includes the poorly drained soils that have developed from the same soil materials that in better drained positions have given rise to Brant and Tuscola.

These soils are found in the depressions between the hills and drumlins of the morainic areas. The poorly drained depressions act as catch basins for excess runoff water and also as reservoirs for eroded surface soil carried down from the adiacent slopes. As in the case of the Tuscola soils, Colwood soil materials are alluvial fine sandy loam and silt loam.

The soils are classified as Dark Grey Gleysolic. The surface soil is black silt loam or fine sandy loam about six inches thick. The sub-surface horizon is grayish brown and mottled, indicating that the water table is high during most of the year. The underlying horizon is also grayish brown but may have a coarser structure. The depth to the underlying calcareous materials is about 24 inches.

The agricultural utilization of these soils is limited and any use made of them will depend on the ease with which they can be drained. At present they are used chiefly for pasture.

BRANTFORD SERIES

The Brantford soils are well drained soils developed from clay loams or silty clay loams of lacustrine origin. The soil materials are sometimes varved, consisting of alternate layers of silt loam and clay loam both of which are calcareous. The topography is gently rolling and external and internal drainage is moderate.

The soil profile is characteristic of the Grey-Brown Podzolic Great Group. The surface soil is very dark brown about four inches thick in uncultivated locations. The Ae horizons are yellowish brown and are underlain by a dark brown Bt horizon which has a well expressed blocky structure and concentration of clay. The over-all thickness of the profile varies from 24 to 30 inches.

The Brantford soils are susceptible to erosion but soil losses have not been large up to the present time. However, a complete soil cover is desirable all seasons of the year, particularly during fall and spring. These soils are used for livestock raising and dairying. Cereal grains, hay and pasture are the main crops grown.

BEVERLY SERIES

The Beverly soils are the imperfectly drained members of the Brantford catena. The composition of the soil material and its origin is assumed to be the same as that from which the Brantford soils developed.

The Beverly is a Grey-Brown Podzolic soil. The profile is like that of the Brantford series except for the presence of mottling and somewhat duller colors in the Ae and Bt horizons. The surface and Ae horizons are a silt loam but are underlain by a silty clay loam layer. The calcareous parent material occurs at 18 to 24 inches.

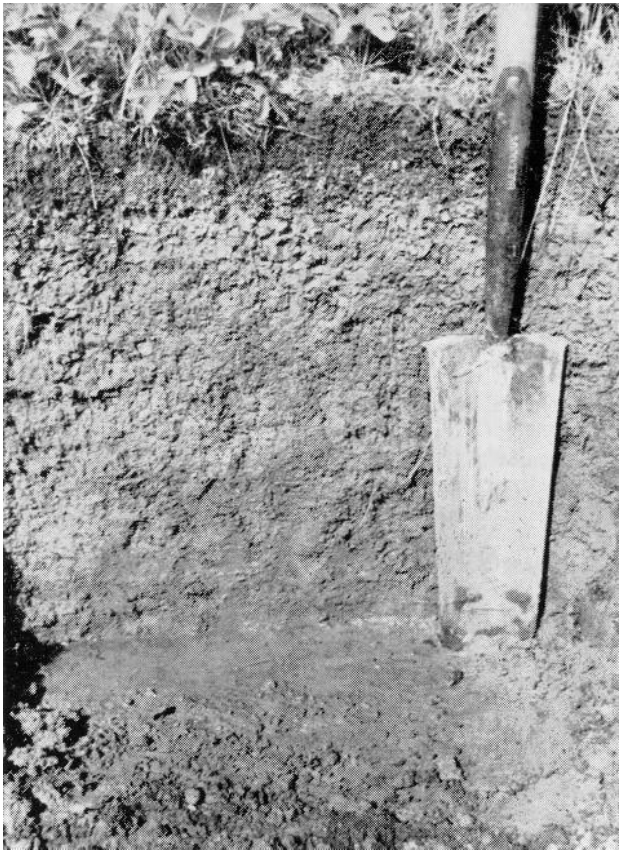
The Beverly soils are used mainly for hay and for pasture. Some grains are grown when spring seeding is not delayed by excess moisture.

TOLEDO SERIES

The poorly drained Toledo soils occur in level and depressional areas. The soil material is silty clay loam to clay loam of lacustrine origin. In some places it consists of alternate bands of brownish clay loam and grayish silt loam.

These soils are classified as Dark Grey Gleysolic. The surface soil is black and has a high content of organic matter. The subsoil horizon is divisible into two horizons on the basis of color. The upper portion is usually darker than the lower portion and contains less mottling. The soil is neutral to slightly alkaline through out the profile but becomes more alkaline at a depth of about 30 inches, where free carbonates are present.

Many of the small areas where these soils occur are covered with trees, mainly elm. Cleared areas are used chiefly for pasture.



A Toledo Clay Loam Profile

DUMFRIES - HILLSBURGH COMPLEX

The Dumfries-Hillsburgh complex comprises Dumfries series and the Hillsburgh series combined in one mapping unit. These two series have been described previously in this report and were differentiated on the basis of texture, stoniness and composition of the parent material. The Dumfries soils are stony loams developed from coarse stony till whereas the Hillsburgh soils are stonefree, fine sandy loams and sandy loams developed from alluvial fine sands.

Although these soils series can be recognized as separate entities, each individual covers such a small area that the soil boundaries cannot be plotted on a map of scale one inch equals one mile.

The Dumfries soils occupy about 60 per cent of the land included in the complex, and the Hillsburgh about 30 per cent. The remaining 10 per cent is made up of small amounts of Brady, Dunedin, Brisbane and Gilford soils.

In general, slopes are much too steep to cultivate and the soils are used mainly for rough pasture. However, some grains and hay are grown on the more gently rolling lands where stones do not interfere with cultivation.

TIOGA-BONDHEAD COMPLEX

The Tioga-Bondhead complex is hilly and slopes are commonly short and steep. Most of the complex is composed of the sandy Tioga soil with many small areas of Bondhead soils scattered through it. In general, the Tioga soils comprise

70 per cent and the Bondhead soils 25 per cent of the complex. The remaining 5 per cent is made up of small amounts of Alliston, Granby, Wauseon and Muck soils.

Steep slopes and high erodibility make cultivation impractical over most of the complex. As a result much of it is forested or is being reforested. However, some of the more gently sloping areas are being used for pasture and hay crops.

OSPREY - DUNEDIN COMPLEX

In Osprey-Dunedin complex, the Osprey soil occurs on the tops of the hills and the Dunedin soil is found on the slopes below. Most of the complex, about 65 per cent, is composed of Osprey loam. The rest is made up of Dunedin clay and a few pockets of Muck.

Because of the extremely rough topography and stoniness this complex is mainly non-agricultural. The slopes are highly susceptible to erosion and often too steep for most farm implements. During the pioneer stages of settlement, steep slopes that should have remained in forest were ploughed and cropped and as a result much of the land has been badly gullied. Most of it is now under sod, but even under permanent pasture, the steeper fields suffer from erosion. There are, of course, gentler slopes or teraces which are favorable for agriculture.

The farmer in these areas must decide which lands are to be forested, which shall be kept almost continuously in sod, and which may be cultivated. Because of their great scenic value, the use of parts of the areas for parkland should be carefully considered.

ESCARPMENT

There are two areas in the vicinity of Mono Mills which consist of steep limestone ridges with very little soil cover. These have been called escarpments. The more or less vertical bank of limestone and the lack of soil make these areas unsuited to agriculture.

MUCK

Soils that have been classed as Muck consist of organic deposits that have accumulated in shallow lakes, ponds or wet, undrained depressions. These soils differ from the soil series previously described in that they are derived from decayed plant remains.

These plant remains are well decomposed. The deposits consist of black, soft and fluffy organic material, together with a few coarse particles of woody fragments from trees. The black material is derived from sedges and grasses, and from the leaf litter that is deposited annually by the deciduous trees.

Muck soil is common in undrained depressions in which organic materials accumulate. Muck is most likely to develop in areas that are water-saturated for the entire year. Such locations are common in this glaciated region in both upland areas and along the meandering stream channels or old glaciated spillways. The depth of the Muck varies from a few inches to several feet. In general the depths of the deposits in Dufferin County exceed five feet.

Organic soil do not have profile development like that which is found in mineral soils but they do have visible layers. These layers can be differentiated on the basis of their composition, and on the degree of decomposition of the organic materials. These soils are neutral in reaction throughout the profile.

In other counties, areas such as the Holland Marsh, Thedford Marsh, Erieau Marsh and the Alfred Bog have been developed for the production of vegetable crops. In Dufferin County no such development has taken place. The principal deterrents to bog development are high cost, small size of many of the areas, and the competition for markets from established areas in more or less the same region. At present most of the Muck areas in the county are covered with trees and under-

brush. Before these areas are cleared, drained, and fertilized for agricultural production, careful consideration should be given to the effect such development would have on the water table levels and on wildlife.

PEAT

The Peat soils consist of organic deposits that have accumulated in shallow lakes, ponds or wet undrained depressions. Peat is not as well decomposed as Muck. It is brown and very fibrous. The roots, mosses and wood fragments that make up the deposit retain their struchure. One large area of Peat covering 2,500 acres occurs in the county and forms a part of the Luther swamp.

With modern methods the Peat soils of Southern Ontario would make good market garden lands. The factors that restrict their development for agriculture are cold climates, high cost of development and a surplus of produce.

AGRICULTURAL METHODS AND MANAGEMENT

Adverse soil conditions in some large areas in the county and a cool, snowy climate limit the growing of a wide variety of crops. The most common field crops consist of hay, mixed grains and oats. The acreages of these and other field crops grown in 1961, as reported in the Census of Canada, are shown in Table 4.

TABLE 4

ACREAGES OF FIELD CROPS BY TOWNSHIP (1961 CENSUS)

Township	*Hay*	*Mixed Grain*	*Oats*	*Wheat*	*Potatoes*	*Flax Seed*	*Barley*	*Ensilage Corn*
Amaranth	12,092	10,072	2,488	334	55	1,234	407	245
Garafraxa E.	7,807	7,329	2,001	189	442	110	177	572
Luther E.	7,953	7,651	1,112	157	1	804	314	289
Melancthon	14,068	12,219	3,493	439	1,276	333	356	69
Mono	9,572	5,352	3,980	1,167	459	——	246	329
Mulmur	8,901	6,356	3,762	1,526	730	37	346	218
TOTAL	60,393	48,979	16,836	3,813	2,963	2,518	1,846	1,722

The large acreages of hay, mixed grains and oats are necessary to provide feed for the many livestock in the county. The comparatively low wheat acreage is likely due to the cool climate and high moisture content of many of the soils which may cause winterkilling.

Livestock raising and mixed farming are the main farm enterprises but dairying prevails in the areas close to large centres of population. The census figures show — 62,000 cattle, 10,500 sheep, 36,000 pigs and 500,000 chickens in the county. Of the cattle on the farm only 20 per cent are kept for milking purposes. With one acre in every 78 acres of improved land being used for growing potatoes, Dufferin County is the second highest producer of this crop.

SOIL MANAGEMENT

The term soil management refers to the various practices that are used or recommended for the growing of agricultural crops. These practices vary with different soils and with different crops and the farmer learns through experience the kind of practices that give the best results. Whatever the limitations of the soil of a particular farm may be, the central objective of soil management is to develop and maintain a proper relationship between the plant and the soil on which it grows.

Success in the growing of crops depends, therefore, on the farmer knowing two sets of factors: the requirements of the different crops he can grow and the characteristics of the soil on his farm. Almost any kind of soil can be modified by management to grow any climatically adapted plant if one is willing to pay the cost. Successful farmers attempt to fit their cropping program to the capability of the soils.

As mentioned in previous pages, most soils consist of a sequence of definite layers or horizons, one above the other. These horizons collectively are called the soil profile. In examining soils, the main things to observe are depth, texture, structure, drainage and nutrients.

DEPTH

The soils of Dufferin County, in general, have sufficient depth to provide space for the development of plant roots and the storage of water for normal crop production. Although growing plant roots may extend several feet into the soil, it is ordinarily considered that a depth of three feet is all that cultivated plants require. This factor becomes serious only in those areas where the soil is thin over bedrock, or where it varies from an inch or two to a depth of one foot. Such soils can provide only a small space for roots and the storage of water. During much of the growing season, therefore, these soils cannot support the plant with the moisture it needs for normal growth. These soils are also too shallow for normal cultivation.

It is estimated that 0.2 per cent of Dufferin County consists of shallow soils. These are being used as pasture land and woodlots. The amount of land involved is so small that it has no effect on agricultural production in the county and therefore no useful purpose can be served by attempting to develop it for agriculture.

TEXTURE

This term refers to the relative proportions of sand, silt and clay that make up the soil material. The texture in most soils changes from horizon to horizon and abrupt changes often occur when one kind of deposit overlies another. In many of the soil series described, the B horizon contains more clay than the soil above or below it.

The sand class of soil has only a small amount of silt and clay. With increasing amounts of clay, the principal textural classes are loamy sand, sandy loam, loam, silt loam, clay loam and clay. The classes can be distinguished by squeezing a moist sample between the fingers. The sands are harsh and gritty and the particles scarcely hold together. At the other extreme, clay can be rolled into a smooth, sticky ball.

In general, soils of intermediate texture such as sandy loams, loams and silt loams are easiest to handle. Sands and loamy sands are open and water drains readily through them, so they hold rather small quantities of water and are said to be droughty soils. However, their water holding capacity can be increased to some extent by adding liberal amounts of barnyard manure or other forms of organic material. Clays, on the other hand, tend to become hard and stick together in clods unless they are handled carefully.

STRUCTURE

The individual soil particles — sand, silt or clay — form various kinds of aggregates which make up the soil structure. The ideal structures are those which are small and soft, such as granular or crumb.

Organic matter, that is the dead portions of plant materials, is an important factor in soil aggregation.

In sandy soils, each grain of sand is often by itself. Clayey soils on the other hand, if deficient in organic matter, become cloddy if plowed when wet. Hardpans can form in loams and even sands when some cementing material is present to hold the particles together. Wherever they occur within the depth of normal rooting of plants, such hard, cloddy soils must be reworked to make them granular or blocky. It is not enough to break up massive clods. Organic matter must be added, as is done by the addition of barnyard manure or the plowing down of green manure, in

order that fragments will not flow back together into masses when they are wet again.

DRAINAGE

Poorly drained soils are relatively unproductive. It is possible for grass crops to survive and frequently flourish under extremely wet conditions but most cultivated plants cannot remain long in soils that are saturated with water.

The drainage of the soil depends upon topography and permeability. Inadequate drainage most often occurs in areas of level or depressional topography but may also occur on undulating areas where slowly permeable materials exist. Often there is little evidence in the surface soil alone of poor drainage beneath. The conditions of soil drainage are indicated fairly reliably by color of the subsoil. Bright, uniform brown or yellow subsoil indicates fairly good drainage, but gray and mottled subsoil indicates poor drainage.

A summary of the drainage condition of the soils in Dufferin County is given in the following Table 5.

TABLE 5
DRAINAGE OF DUFFERIN COUNTY SOILS

Drainage Class	*Acreage*	*Per Cent of Total Area*
Good	241,700	68.0
Imperfect	41,200	11.6
Poor	38,600	10.9
Very Poor	33,600	9.5

Thirty-two per cent of the land is inadequately drained. The method of drainage improvement must be determined for each individual field. Where open ditches and high crowns may be satisfactory for one field, tile drainage may be essential for another. In all cases, the cost of installation and maintenance of a drainage system in relation to the price of the crop produced should be considered.

NUTRIENTS

One of the most important conditions required for good plant growth is that there be a balance of plant nutrients in the soil. All plants take at least 12 essential elements from the soil. The elements most commonly deficient are nitrogent, phosphorus and potassium. These are the elements contained in mixed fertilizers. Calcium and magnesium are included in liming materials and small amounts are usually present in mixed fertilizers. The other elements used in lesser amounts and usually adequate in most soils are sulphur, iron, boron, manganese, copper, zinc, and molybdenum.

The inorganic or mineral fraction makes up the bulk of most soils. It is derived from rocks of various kinds and their degradation products. The nutrient supplying power of the larger particles — that is the sand and silt — are quite different from those of the fine particles or clay fraction. Since the nutrient elements are held in the soil mainly by the finer particles, clay textured soils are commonly considered to have a higher nutrient supply than coarser textured soils.

In order to estimate the amounts of fertilizer that it is necessary to apply to achieve a balance of plant nutrients in the soil, several things need to be determined: the nutrients already in the soil, plus those normally added in manure; the general requirements of the plants to be grown; and the amounts of the nutrients contained in the various fertilizer materials available for use. A soil test provides a sound basis for selecting the most profitable fertilizer treatment.

CAPABILITY GROUPINGS OF DUFFERIN COUNTY SOILS

The capability classification is an interpretive grouping that shows, in a general way what the capabilities of the soils are for crop production. There are seven soil capability classes. In Class 1 are the soils that have few limitations, the widest range of use and the least risk of damage when they are used for agriculture. The soils in the other classes have progressively greater natural limitations.

Soils in Classes 1, 2 and 3 are suitable for sustained production of common field crops, soils in Class 4 are marginal for arable agriculture, soils in Classes 5 and 6 are capable of use for permanent pasture, while soils in Class 7 are unsuitable for arable agriculture or permanent pasture. Soil areas in all classes may be suited for forestry, wildlife, recreational and engineering purposes.

The subclasses indicate major kinds of limitations within classes. Five different subclasses have been recognized in Dufferin County. The subclass is shown by adding a letter e, p, s, t, or w to the class numeral, for example 2e. The letter e indicates that the main limitation is risk of erosion, p indicates that stones are sufficiently numerous to significantly increase the difficulty of tillage, planting and harvesting; s indicates soils having limitations of low fertility difficult to correct, low water holding capacity or poor structure; t indicates soils in which topography is a limitation to agricultural use and w indicates that excess water in the soil will interfere with plant growth, cultivation or harvesting.

In Class 1 there are no subclasses because the soils of this class have few or no limitations. Within most of the classes there can be up to five subclasses.

The soils of the county can be grouped into classes and subclasses as follows.

Class 1

The soils grouped in Class 1 are gently undulating and very gently rolling fine sandy loams, loams, and silt loams. These soils are easy to work. They are permeable to water and air and have a moderate capacity to hold moisture that plants can use. Their surface soils are slightly acid to neutral and have a moderate supply of nutrients.

The soils are:

Brantford silt loam, 0 to 5% slopes
Bennington fine sandy loam, 0 to 5% slopes
Bennington silt loam, 0 to 5% slopes
Bondhead sandy loam, 0 to 5% slopes
Brant fine sandy loam, 0 to 5% slopes
Camilla fine sandy loam
Camilla silt loam
Embro fine sandy loam
Embro silt loam
Guelph loam, 0 to 5% slopes
Harkaway loam, 0 to 5% slopes
Harriston loam, 0 to 5% slopes
Harriston silt loam, 0 to 5% slopes
Honeywood fine sandy loam
Honeywood silt loam
Huron loam, 0 to 5% slopes
Huron silt loam, 0 to 5% slopes
Listowel loam
Listowel silt loam
London loam
Perth loam

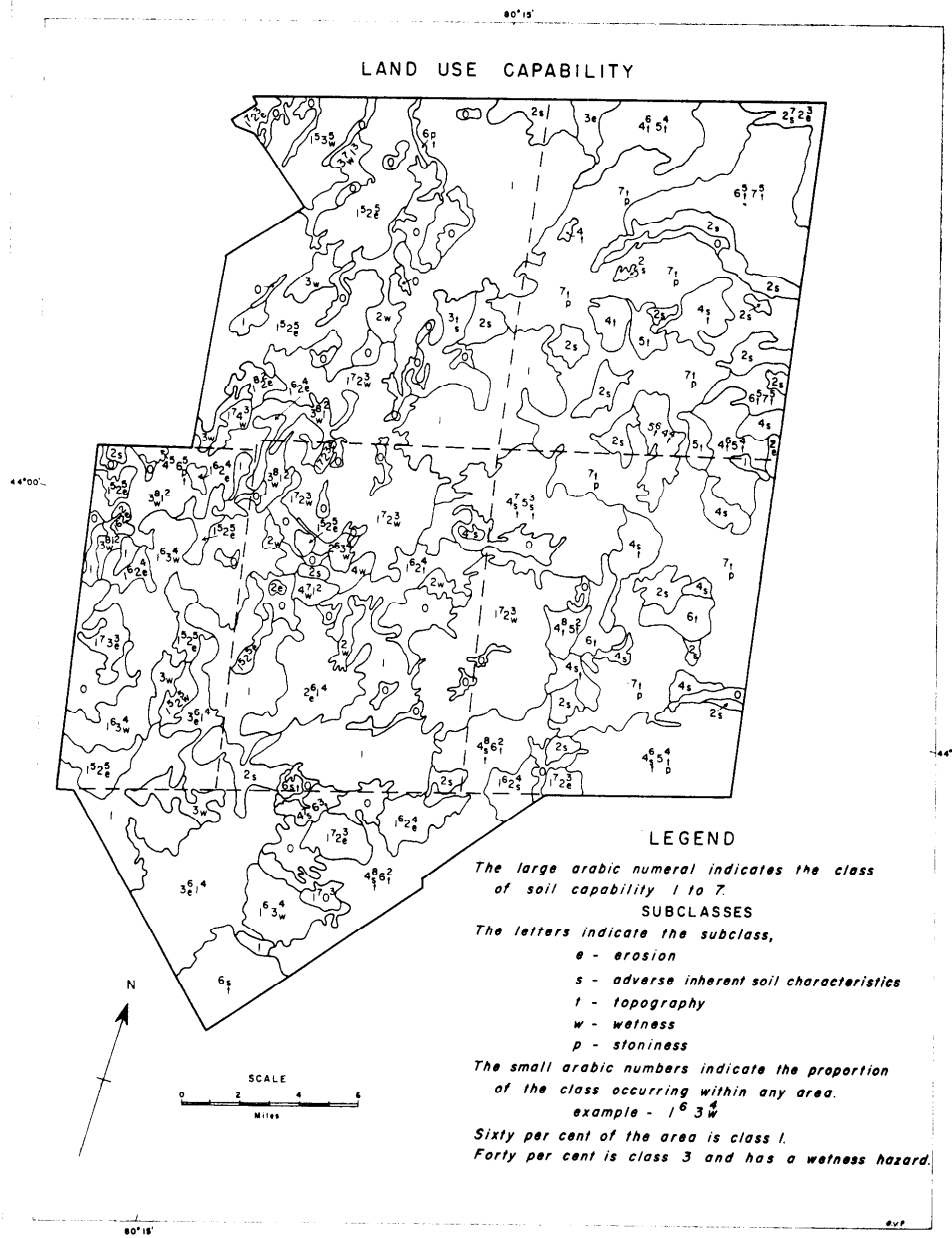


Figure 6 — Outline Map Showing the Distribution of the Land Use Capability Classes

Perth silt loam
Smithfield silt loam
Tavistock fine sandy loam
Tavistock silt loam
Tuscola fine sandy loam
Tuscola silt loam.

These soils are well suited for all of the crops generally grown in the county. They can be tilled regularly without great risk of erosion. Fertilizer should be applied regularly to maintain soil fertility. The amounts and analyses of fertilizers needed should be determined by soil tests.

Class 2

Subclass 2e

The soils in this subclass are deep, well drained, moderately rolling fine sandy loams, loams and silt loams. The soils have good structure and are permeable to water and air. They have a moderate capacity to hold soil moisture and have a medium supply of plant nutrients.

The soils are:

Brantford silt loam, 6 to 9% slopes
Bennington fine sandy loam, 6 to 9% slopes
Bennington silt loam, 6 to 9% slopes
Bondhead loam, 6 to 9% slopes
Brant fine sandy loam, 6 to 9% slopes
Harriston loam, 6 to 9% slopes
Harriston silt loam, 6 to 9% slopes
Guelph loam, 6 to 9% slopes
Huron loam, 6 to 9% slopes
Huron silt loam, 6 to 9% slopes.

These soils are suitable for almost all general farm crops and pasture. They are susceptible to erosion which can be controlled by strip crops or growing crops which provide adequate cover.

Subclass 2s

Subclass 2s consists of gently undulating, well drained soils having sandy surface layers or gravelly materials at depths of two or three feet. These soils have a low moisture holding capacity and a medium to low natural fertility.

The soils are:

Burford loam
Bookton sandy loam
Caledon sandy loam
Caledon fine sandy loam
Dundonald sandy loam
Fox sandy loam.

Although these soils are suitable for general farm crops, they become dry during the latter part of the growing season and irrigation is required to maintain adequate crop yields. Their organic matter content is low and applications of barnyard manure or the use of green manure crops are required to maintain soil structure. Fertilizers should be applied regularly in amounts determined by soil tests.

Subclass 2w

Poorly drained and imperfectly drained fine sandy loams, loams, silt loams, silty clay loams and clay loams have been grouped in this subclass. These soils occur on nearly level to gently undulating topography and have a medium to high natural fertility.

Included in this subclass are:
Brookston loam
Brookston silt loam
Beverly silt loam
Colwood fine sandy loam
Colwood silt loam
Maplewood fine sandy loam
Toledo clay loam
Toledo silty clay loam
Wiarton loam.

At present these soils are used chiefly for hay and pasture crops because little artificial drainage has been installed. However, excess water can be drained by tile or ditches and a greater variety of crops can be grown where drainage is improved.

Once drainage is improved it is important that soil fertility be maintained by additions of fertilizer and organic matter. The high organic matter content of these soils decreases rapidly under better drainage and soil structure deteriorates. Poor structure, especially in clayey soils, decreases the effectiveness of tile drains. Therefore, maintenance of the organic matter content is of some importance.

Subclass 3s

Well drained and imperfectly drained soils developed from sands or gravels are grouped in Subclass 3s. Some of these soils are wet for part of the growing season and others are too dry. They are low in natural fertility and fertilizer that is added will easily leach through the coarse soil materials.

The following soils are included in this subclass:
Alliston sandy loam
Brisbane loam
Brady sandy loam
Hillsburgh sandy loam, 0 to 5% slopes
Tioga fine sandy loam
Whitfield fine sandy loam

The Whitfield fine sandy loam tends to be droughty because of the proximity of the bedrock to the surface. The sandy surface soils of the Hillsburgh sandy loam and Tioga fine sandy loam do not hold much moisture and are low in organic matter and soil drifting is common.

In Dufferin County these soils are used for general farm crops. Climatically adapted special crops might be grown where these soils have been improved.

The most serious limitation on these soils is lack of fertility. In addition the Alliston, Brisbane, and Brady require some draining to make them more reliable. Irrigation is a requirement of the remaining soils of the subclass.

Subclass 3w

Subclass 3w consists of poorly drained fine sandy loams, loams and silt loams on nearly level topography. These soils have a high water table and are saturated most of the year. Little has been done to improve drainage except for ditching. The ditches occur at widely spaced intervals and are often filled with brush and grass which lowers their efficiency. These soils have a medium fertility.

Only three soils have been grouped in Subclass 3w. These are:
Crombie fine sandy loam
Crombie silt loam
Parkhill loam.

Undrained areas of these soils are used mainly for hay and pasture but a greater variety of crops can be grown when drainage is improved. Tile may be difficult to install in some places, because of the stones in the soil materials.

Subclass 3p

Well drained silt loam and fine sandy loam soils with gently undulating slopes are included in Subclass 3p. The two soils in this subclass are:
Honeywood silt loam, stoniness 2.
Caledon fine sandy loam, stoniness 2.

These soils have a surface cover of ice-rafted boulders which occur in sufficient numbers to interfere with cultivation. Once the surface stones are removed cultivation is no longer difficult. Stone disposal presents a problem. In most instances the stones are piled in fence rows or in the corners of the field. Shrubs and trees soon grow up in these areas and in a few years a substantial amount of land is lost to agriculture. However, these wide, stony fence rows, with their trees and shrubs help to provide cover and food for the wildlife in the district.

Fields from which the stones have been removed are used for such crops as oats, barley, mixed grains, hay, pasture, and silage corn.

Subclass 3e

Subclass 3e consists of well drained silt loam and fine sandy loam soils which are very susceptible to wind and water erosion. The soils in the subclass are:
Honeywood silt loam, 10 to 15% slopes
Caledon fine sandy loam, 6 to 9% slopes.

These are moderately and steeply rolling soils. Since the Caledon is sandy it soaks up rainfall readily but the moisture soon percolates through the underlying gravel. It is low in fertility and organic matter and blows easily.

These soils are best suited to general farm crops, especially hay and pasture. Soil losses can be reduced by strip cropping or contour tillage.

Subclass 4s

Moderately rolling, well drained coarse and very fine textured soils are in this subclass. These soils are:
Dunedin clay, 6 to 9% slopes
Hillsburgh fine sandy loam, 6 to 9% slopes
Hillsburgh sandy loam, 6 to 9% slopes
Tioga loamy sand
Dumfries-Hillsburgh complex, 6 to 9% slopes.

Management problems on the Dunedin clay are different from those of the other soils of the subclass. The clay content of the surface soil is high and the organic matter content is low. Consequently soil structure is poor and the soil is difficult to work. In addition, the Dunedin clay is only slightly permeable and runoff of rainfall is rapid, causing severe losses of topsoil wherever the surface is without cover. This soil is best suited to hay and pasture.

The other soils in this subclass are of a sandy nature. They have a low natural fertility, low organic matter content, low moisture holding capacity and tend to blow easily. These soils are suitable for limited production of general farm crops and could be used for certain cash crops if irrigated, heavily fertilized, and protected from wind erosion.

Subclass 4w

Subclass 4w consists of level and depressional loams and sandy loams that are very wet. The water table is very close to the surface most of the year and rarely goes below five feet at any time. In a few cultivated areas drainage has been somewhat improved by ditches. The surface soils are neutral to slightly alkaline in reaction and have a high organic matter content. The soils in the subclass are:
Gilford loam
Granby sandy loam
Wauseon sandy loam.

If drained, these soils are suitable for most farm crops but in their present state, cleared areas are used for pasture. Most areas are forested with white cedar and willow.

Subclass 5t

The well drained soils occuring on steeply rolling topography have been grouped in this subclass. These soils are sometimes severely eroded. Included in the subclass are:
Hillsburgh fine sandy loam, 10 to 15% slopes
Hillsburgh sandy loam, 10 to 15% slopes
Dumfries-Hillsburgh complex, 10 to 15% slopes
Honeywood fine sandy loam, 16 to 30% slopes
Dunedin clay, 10 to 15% slopes
Osprey-Dunedin complex, 10 to 15% slopes.

Because of steep slopes and the danger of erosion these soils cannot be cultivated regularly. Hence when used for agriculture they are best suited to pasture crops. Pasture yields can be increased and the better varieties of grasses and legumes maintained when fertilizers are added. Carrying capacity can also be increased on fields which have been irrigated.

Subclass 6t

The soils in this subclass have characteristics similar to those in Subclass 5t except that they are steeper and stonier. The soils included in the subclass are:
Donnybrook sandy loam
Dumfries loam
Hillsburgh fine sandy loam, 16 to 30% slopes
Hillsburgh sandy loam, 16 to 30% slopes
Dumfries-Hillsburgh complex, 16 to 30% slopes
Osprey-Dunedin complex, 16 to 30% slopes
Tioga-Bondhead complex, 16 to 30% slopes.

Very steep slopes prevent the use of most farm machinery on these soils. In addition stones seriously interfere with cultivation on the Dumfries, Donnybrook, and Osprey soils.

These soils provide a certain amount of grazing but should also be considered for forest and wildlife uses.

Subclass 7t

The rough hilly soils of Dufferin County have been grouped in Subclass 7t. These soils are:
Dumfries-Hillsburgh complex, slopes over 30%
Dunedin clay, slopes over 30%
Osprey-Dunedin complex, slopes over 30%.

These soils are too steep and the erosion hazard is too severe for agriculture. Alternative uses such as forestry, recreation and wildlife should be considered for them.

APPENDIX
Taxonomic Classification, Profile Descriptions and Analytical Data

ALLISTON SERIES

Location: Concession VIII, Lot 16, Mulmur Township
Parent Material: Pale brown to gray, calcareous sand
Classification:
Order — Podzolic
Great Group — Podzol
Sub Group — Gleyed Bisequa Podzol
Family — Alliston

Description:

Ah —0 to 1 inch sandy loam, black (10YR2/1); fine crumb structure; very friable consistency; stonefree; pH 5.4.

Ae —1 to 3 inches; loamy sand; light gray (10YR6/1); single grain; loose; stonefree; pH 5.0.

Bhfg1 —3 to 10 inches loamy sand; light yellowish brown (10YR6/4); mottled; single grain; loose; stonefree; pH 5.6.

Bhfg2 —19 to 31 inches loamy sand; brownish yellow (10YR6/6); very mottled; single grain; loose; stonefree; pH 6.4.

Bt —31 to 33 inches sandy loam; yellowish brown (10YR5/4); very mottled; weak medium nuciform; very friable; stonefree; pH 7.0.

C —Sand; pale brown (10YR6/3); mottled; single grain; loose; stonefree; calcareous; pH 8.2.

BENNINGTON SERIES

Location: Concession II, Lot 29, Adjala Township
Parent Material: Non-calcareous fine sandy loam or silt loam underlain by clay till or clay
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Honeywood

Description:

Ah —0 to 3 inches fine sandy loam; dark gray (10YR4/1); medium crumb structure; very friable consistency; stonefree; pH 6.6.

Ae1 —3 to 12 inches fine sandy loam; yellowish brown (10YR5/6); medium crumb; very friable; stonefree; pH 6.6.

Ae2 —12 to 17 inches fine loamy sand; light yellowish brown (10YR6/4); single grain; loose; stonefree; pH 6.0.

BA —17 to 29 inches fine loamy sand; light brown (7.5YR6/4); very weak fine nuciform; very friable, stonefree; pH 6.4.

Bt —29 to 32 inches fine sandy loam; dark brown (7.5YR4/4); medium nuciform; firm; stonefree; pH 7.2.

IIC —Clay, grayish brown (10YR5/2); coarse blocky; very hard when dry; very plastic when wet; stonefree; calcareous; pH 7.9.

BEVERLY SERIES

Location: Concession VII, Lot 12, Amaranth Township
Parent Material: Lacustrine silty clay loam
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Beverly

Description:

Ah —0 to 6 inches silt loam; very dark gray; (10YR3/1); medium granular structure; friable consistency; stonefree; pH 6.8.

Aeg —6 to 10 inches silt loam; brownish yellow (10YR6/6); mottled; medium granular; friable; stonefree; pH 6.6.

Bt —10 to 18 inches silty clay loam; yellowish brown (10YR5/4); mottled; medium subangular blocky; firm; stonefree; pH 7.0.

C —Silty clay loam; pale brown (10YR6/3); medium blocky; firm; stonefree; calcareous; pH 7.8.

BONDHEAD SERIES

Location: Concession VIII, Lot 17, Mono Township

Parent Material: Light gray, calcarcous sandy loam or loam till

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Guelph

Description:

Ah —0 to 3 inches loam; very dark grayish brown (10YR3/2); fine granular structure; friable consistency; moderately stony; pH 6.5.

Ae1 —3 to 18 inches loam; yellowish brown (10YR5/6); weak fine granular; firm; slightly stony; pH 6.2.

Ae2 —18 to 23 inches sandy loam; light gray (10YR7/2); weak fine granular; firm; slightly stony; pH 5.9.

Bt —23 to 31 inches loam; dark brown (10YR4/3); medium nuciform; plastic; slightly stony; pH 6.6.

C —Loam till; light gray (10YR7/2); prismatic, hard; moderately stony; calcareous; pH 7.8.

BOOKTON SERIES

Location: Concession VII, Lot 32, Mulmur Township

Parent Material: Non-calcareous sand underlain by calcareous clay or silty clay loam

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Bookton

Description:

Ah —0 to 5 inches sandy loam; dark grey (10YR4/1); fine crumb structure; very friable consistency; stonefree; pH 6.1.

Ae1 —5 to 15 inches loamy sand; yellowish brown (10YR5/6); single grain; loose; stonefree; pH 5.5.

Ae2 —15 to 25 inches loamy sand; brownish yellow (10YR6/6); single grain; loose; stonefree; pH 6.0.

Bt —25 to 28 inches sandy loam; yellowish brown (10YR5/4); very weak medium nuciform; very friable; stonefree; pH 6.5.

IIC —Clay; light brownish gray (10YR6/2); coarse blocky; very hard when dry; plastic when wet; calcareous; pH 7.8.

BRADY SERIES

Location: Concession V, Lot 15, Amaranth Township
Parent Material: Calcareous medium sand
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Brady

Description:

Ah —0 to 5 inches sandy loam; very dark grayish brown (10YR3/2); medium crumb structure; very friable consistency; stonefree; pH 7.0.

Aeg —5 to 9 inches loamy sand; pale brown (10YR6/3); mottled; single grain; loose; stonefree; pH 6.8.

Btg —9 to 14 inches sandy loam; yellowish brown (10YR5/8); mottled; weak medium subangular blocky; very friable; stonefree; pH 7.0.

Bmg —14 to 22 inches loamy sand; brownish yellow (10YR6/6); mottled; single grain; loose; stonefree; pH 7.3.

C —Sand; light yellowish brown (10YR6/4); single grain; loose; stonefree; calcareous; pH 7.6.

BRANT SERIES

Location: Concession IX, Lot 7, East Garafraxa Township
Parent Material: Calcareous alluvial fine sand and silt loam
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Honeywood

Description:

Ah —0 to 4 inches fine sandy loam; dark grayish brown (10YR4/2); medium granular structure; friable consistency; stonefree; pH 6.6.

Ae1 —4 to 15 inches fine sandy loam; yellowish brown (10YR5/6); weak medium crumb; very friable; stonefree; pH 6.6.

Ae2 —15 to 23 inches fine sandy loam; light yellowish brown (10YR6/4); weak fine crumb; very friable; stonefree; pH 6.3.

Bt —23 to 28 inches loam; dark brown (7.5YR4/4); medium subangular blocky; firm; stonefree; pH 7.0.

C —Varved fine sand and silt loam; light brown (7.5YR6/4); soft; calcareous; stonefree; pH 7.8.

BRANTFORD SERIES

Location: Concession VII, Lot 11, Amaranth Township
Parent Material: Lacustrine silty clay loam
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Brantford

Description:

Ah —0 to 3 inches silt loam; very dark brown (10YR2/2); medium granular structure; friable consistency; stonefree; pH 7.0.

Ae1 —3 to 17 inches silt loam; yellowish brown (10YR5/4); fine subangular blocky; friable; stonefree; pH 6.7.

Ae2 —17 to 19 inches loam; brown (10YR5/3); medium granular; friable; stonefree; pH 6.7.

Bt —19 to 33 inches silty clay loam; very dark; grayish brown (10YR3/2); coarse subangular blocky; hard when dry; plastic when wet; stonefree; pH 7.0.

C —Silty clay loam; brown (10YR5/3); medium blocky; firm; stonefree; calcareous; pH 7.6.

BRISBANE SERIES

Location: Concession VIII, Lot 11, Amaranth Township
Parent Material: Loam overlying coarse gravel
Classification: Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Brisbane

Description:

Ah —0 to 5 inches loam; very dark brown (10YR2/2); mottled; fine granular structure; friable consistency; few cobbles; pH 7.0.

Aeg —5 to 7 inches loam; yellowish brown (10YR5/8); mottled; medium granular; friable; few cobbles; pH 7.0.

Bt —7 to 19 inches gravelly loam; yellowish brown (10YR5/4); mottled; medium subangular blocky; friable; few cobbles; pH 7.2.

IIC —Gravel; light yellowish brown (2.5YR6/4); single grain; loose; calcareous; pH 7.8.

BROOKSTON SERIES

Location: Concession IX, Lot 24, East Garafraxa Township
Parent Material: Calcareous clay loam till
Classification: Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Brookston

Description:

Ah —0 to 6 inches loam; black (10YR2/1); medium granular structure; friable consistency; few stones; pH 6.8.

Bmg1 —6 to 10 inches loam; grayish brown (2.5Y5/2); mottled; mottles light olive brown (2.5Y5/6); coarse subangular blocky; firm; stonefree; pH 7.0.

Bmg2 —10 to 27 inches clay loam; light brownish gray (2.5Y6/2); strongly mottled; mottles olive-yellow (2.5Y6/8); coarse blocky; plastic; few stones; pH 7.2.

C —Clay loam till; gray (10YR6/1); coarse blocky; plastic; few stones; calcareous; pH 7.6.

TABLE 6

ANALYSES OF SURFACE SAMPLES — BROOKSTON SERIES

Township	*Location Concession*	*Lot*	*Sand %*	*Silt %*	*Clay %*	*pH*	*Organic Matter %*
Garafraxa W.	II	25E	37.2	44.4	18.4	6.8	6.6
Minto	VII	27	37.2	50.8	12.0	7.0	7.0
Maryborough	XIV	3	35.0	49.2	15.8	7.0	8.1
Peel	XVII	15	31.6	50.0	18.4	6.8	5.4

BURFORD SERIES

Location: Concession XIV, Lot 20, East Luther Township
Parent Material: Loam overlying coarse gravel
Classification: Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Burford

Ah —0 to 4 inches loam; very dark grayish brown (10YR3/2); fine granular structure; friable consistency; moderately cobbly; pH 6.8.

Ae1 —4 to 7 inches loam; brown (10YR5/3); medium granular; friable; few cobbles; pH 6.6.

Ae2 —7 to 12 inches loam; light yellowish brown (10YR6/4); weak medium granular; friable; few cobbles; pH 6.8.

Bt —12 to 19 inches clay loam; dark brown (7.5YR4/4); medium; subangular blocky; friable; moderately cobbly; pH 7.2.

IIC —Gravel; light yellowish brown (10YR6/4); single grain; loose; calcareous; pH 7.8.

TABLE 7

ANALYSES OF SURFACE SAMPLES — BURFORD SERIES

Township	*Location* *Concession*	*Lot*	*Sand* %	*Silt* %	*Clay* %	*pH*	*Organic Matter* %
Arthur	XI	8N	35.8	48.2	16.0	6.6	3.5
Erin	X	12NE	40.6	42.6	16.8	7.2	4.3
Puslinch	II	21	35.6	44.4	20.4	7.7	3.9
Puslinch	II	5	36.6	42.6	20.8	7.5	3.6

CAMILLA SERIES

Location: Concession III W, Lot 8, Mono Township
Parent Material: Silt loam or fine sandy loam materials over outwash gravel.
Classification: Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Brisbane

Description:

Ah —0 to 5 inches fine sandy loam; very dark grayish brown (10YR3/2); medium crumb structure; friable consistency; stonefree; pH 6.7.

Aeg —5 to 17 inches fine sandy loam; brownish yellow (10YR6/4); mottled; medium granular; very friable; stonefree; pH 6.7.

Btg —17 to 24 inches loam; yellowish brown (10YR5/4); mottled; medium subangular blocky; firm, stonefree; pH 7.2.

IIC —Gravel; light brownish gray (10YR6/2); single grain; loose; calcareous; pH 7.6.

CALEDON SERIES

Location: Concession I E, Lot A, Mono Township
Parent Material: Fine sandy loam over outwash gravel
Classification: Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Burford

Description:

Ah —0 to 4 inches fine sandy loam; very dark grayish brown (10YR3/2); fine crumb structure; very friable consistency; stonefree; pH 6.7.

Ae1 —4 to 15 inches fine sandy loam; yellowish brown (10YR5/4); weak fine subangular blocky; very friable; stonefree; pH 6.4.

Ae2 —15 to 28 inches fine loamy sand; light yellowish brown (10YR6/4); single grain; loose; stonefree; pH 6.6.

Bt —28 to 36 inches fine sandy loam; dark yellowish brown (10YR4/4); medium subangular blocky; friable; pH 7.0.

IIC —Gravel; pale brown (10YR6/3; single grain; loose; calcareous; pH 7.8.

COLWOOD SERIES

Location: Concession IV W, Lot 1, Melancthon Township
Parent Material: Lacustrine sands and silts
Classification:
Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Colwood

Description:

Ah —0 to 6 inches fine sandy loam; black (10YR2/1); medium crumb structure; friable consistency; stonefree; pH 7.0.

Bmg1 —6 to 15 inches fine sandy loam; grayish brown (10YR5/2); mottled; medium subangular blocky; friable; stonefree; pH 7.1.

Bmg2 —15 to 22 inches fine sandy loam; gray (10YR6/1); strongly mottled; coarse subangular blocky; friable; stonefree; pH 7.2.

C —Varved fine sand and silt loam; pale brown (10YR6/3); calcareous; stonefree; pH 7.6.

CROMBIE SERIES

Location: Concession II W, Lot 7, Melancthon Township
Parent Material: Loess or alluvium over loam till
Classification:
Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Colwood

Description:

Ah —0 to 6 inches silt loam; black (10YR2/1); medium granular structure; friable consistency; stonefree; pH 7.1.

Bmg1 —6 to 11 inches silt loam; grayish brown (2.5Y5/2); mottled; medium subangular blocky; firm; stonefree; pH 7.2.

Bmg2 —11 to 21 inches silt loam; light brownish gray (10YR6/2); strongly mottled; mottles olive-yellow (2.5Y6/8); coarse subangular blocky; firm; stonefree; pH 7.2.

IIC —Loam till; light brown (7.5YR6/4); medium subangular blocky; hard; moderately stony; calcareous; pH 7.6.

DONNYBROOK SERIES

Location: Concession IX E, Lot 22, Melancthon Township
Parent Material: Esker and kame gravel
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Dumfries

Description:

Ah —0 to 3 inches gravelly sandy loam; dark grayish brown (10YR4/2); fine crumb structure; loose consistency; moderately stony; pH 7.0.

Ae1 —3 to 8 inches gravelly sandy loam; yellowish brown (10YR-5/4); weak medium granular; loose; very stony; pH 6.8.

Ae2 —3 to 10 inches gravelly loamy sand; light yellowish brown (10YR6/4); single grain; loose; pH 7.0.

Bt —10 to 14 inches gravelly sandy loam; brown (10YR5/3); fine subangular blocky; loose; very stony; pH 7.4.

C —Coarse gravel; pale brown (10YR6/3); single grain; loose; calcareous; very stony; pH 7.8.

DUMFRIES SERIES

Location: Concession V, Lot 3, Mono Township

Parent Material: Stony, loam till

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Dumfries

Description:

Ah —0 to 4 inches loam; dark grayish brown (10YR4/2); fine crumb structure; friable consistency; very stony; pH 6.9.

Ae1 —4 to 10 inches loam; yellowish brown (10YR5/4); fine crumb; friable; moderately stony; pH 6.6.

Ae2 —10 to 15 inches loam; pale brown (10YR6/3); fine crumb; friable; very stony; pH 6.6.

Bt —15 to 23 inches clay loam; dark brown (10YR3/4); medium subangular blocky; firm; very stony; pH 7.2.

C —Sandy loam till; pale brown (10YR6/3); weak medium subangular blocky; excessively stony; calcareous; pH 7.8.

DUNDONALD SERIES

Location: Concession VII, Lot 29, East Luther Township

Parent Material: Non-calcareous sand underlain by gray, calcareous loam

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Bookton

Description:

Ah —0 to 3 inches sandy loam; dark grayish brown (2.5Y4/2); fine crumb structure; very friable; stonefree; pH 6.2.

Ae1 —3 to 9 inches sandy loam; yellowish brown (10YR5/4); single grain; loose; stonefree; pH 6.0.

Ae2 —9 to 16 inches loamy sand; yellowish brown (10YR5/6); single grain; loose; stonefree; pH 5.7.

Bt —16 to 24 inches sandy loam; brown (10YR5/3); very weak medium nuciform; very friable; stonefree; pH 6.2.

IIC —Loam till; gray (10YR6/1); fine prismatic; hard; calcareous; pH 8.0.

DUNEDIN SERIES

Location: Concession V, Lot 13, Mulmur Township
Parent Material: Clay till
Classification:
Order — Brunisolic
Great Group — Brown Forest
Sub Group — Degraded Brown Forest
Family — Saugeen

Description:

Ah —0 to 4 inches clay; dark brown (7.5YR3/2); fine nuciform structure; hard consistency when dry, very plastic when wet; slightly stony; pH 6.7.

Bm —4 to 7 inches clay; reddish brown (5YR5/3); coarse blocky; very hard when dry, very plastic when wet; slightly stony; pH 6.8.

Btj —7 to 14 inches clay; reddish brown (5YR4/3); coarse blocky to massive; very hard when dry, very plastic when wet; pH 7.0.

C —Clay till; dark reddish brown (5YR3/4); massive; very hard when dry, very plastic when wet; calcareous; pH 7.8.

EMBRO SERIES

Location: Concession II W, Lot 11, Mono Township
Parent Material: Loess or alluvium over loam till
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Tuscola

Description:

Ah —0 to 6 inches silt loam; very dark grayish brown (10YR3/2); medium granular structure; friable consistency; stonefree; pH 6.9.

Aeg —6 to 13 inches silt loam; light yellowish brown (10YR6/4); mottled; medium granular; friable; stonefree; pH 6.8.

Btg —13 to 22 inches silty clay loam; brown (7.5YR5/4); mottled; medium subangular blocky; firm; stonefree; pH 7.2.

IIC —Loam till; light brown (7.5YR6/4); medium subangular blocky; hard; moderately stony; calcareous; pH 7.6.

FOX SERIES

Location: Concession X, Lot 1, East Garafraxa Township
Parent Material: Outwash Sand
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Fox

Description:

Ah —0 to 4 inches sandy loam; very dark grayish brown (2.5Y-3/2); weak medium crumb structure; very friable consistency; stonefree; pH 6.4.

Ae1 —4 to 20 inches loamy sand; yellowish red (5YR5/6); single grain; loose; stonefree; pH 6.2.

Ae2 —20 to 27 inches loamy sand; light reddish brown (5YR6/4); single grain; loose; stonefree; pH 6.0.

Bt —26 to 32 inches sandy loam; dark brown (10YR4/3); weak medium subangular blocky; very friable; stonefree; pH 6.8.

C —Sand; pale brown (10YR6/3); single grain; loose; stonefree; calcareous; pH 7.6.

GILFORD SERIES

Location: Concession XV, Lot 1, East Garafraxa Township
Parent Material: Loam over outwash gravel
Classification: Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Lyons

Description:

Ah —0 to 8 inches loam; black (10YR2/1); medium granular structure; friable consistency; slightly stony; pH 7.3.

Bmg1 —8 to 16 inches loam; grayish brown (10YR5/2); mottled; coarse subangular blocky; friable; slightly cobbly; pH 7.3.

Bmg2 —16 to 26 inches loam; light brownish gray (10YR6/2); strongly mottled; mottles brownish yellow (10YR6/6); massive; friable; cobbly; pH 7.3.

IIC —Gravel; pale brown (10YR6/3); single grain; loose; calcareous; pH 7.5.

TABLE 8
ANALYSES OF GILFORD LOAM

Horizon	*Sand* %	*Silt* %	*Clay* %	*pH*	*Organic Matter* %	*Total P* %	*Loss on Ignition* %
Ah	47.6	36.8	15.6	7.3	7.9	36.4	14.4
Bmg1	34.0	43.4	22.6	7.3	4.6	24.2	8.8
Bmg2	33.2	43.6	23.2	7.3	2.2	20.1	8.3
IIC	67.6	27.8	4.6	7.5	0.4	9.4	20.8

GRANBY SERIES

Location: Concession VII, Lot 16, Amaranth Township
Parent Material: Outwash sand
Classification: Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Granby

Description:

Ah —0 to 7 inches sandy loam; black (10YR2/1); medium crumb structure; very friable consistency; stonefree; pH 7.2.

Bmg1 —7 to 13 inches sandy loam; dark gray (10YR4/1); mottled; weak meduim crumb; loose; stonefree; pH 7.2.

Bmg2 —13 to 25 inches loamy sand; gray (10YR6/1); mottled; single grain; loose; stonefree; pH 7.4.

C —Sand; light brownish gray (10YR6/2); single grain; loose; stonefree; calcareous; pH 7.6.

GUELPH SERIES

Location: Concession A, Lot 3, East Garafraxa Township
Parent Material: Calcareous loam till

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Guelph

Description:

Ah —0 to 5 inches loam; very dark brown (10YR2/2); fine granular structure; friable consistency; slightly stony; pH 6.8.

Ae1 —5 to 12 inches loam; brown (10YR5/3); medium granular; friable; slightly stony; pH 6.6.

Ae2 —12 to 16 inches loam; pale brown (10YR6/3); fine granular; friable; slightly stony; pH 6.7.

Bt —16 to 23 inches loam; dark brown (10YR4/3); medium subangular blocky; friable; moderately stony; pH 7.0.

C —Loam till; grayish brown (10YR5/2); coarse subangular blocky; hard; moderately stony; pH 7.5.

HARKAWAY SERIES

Location: Concession VII W, Lot 21, Melancthon Township
Parent Material: Loam till
Classification:
Order — Brunisolic
Great Group — Brown Forest
Sub Group — Degraded Brown Forest
Family — Otonabee

Description:

Ah —0 to 5 inches loam; very dark brown (10YR2/2); fine granular structure; friable consistency; moderately stony; pH 7.0.

Bm —5 to 9 inches loam; light olive-brown (2.5Y5/4); medium nuciform; friable; moderately stony; pH 7.2.

Btj —9 to 14 inches loam; olive-brown (2.5Y4/4); medium nuciform; friable; moderately stony; pH 7.6.

C —Loam till; light yellowish brown (10YR6/4); prismatic; hard; moderately stony; pH 8.0.

HARRISTON SERIES

Location: Concession VIII, Lot 12, Amaranth Township
Parent Material: Loam till
Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Guelph

Description:

Ah —0 to 5 inches loam; very dark grayish brown (10YR3/2); medium granular structure; friable consistency; slightly stony; pH 6.8.

Ae1 —5 to 13 inches loam; brown (7.5Y5/4); medium granular; friable; stonefree; pH 6.5.

Ae2 —13 to 19 inches loam; light yellowish brown (2.5Y6/4); weak fine platy; soft; stonefree; pH 6.7.

Bt —19 to 28 inches loam; olive-brown (2.5Y4/4); medium subangular blocky; friable; stonefree; pH 7.0.

C —Loam till; light yellowish brown (2.5Y6/4); medium subangular blocky; hard; slightly stony; calcareous; pH 7.6.

HILLSBURG SERIES

Location: Concession IX, Lot 6, East Garafraxa Township
Parent Material: Outwash fine sand
Classification: Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Pontypool

Description:

Ah —0 to 3 inches fine sandy loam; dark brown (10YR3/3); fine crumb structure; very friable consistency; stonefree; pH 6.6.

Ae1 —3 to 10 inches fine loamy sand; dark yellowish brown (10YR4/4); weak meduim crumb; loose; stonefree; pH 6.3.

Ae2 —10 to 18 inches fine sand; light yellowish brown (10YR6/4); single grain; loose; stonefree; pH 6.3.

Bt —18 to 25 inches fine sandy loam; yellowish red (5YR4/8); weak medium subangular blocky; very friable; stonefree; pH 7.1.

C —Fine sand; light yellowish brown (10YR6/4); single grain; loose; occasional stones; pH 7.5.

HONEYWOOD SERIES

Location: Concession III E, Lot 20, Melancthon Township
Parent Material: Loess or alluvium over loam till
Classification: Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Honeywood

Description:

Ah —0 to 3 inches silt loan; dark gray (10YR4/1); medium granular structure; friable consistency; stonefree; pH 6.6.

Ae1 —3 to 12 inches silt loam; yellowish brown (10YR5/6); fine granular; friable; stonefree; pH 6.6.

Ae2 —12 to 17 inches fine sandy loam; light yellowish brown; weak fine crumb; very friable; stonefree; pH 6.0.

Ae3 —17 to 29 inches fine sandy loam; light brown (7.5YR6/4); weak fine crumb; very friable; stonefree; pH 6.4.

Bt —29 to 37 inches silt loam; dark brown (7.5YR4/4); medium subangular blocky; firm; stonefree; pH 7.2.

IIC —Loam till; light brown (7.5YR6/4); medium blocky; hard; moderately stony; calcareous; pH 7.8.

HURON SERIES

Location: Concession X, Lot 11, East Garafraxa Township
Parent Material: Clay loam till
Classification: Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Orthic Grey-Brown Podzolic
Family — Huron

Description:

Ah —0 to 5 inches loam; very dark grayish brown (10YR3/2); medium granular structure; friable consistency; stonefree; pH 6.9.

Ae1 —5 to 7 inches loam; pale brown (10YR6/3); medium granular; friable; slightly stony; pH 6.9.

Ae2 —7 to 12 inches loam; very pale brown (10YR7/3); coarse granular; friable; slightly stony; pH 6.7.

BA —12 to 17 inches clay loam; light gray (10YR7/2); coating on dark grayish brown (10YR4/2) aggregates; medium subangular blocky; hard; slightly stony; pH 7.0.

Bt —17 to 23 inches clay; dark brown (10YR3/4); medium blocky; very hard; moderately stony; pH 7.3.

C —Clay loam till; brown (10YR5/3); medium subangular blocky; very hard; moderately stony; calcareous; pH 7.8.

TABLE 9

ANALYSES OF SURFACE SAMPLES — HURON SERIES

Location			*Sand*	*Silt*	*Clay*		*Organic Matter*
Township	*Concession*	*Lot*	*%*	*%*	*%*	*pH*	*%*
Amaranth	III	8	44.2	44.2	13.6	7.6	5.0
E. Garafraxa	X	10	26.2	52.6	21.2	7.6	4.6
E. Garafraxa	IX	18	26.0	44.4	29.6	7.8	5.3
E. Garafraxa	XIII	16	33.6	47.2	19.2	7.2	5.8
E. Luther	I	24	31.0	48.6	20.4	7.7	4.4

LISTOWEL SERIES

Location: Concession V, Lot 3, Amaranth Township

Parent Material: Loam and silt loam till

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — London

Description:

Ah —0 to 6 inches loam; very dark brown (10YR2/2); medium granular structure; friable consistency; stonefree; pH 7.0.

Aeg —6 to 14 inches loam; yellowish brown (10YR5/8); mottled; weak subangular blocky; soft, stonefree; pH 6.8.

Btg —14 to 24 inches loam; yellowish brown (10YR5/4); mottled; coarse subangular blocky; firm; stonefree; pH 7.3.

C —Loam till; light yellowish brown (10YR6/4); medium subangular blocky; hard; few stones; calcareous; pH 7.8.

LONDON SERIES

Location: Concession I, Lot 19, East Luther Township

Parent Material: Loam till

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — London

Description:

Ah —0 to 6 inches loam; very dark grayish brown (10YR3/2); medium granular structure; friable consistency; slightly stony; pH 6.9.

Aeg —6 to 11 inches loam; yellowish brown (10YR5/6); mottled; weak fine subangular blocky; friable, slightly stony; pH 7.3.

Btg —11 to 19 inches loam; yellowish brown (10YR5/4); mottled; medium blocky; friable; slightly stony; pH 7.5.

C —Loam till; grayish brown (10YR5/2); medium subangular blocky; compact; moderately stony; calcareous; pH 8.0.

MAPLEWOOD SERIES

Location: Concession X, Lot 8, Amaranth Township
Parent Material: Loess or alluvium over clay loam till
Classification:
Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Colwood

Description:

Ah —0 to 7 inches fine sandy loam; very dark gray (10YR3/1); medium granular structure; friable; stonefree; pH 7.0.

Bmg1 —7 to 14 inches fine sandy loam; gray (10YR5/1); mottled; weak medium subangular blocky; friable; stonefree; pH 7.0.

Bmg2 —14 to 23 inches fine sandy loam; gray (10YR6/1); strongly mottled; mottles brownish yellow (10YR6/6); weak coarse subangular blocky; friable; stonefree; pH 7.2.

IIC —Clay loam till; grayish brown (10YR5/2); coarse blocky; hard; slightly stony; calcareous; pH 7.8.

OSPREY SERIES

Location: Concession V, Lot 15, Orillia Township
Parent Material: Coarse, stony, pale brown, calcareous loam till
Classification:
Order — Brunisolic
Great Group — Brown Forest
Sub Group — Degraded Brown Forest
Family — Osprey

Description:

Ah —0 to 3 inches loam; very dark brown (10YR2/2); medium granular structure; friable consistency; very stony; pH 7.0.

Bm —3 to 8 inches loam; dark yellowish brown (10YR4/4; weak medium nuciform; friable; moderately stony; pH 6.8.

Btj —8 to 16 inches loam; dark brown (10YR4/3); medium nuciform; friable; very stony; pH 7.4.

C —Loam till; pale brown (10YR6/3); weak prismatic; friable; very stony; calcareous; pH 8.0.

PARKHILL SERIES

Location: Concession XIV, Lot 30, East Luther Township
Parent Material: Loam till
Classification:
Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Lyons

Description:

Ah —0 to 7 inches loam; very dark brown (10YR2/2); medium granular structure; friable consistency; stonefree; pH 6.9.

Bmg1 —7 to 14 inches loam; light olive-brown (2.5Y5/6); strongly mottled; mottles olive-yellow (2.5Y6/8); medium subangular blocky; friable; slightly stony; pH 7.3.

Bmg2 —14 to 27 inches loam; light brownish gray (2.5Y6/2); strongly mottled; mottles yellowish brown (10YR5/8); coarse blocky; friable; slightly stony; pH 7.5.

C —Loam till; light brownish gray (10YR6/2); strong brown (7.5YR5/8) mottles; weak medium blocky; hard; slightly stony; calacareous; pH 7.8.

TABLE 10

ANALYSES OF PROFILE SAMPLES — PARKHILL SERIES

Location			Horizon	Sand %	Silt %	Clay %	pH	Organic Matter %
Township	Concession	Lot						
E. Luther	XIV	30	Ah	24.8	49.4	25.8	6.9	10.8
			Bmg1	45.0	44.8	10.2	7.4	1.2
			Bmg2	39.8	47.9	12.3	7.5	0.7
			C	36.5	48.7	14.8	7.6	0.7
E. Luther	XIII	30	Ah	32.4	44.3	23.3	7.0	8.1
			Bmg	45.5	36.9	17.6	7.4	3.2
			C	36.2	48.8	15.0	7.5	0.4

PERTH SERIES

Location: Concession III, Lot 21, East Luther Township

Parent Material: Clay loam till

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Perth

Description:

Ah —0 to 6 inches loam; very dark brown (10YR2/2); coarse granular structure; friable consistency; stonefree; pH 6.8.

Aeg —6 to 9 inches loam; yellowish brown (10YR5/4); mottled; fine subangular blocky; friable; stonefree; pH 7.0.

Btg1 —9 to 11 inches clay loam; dark grayish brown (10YR4/2); mottled; medium subangular blocky; hard; slightly stony; pH 7.1.

Btg2 —11 to 22 inches clay loam; dark brown (10YR4/3); mottled; medium blocky; hard; slightly stony; pH 7.3.

C —Clay loam till; grayish brown (10YR5/2); medium blocky; hard; slightly stony; calcareous; pH 8.0.

SMITHFIELD SERIES

Location: Concession I W, Lot 32, Mulmur Township

Parent Material: Lacustrine silty clay loam

Classification:
Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Perth

Description:

Ah —0 to 5 inches silty clay loam; very dark gray (10YR3/1); medium granular structure; friable consistency; stonefree; pH 7.0.

Aeg —5 to 8 inches silty clay loam; light yellowish brown (10YR-6/4); mottled; weak fine platy; friable; stonefree; pH 6.5.

Btg —8 to 19 inches silty clay; brown (10YR5/3); mottled; coarse blocky; hard when dry; plastic when wet; stonefree; calcareous; pH 7.4.

C —Silt loam and clay varves; clay grayish brown (10YR5/2); silt loam; light gray (10YR7/2); hard when dry, plastic when wet; stonefree; calcareous; pH 8.2.

TAVISTOCK SERIES

Location: Concession V, Lot 12, Amaranth Township

Parent Material: Loess or alluvium over clay loam till

Classification:

Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Tuscola

Description:

Ap —0 to 7 inches silt loam; very dark grayish brown (10YR3/2); medium granular structure; friable consistency; stonefree; pH 6.7.

Aeg —7 to 12 inches silt loam; light yellowish brown (10YR6/4); mottled; medium granular; friable; stonefree; pH 6.5.

Btg —12 to 23 inches silty clay loam; yellowish brown (10YR5/4); mottled; medium subangular blocky; firm; stonefree; pH 7.0.

IIC —Clay loam till; grayish brown (10YR5/2); coarse blocky; hard; slightly stony; calcareous; pH 7.8.

TIOGA SERIES

Location: Concession VII, Lot 7, Mulmur Township

Parent Material: Outwash sand

Classification:

Order — Podzolic
Great Group — Podzol
Sub Group — Bisequa Podzol
Family — Tioga

Description:

Ah —0 to 1 inch loamy sand; very dark grayish brown (10YR3/2); fine crumb structure; very friable consistency; stonefree; pH 6.0.

Ae —1 to 2 inches loamy sand; light gray (10YR 6/1); single grain; loose; stonefree; pH 4.6.

Bhf1 —2 to 17 inches loamy sand; yellowish brown (10YR5/4); very weak medium nuciform; very friable; stonefree; pH 5.9.

Bhf2 —17 to 35 inches loamy sand; yellowish brown (10YR5/8); very weak medium nuciform; very friable; stonefree; pH 6.5.

Bt —35 to 37 inches sandy loam; brown (10YR5/3); weak medium nuciform; very friable; stonefree; pH 7.5.

C —Sand; pale brown (10YR6/3); single grain; loose; stonefree; calcareous; pH 8.4.

TOLEDO SERIES

Location: Concession X, Lot 10, East Garafraxa Township
Parent Material: Lacustrine silty clay loam
Classification: Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Brookston

Description:

Ah —0 to 6 inches silty clay loam; black (10YR2/1); medium granular structure; friable consistency; stonefree; pH 6.6.

Bmg1 —6 to 11 inches silty clay loam; very dark grayish brown (2.5Y3/2); mottled; coarse subangular blocky; firm; stonefree; pH 7.0.

Bmg2 —11 to 17 inches silty clay loam; grayish brown (2.5Y5/2); strongly mottled; mottles light olive-brown (2.5Y5/6); coarse blocky; plastic; stonefree; pH 7.1.

C —Silty clay loam; grayish brown (2.5Y6/2) with olive-yellow (2.5Y6/8) mottles; massive; plastic; stonefree; calcareous; pH 7.6.

TUSCOLA SERIES

Location: Concession XVI, Lot 2, East Garafraxa Township
Parent Material: Lacustrine sands and silts
Classification: Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Gleyed Grey-Brown Podzolic
Family — Tuscola

Description:

Ah —0 to 5 inches silt loam; very dark brown (10YR2/2); medium granular structure; friable consistency; stonefree; pH 6.8.

Aeg —5 to 13 inches silt loam; light olive-brown (2.5Y5/4); mottled; weak fine platy; soft; stonefree; pH 6.8.

Btg —13 to 19 inches silt loam; olive-brown (2.5Y4/4); mottled; medium subangular blocky; friable; stonefree; pH 7.2.

C —Varved fine sand and silt loam; light brown (7.5YR6/4); soft; calcareous; stonefree; pH 7.9.

WAUSEON SERIES

Location: Concession C, Lot 2, East Garafraxa Township
Parent Material: Non-calcareous sand underlain by calcareous clay or silty clay loam

Classification:

Order — Gleysolic
Great Group — Dark Grey Gleysolic
Sub Group — Orthic Dark Grey Gleysolic
Family — Granby

Description:

Ah —0 to 8 inches sandy loam; very dark brown (10YR2/2); fine crumb structure; very friable consistency; stonefree; pH 7.0.

Bmg —8 to 19 inches sandy loam; light brownish gray (10YR6/2); mottled; single grain, loose; stonefree; pH 7.2.

IIC —Clay, pale brown (10YR6/3); coarse blocky; very hard when dry, plastic when wet; stonefree; calcareous; pH 7.9.

WHITFIELD SERIES

Location: Concession I W, Lot 11, Mulmur Township

Parent Material: Loess or alluvium over bedrock

Classification:

Order — Podzolic
Great Group — Grey-Brown Podzolic
Sub Group — Brunisolic Grey-Brown Podzolic
Family — Honeywood

Description:

Ah —0 to 4 inches fine sandy loam; very dark gray (10YR3/1); medium crumb structure; friable consistency; stonefree; pH 6.6.

Ae1 —4 to 11 inches fine sandy loam; yellowish brown (10YR5/6); fine crumb, very friable; stonefree; pH 6.5.

Ae2 —11 to 16 inches fine loamy sand; light yellowish brown (10YR6/4); weak fine crumb; very friable; stonefree; pH 6.2.

Bt —16 to 26 inches loam; dark brown (7.5Y4/4); medium sub-angular blocky; friable; stonefree; pH 7.2.

IIC —Limestone bedrock.

WIARTON SERIES

Location: Concession VIII W, Lot 21, Melancthon Township

Parent Material: Loam till

Classification:

Order — Brunisolic
Great Group — Brown Forest
Sub Group — Gleyed Brown Forest
Family — Matilda

Description:

Ah —0 to 5 inches loam; very dark brown (10YR2/2); medium granular structure; friable consistency; slightly stony; pH 7.2.

Bmg —5 to 12 inches loam; light olive-brown (2.5Y5/4); mottled; medium nuciform; firm; slightly calcareous; pH 7.5.

C —Loam till; light yellowish brown (10YR6/4); prismatic; hard; slightly stony; calcareous; pH 8.0.

GLOSSARY

Aggregate (soil)—A single mass or cluster of many soil particles, held together in a prism, granule, cube or other form.

Calcareous material—Material containing a large amount of calcium carbonate. It effervesces visibly when treated with hydrochloric acid.

Cation exchange capacity—A measure of the adsorptive capacity of soil for cations (hydrogen plus bases), or the amount of cations that can be absorbed by a stated amount of soil, usually expressed as milli-equivalents per 100 grams of dry soil. A soil with a fairly high cation exchange capacity is usually preferred for agriculture to one with a low exchange capacity because it will retain more plant nutrients and be less subject to leaching or exhaustion.

Consistency (soil)—The degree of mutual attraction of the particles in the whole soil mass, or their resistance to separation or deformation. Consistency is described by such general terms as loose or open; slightly, moderately or very compact; friable; plastic; sticky; soft; firm; hard and cemented.

Drift—Material of any sort deposited in one place after movement from another by natural forces. Glacial drift includes all glacial deposits, whether stratified or unstratified.

Drumlin—A narrow, often spoon-shaped, hill formed as part of a ground moraine. There is usually an abrupt slope at the end facing the source of ice and a gentle slope in the direction to which the ice moved.

Dune—A mount or ridge of loose sand piled by the wind.

Erosion—The wearing away of the land surface by water, wind or other forces, including human activities. It includes sheet, rill and gully erosion of soils.

Friable—Easily crushed between thumb and forefinger, and nonplastic.

Gley—A soil in which the material has been modified by a reduction process brought about by saturation with water for long periods in the presence of organic matter.

Horizon—A more or less horizontal layer in the soil profile having characteristics derived from the soil building process.

Humus—The well-decomposed, more or less stable part of the soil organic matter.

Kame—The deposit of a stream that flowed between a glacier and a valley side. After the ice retreated the kame remained as a terrace-like deposit.

Lacustrine materials—Sediments deposited in lakes.

Leaching—The removal of constituents from the soil by percolating water.

Mottled—Irregularly marked with spots of different colors. Mottling of soils usually indicates poor aeration and lack of adequate drainage.

Muck—Dark-colored, decomposed organic material that has accumulated in damp areas. Muck has a higher mineral content than peat, and the bulk of the plant remains are decomposed beyond recognition.

Parent Material—Geological material from which a soil is derived.

Peat—Undecomposed to partly decomposed organic material with recognizable plant remains. Peat accumulates in bogs and seepage areas under very moist conditions.

Permeability—The quality or state of a soil or of any horizon in the soil profile that permits passage of water or air to all parts of the mass.

Percolation—Downward movement of water through the soil, specially the downward flow of water in saturated or nearly saturated soil.

pH—A logarithmic designation of the relative acidity or alkalinity of soil or other materials. A pH of 7.0 indicates the neutral condition. Higher values indicate alkalinity and lower ones acidity.

Plant Nutrients—The elements taken in by the plant, essential to its growth and used by it in the elaboration of its food and tissue. These include nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, copper, boron and perhaps others obtained from the soil; and carbon, hydrogen and oxygen obtained chiefly from air and water.

Plastic—Capable of being molded or modeled without rupture when moist.

Relief—The elevations of inequalities of the land surface when considered collectively. Minor surface configurations are called microrelief. See topographic classes.

Soil profile—A vertical section of a soil that extends through the A and B horizons and the C horizon or the parent material.

Soil separates—The particle sizes on which textural classes of soil are based.

These are as follows:

	Diameter in millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	Below—0.002

Sands are further separated according to the occurence of different-sized sand fractions. Medium and coarse sands may contain over 25 per cent coarse sand but not over 50 per cent fine sands. Fine and very fine sands must contain over 50 per cent of the respective sand fractions.

Soil Structure—The morphology of the aggregates of the soil particles. The following types are mentioned in this report.

Blocky—Blocklike, with sharp, angular corners.

Crumb—Porous and granular.

Granular—More or less rounded, with no smooth faces and edges, relatively non-porous.

Massive—In large cohesive masses, almost amorphous or structureless, with irregular cleavage faces.

Single-grained—Each grain by itself, as in sand.

Subangular blocky—With mixed rounded and flattened faces and many rounded vertices.

Solum—The upper, weathered part of the soil, in which the processes of soil formation take place. The A and B horizons.

Stratified materials—Geological materials composed of or arranged in strata or layers.

Submarginal soils—Soils that are unsuitable for a given purpose.

Texture—The percentages of sand, silt and clay in a soil determine its texture.

Till—An unsorted mixture of stones, gravels, sand, silt and clay transported by glaciers and deposited during the melting and recession of the ice.

Topographic Classes—Groupings of landscape according to percent slope and shape.

A.	*Regular Surface*	*B.*	*Irregular or Rough Surface*	*Slope*
A0	Smooth depressional	B0	Hummocky depressional	0%
A1	Smooth level	B1	Irregular level	0 to 0.5%
A2	Smooth very gently undulating	B2	Irregular very gently undulating	0.5 to 2%
A3	Smooth gently undulating	B3	Irregular gently undulating	2 to 5%
A4	Smooth moderately rolling	B4	Irregular moderately rolling	6 to 9%
A5	Smooth steeply rolling	B5	Irregular steeply rolling	10 to 15%
A6	Smooth very steeply rolling	B6	Irregular very steeply rolling	16 to 30%
A7	Smooth hilly	B7	Irregular hilly	over 30%

Varves—Annual layers of sediment generally found in glacial lake deposits. Varves consist of two thin layers of differing composition, one laid down in summer, the other in winter when the lake is frozen over. The winter layer is thinner, darker-colored and of finer texture than the summer layer.

Water table—The upper limit of the soil or underlying material that is saturated with water.

Weathering—The physical and chemical disintegration and decomposition of rocks and minerals.

HORIZON DESIGNATIONS

Organic Horizons

L —The 0 (organic) horizon designation is to be dropped and replaced with: An organic layer characterized by the accumulation of organic matter in which the original structures are definable.

F —An organic layer characterized by the accumulation of partly decomposed organic matter. The original structures are discernible with difficulty. Fungi mycelia often present.

H —An organic layer characterized by an accumulation of decomposed organic matter in which the original structures are undefinable.

Note 1 —If it is not possible or advisable to subdivide the organic layer it may be referred to as L-H or other combinations.

Note 2 —It may be desirable to use lower case suffixes to differentiate kinds of organic material. However, none is suggested in this report.

Master Mineral Horizons

A —A mineral horizon or horizons formed at or near the surface in the zone of maximum removal of materials in solution and suspension and/or maximum in situ accumulation of organic matter. It includes:

(1) horizons in which organic matter has accumulated as a result of biological activity (Ah);

(2) horizons that have been eluviated of clay, iron, aluminum, and/or organic matter (Ae);

(3) horizons dominated by 1 and 2 above but transitional to underlying B or C (AB or A and B);

(4) horizons markedly disturbed by cultivation or pasture (Ap).

B —A mineral horizon or horizons characterized by one or more of the following:

(1) an enrichment (exclusive of dolomite or salts more soluble in water) in silicate clay, iron, aluminum, and/or illuvial organic matter (Bt, Bf, Bh, Bfh);

(2) a prismatic or columnar structure which exhibits pronounced coatings or stainings and characterized by the presence of significant amounts or exchangeable sodium and/or magnesium (Bn);

(3) an alteration by hydrolysis or oxidation to give a change in color and/or structure and does not meet the requirements of (1) and (2) above (Bm);

C —A mineral horizon or horizons comparatively unaffected by the pedogenic processes operative in A and B, excepting (1) the process of gleying, and (2) the accumulation of dolomite and salts more soluble in water (Ck, Cs, Cg and C).

Lower Case Suffixes

c —A *cemented* (irreversible) pedogenic horizon.

ca —A horizon with secondary carbonate enrichment.

cc —*Cemented* (irreversible) pedogenic *concretions.*

e —A horizon characterized by the removal of clay, iron, aluminum or organic matter. Lighter in color by one unit of value or chroma when dry than the layer below (eluviated).

f —A horizon enriched with hydrated iron (fe). It has a chroma of three or more and is redder than the horizon above or below.

g —A horizon characterized by reduction and gray colors; often mottled (gley). Weak gleying as indicated by mottling is shown by gj.

h —A horizon enriched with organic matter. When used with A it must show at least one Munsell unit of value darker than the layer immediately below (humus). When used as the only suffix to B (Bh) this horizon must contain 10 per cent or more of organic matter.

j —A horizon whose characteristics are weakly expressed. It must be used with some other suffix.

k —Presence of carbonate as indicated by visible effervesence with dilute HCl (kalk).

m —A horizon slightly altered by hydrolysis, oxidation and/or solution to give a change in color and/or structure (mellowed).

n —A horizon with distinctive morphological and physical characteristics as shown by black or dark colorations or coatings on the surface of the peds and characterized by prismatic or columnar structure hard to very hard consistency when dry. It contains more than 12% exchangeable sodium or more than 50% exchangeable sodium plus magnesium (natrium).

p —A layer disturbed by man's activities i.e. by cultivation and/or pasturing. To be used only with A.

sa —A horizon with secondary enrichment of salts more soluble than carbonates.

s —A horizon with salts including gypsum which may be detected as crystals or veins, or as surface crusts of salt crystals, or by distressed crop growth, or presence of salt tolerant plants (salt).

t —A horizon enriched with silicate clay (ton).

z —A permanently frozen layer (zero).

Note: Lithologic changes are indicated by Roman Numeral prefixed (I to be assumed). e.g. Ah, Ae, IIBt1, IIIC.