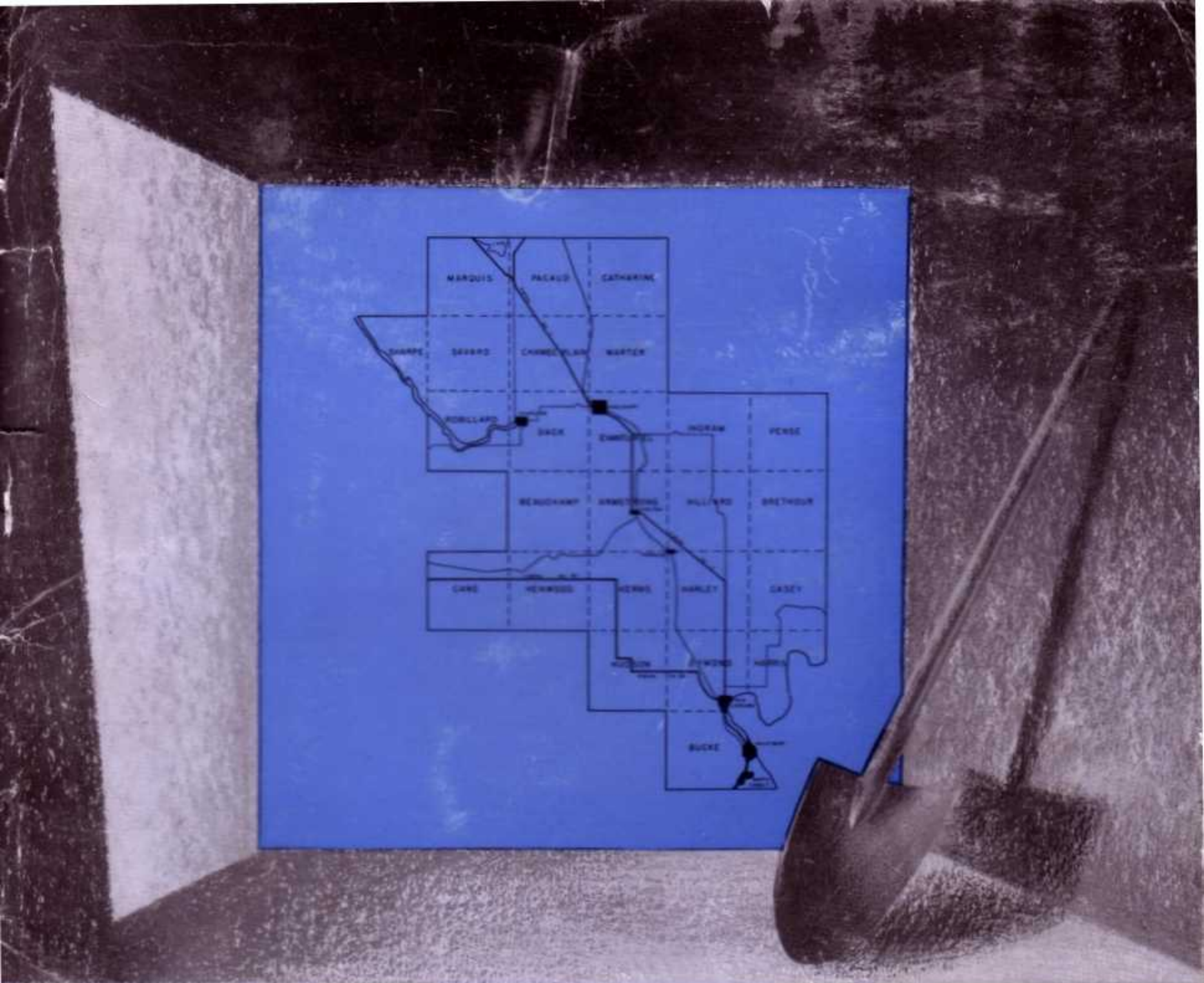

SOIL SURVEY OF NEW LISKEARD–ENGLEHART AREA

REPORT NO. 21 OF THE ONTARIO SOIL SURVEY

Experimental Farm Service, Dominion Department of Agriculture and the Ontario Agricultural College

SOIL SURVEY
of
NEW LISKEARD-ENGLEHART AREA

Timiskaming District
Ontario

by

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GUELPH, ONTARIO

REPORT No. 21 OF THE ONTARIO SOIL SURVEY

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PREFACE

The survey of New Liskeard-Englehart area was completed during the summer of 1952. Other counties and districts surveyed and maps published are as follows:

Norfolk	*Map only*
Elgin	*Map only*
Kent	*Map only*
Haldimand	*Map only*
Welland	*Map only*
Middlesex	*Map only*
Carleton	*Map and Report*
Parts of Northwestern Ontario	*Map and Report*
Durham	*Map and Report*
Prince Edward	*Map and Report*
Essex	*Map and Report*
Grenville	*Map and Report*
Huron	*Map and Report*
Dundas	*Map and Report*
Perth	*Map and Report*
Grey	*Map and Report*
Bruce	*Map and Report*
Peel	*Map and Report*
York	*Map and Report*
Stormont	*Map and Report*

ACKNOWLEDGMENTS

The Canada Department of Mines and Technical Surveys, Surveys and Mapping Branch supplied the base maps. The final copy of the Soil Map for lithographing was prepared by the Cartographic Section of the Division of Field Husbandry, Soils and Agricultural Engineering, Central Experimental Farm Service, Ottawa.

Helpful suggestions pertaining to classification and correlation, and assistance in critically reviewing the manuscript came from Dr. P. C. Stobbe, Canada Department of Agriculture, and others.

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FIG. 1. Outline Map of Ontario Showing Location of the New Liskeard-Englehart Area.

Soil Survey Report of the New Liskeard-Englehart Area, Timiskaming, Ontario

by

D. W. Hoffman,[1] R. E. Wicklund,[2] *and* N. R. Richards[3]

INTRODUCTION

A detailed reconnaissance survey of twenty-six townships in the Timiskaming District was undertaken in 1951 in order to study the nature and extent of the soils occurring within the area and was completed in 1952. The project consists of two parts, a Soil Map and a Soil Survey Report.

The Soil Map is important since it indicates the distribution and area of the different soils found in the area. It also shows the most important physical features of the area such as roads, railways, rivers, buildings, towns, etc. By using the lot numbers and the concession lines the property owner can plot his location on the map and from that determine the soil types occurring in his locality. The survey was conducted on a map of the scale of one inch to the mile, which does not permit the delineation of areas twenty-five acres and less in size.

The Soil Report presents information as to the formation, character, capabilities and limitations of the soils and gives a brief general description of the area. Every soil type is described in detail and the capability and fertility of each soil type is discussed.

The soils in the surveyed area differ from each other in some way and this has an important bearing on the kind of crops grown, the yield obtained, and the soil management practices required. Field observation and laboratory studies have given information from which tentative conclusions are made regarding adaptability and productivity of the soils. However, much accurate information regarding management and fertility requirements is still needed.

How to Use the Soil Map and Report

The first step in using the soil survey report is to turn to the soil map and note the names of the soil types in the area in which you are interested. The map shows the lot and concession numbers so that any area in the District can be readily located and also shows the location and boundaries of the various soil types. The area that each type occupies on the map is shown by a distinguishing colour and by letter designations placed in each area. Where an area is too small to accommodate the soil letters, they are placed adjacent to the area and connected with it by a line.

After determining what soil types occur on the farm or tract of land in which you are interested turn to the soil description found in Part III of the report and read what is said about each of the soils on the tract. More information concerning land use and soil management and crop adaptability can be found in Part IV of the report.

Readers interested in how the soils of the area were formed should read Part II of this report. Information of a general nature concerning markets, roads, population, etc., can be obtained from Part I of the report. Chemical and physical analyses of surface and profile samples of some of the soils in the region may be found in the appendix.

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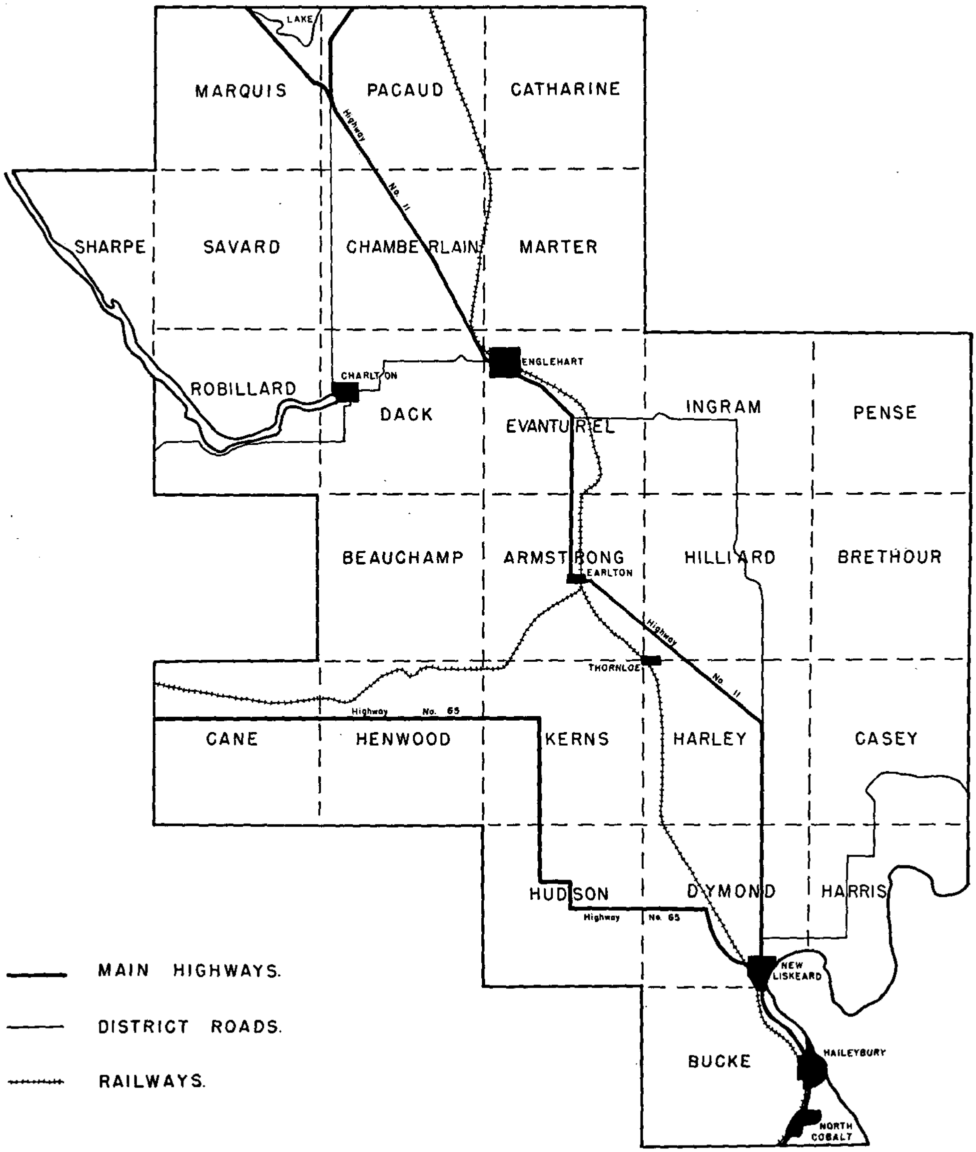


FIG. 2. Outline Map Showing Townships and Principal Centres.

PART I

GENERAL DESCRIPTION OF THE AREA

Location and Area

The New Liskeard-Englehart Area is located in Northern Ontario at the head of Lake Timiskaming and in the Timiskaming District.

The surveyed area consists of almost 24 Townships and is approximately 534,000 acres or 820 square miles in size. According to the 1951 census about 50 per cent of the area is occupied farm land of which approximately 40 per cent is improved land.

Principal Towns

Haileybury (2,300)* was founded in 1883 but had few settlers before the Cobalt strike in 1903, when it was made the location of the mine recorder's office. In 1912 it was chosen as the judicial centre for the District of Timiskaming.

Haileybury is the judicial centre for the District of Timiskaming.

New Liskeard (4,200) located on Wabi Bay at the head of Lake Timiskaming was founded in 1895. It is a well built town which functions as a market and supply point for much of the nearby area. It has a woodworking plant, dairy product plant, canning factory, feed mill, seed mill and foundry. The office of the Representative of the Provincial Department of Agriculture is located here as well as a provincial Demonstration Farm.

Cobalt (2,200) said to have 10,000 people in its boom days as a silver camp is now much smaller with only a few of the mines producing small quantities of ore.

* Population figures.

The Demonstration Farm at New Liskeard has been of great assistance to the farmers in the area.

Other centres such as Englehart, Earlton and Charlton act as markets and supply points for agricultural commodities.

Population

According to the 1951 Census the total population of the Timiskaming District is 50,016. Approximately 16 per cent (8,050) of the population are rural dwellers.

There was an increase in population in the District up until 10 years ago. Since that time there has been a slight decrease in population. The trend in population is shown in Table 1.

TABLE I

TREND IN POPULATION (TOTAL)

Year	Population	Year	Population
1901	1,252	1931	37,043
1911	26,592	1941	50,604
1921	26,657	1951	50,016

Of the 8,000 people on farms about one-third are French speaking. Of the total population, 25 per cent are of English origin, 30 per cent are of Scotch and Irish origin and 25 per cent are of French origin. The remaining 20 per cent is composed of other races.

Transportation and Markets

New Liskeard-Englehart Area is served by a fair network of roads and railways. Highway No. 11 runs in a northerly direction through New Liskeard, Earlton and Englehart connecting these centres with markets in southern or northern Ontario. Matachewan and Gowganda to the west of the area are linked to New Liskeard by Highway 65. The system of Township and District roads is inadequate, much of the area having poor roads or no road at all. However, roads are generally good through parts of the main farming areas. Road upkeep is extremely difficult and expensive because of the numerous frost "boils" in the spring of the year.

The Ontario Northland Railway line runs through the surveyed area providing transportation for the people and products of the region.

PART II

THE FORMATION OF SOILS OF THE NEW LISKEARD-ENGLEHART AREA

Soil is the natural medium for the growth of land plants and is the product of the environmental conditions under which they have developed. Soil development processes are dependent upon a number of factors which include climate, vegetation, soil materials, relief and age.

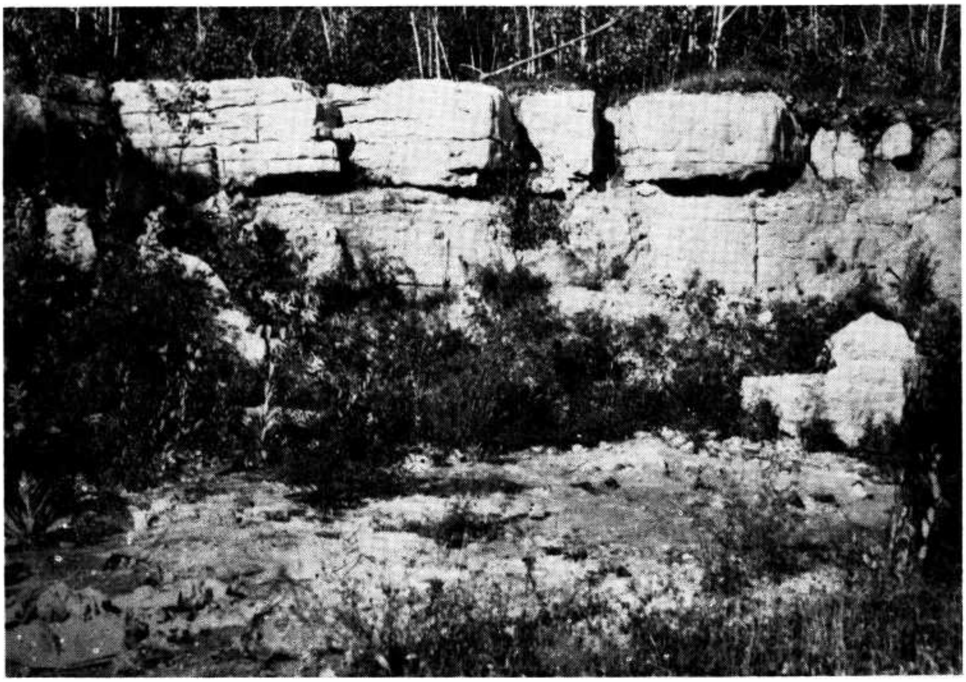
Soil Parent Materials

The New Liskeard-Englehart Area is chiefly underlain by Precambrian rock formations. However, at the northern end of Lake Timiskaming limestones of the Ordovician and Silurian ages occur in an area about 33 miles long and 8 miles wide extending from North Cobalt to Englehart.

The Keeweenawan, Cobalt, Matachewan, Algoman and Keewatin formations make up the Precambrian age and many different rocks and minerals are present. Some of the more common rocks are conglomerate, slate, quartzite, quartz porphyry, feldspar porphyry, granite, diorite, amphibolite, andesite, and rhyolite.

The Silurian limestones in the area are Lockport and Medina. The Lockport formation in this area varies in colour from pale blue to buff and varies in composition from a limestone containing 90 per cent calcium carbonate and 7 per cent magnesium carbonate to a limestone containing 54 per cent calcium carbonate and 42 per cent

The rock of the Lockport formation has been quarried and crushed for road building materials.



BEDROCK GEOLOGY

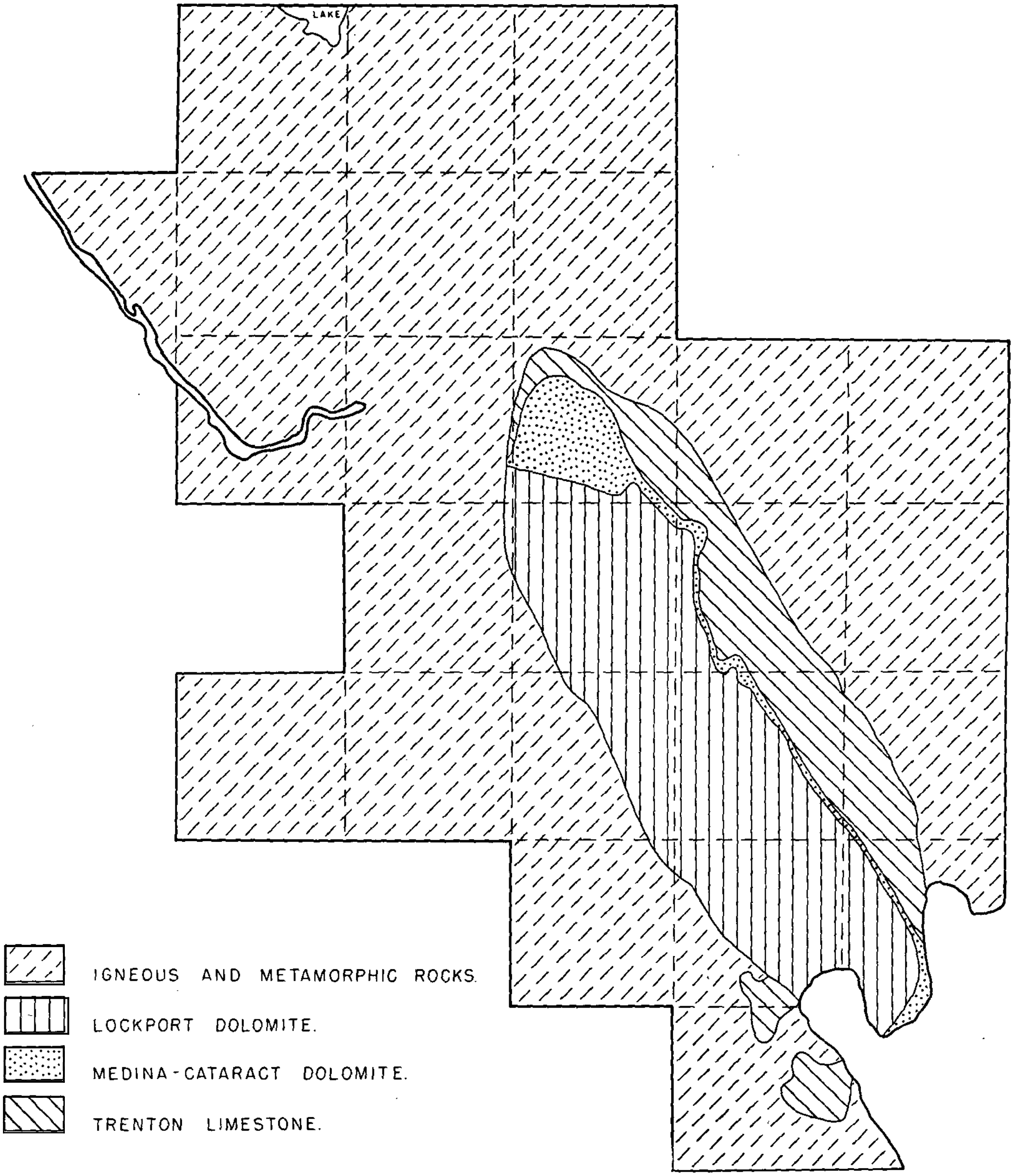


FIG. 3. Outline Map Showing Bedrock Geology.

magnesium carbonate. Several exposures occur in the district which could be quarried. The Medina formation is composed of sandstone, shale, and dolomite and usually underlies the Lockport limestones.

The Trenton formation is composed chiefly of limestone of the Ordovician age. In the Little Clay Belt the Trenton formation consists of a fine grained, mottled limestone. The freshly broken rock is gray in color with numerous mottlings of yellowish blue magnesian material which weathers to a rusty brown crumbly mass. The crumbly material is eventually washed away leaving pits in the stone.

The distribution of the different bedrock formations is shown in Figure 3.

The rock formations described above are the sources of the materials which were laid down by the Wisconsin glaciation.

Small areas of flood land along stream courses, areas resulting from wind and water erosion and areas of peat and muck are of more recent origin.

All of the surface deposits previously described form the parent material of the soils of the New Liskeard-Englehart Area.

The unsorted material deposited by ice is referred to as till and consists of particles of all sizes from clay and silt to sand and gravel with varying amounts of stones and boulders. There are two loam textured tills in the surveyed area which differ chiefly in carbonate content. These deposits contain a large number of boulders of varying size. The tills occur in gently to moderately rolling plains and occupy only a small proportion of the surveyed area.

Morainic sands and gravels occupy a large area in Beauchamp Township. The topography consists of irregular steeply rolling slopes and the materials are non-calcareous.

A large part of the surveyed area is occupied by outwash sand. These sands are generally stonefree but small amounts of gravel occur in some areas. The topography ranges from very gently sloping to gently rolling and the materials are non-calcareous.

The depth of outwash varies and the underlying clay is within 3 feet of the surface in some areas.

A large part of the surveyed area was covered by glacial Lake Barlow. This resulted in the deposition of lacustrine materials to varying depths over the underlying rock. Four differing deposits can be recognized. They are:

1. Varved calcareous clay. The clay is comprised of alternate white and dark brown layers.

2. Dark brown calcareous clay.

3. Pale brown calcareous silt loam.

4. Pale brown silt loam or silty clay loam; low in calcium carbonate.

The topography of all these lacustrine deposits varies from level to steeply rolling.

Exposed bedrock occurs throughout the district. The largest exposures are found on the outskirts of the surveyed area. Shallow soils over bedrock occur mainly in the southern and central parts of the New Liskeard-Englehart Area.

Large deposits of organic materials occur in the eastern part of the surveyed area while smaller tracts may occur anywhere. They are the remains of decayed trees, herbs and mosses and their chemical composition varies depending on the origin of the materials. These deposits have been classified as muck and peat.

The distribution of the different soil parent materials is shown in Figure 4.

The varved calcareous clay materials occur over a large part of the Little Clay Belt.

Natural Forest Vegetation

When vegetation becomes established it exerts an influence on the development of a soil and therefore is an important factor of soil formation. The extent to which vegetation influences soil development varies with the type of vegetation. The forest litter of deciduous trees decomposes more readily and is richer in plant nutrients than the litter from conifers and it is generally assumed that the latter produces more strongly leached soils than the former.

A survey of the vegetation shows in a general way, what tree association most commonly occurs on some of the more important soils in the New Liskeard-Englehart Area. This information is given in the discussion of each soil series in Part III of this report.

The most commonly occurring trees are aspen poplar, white birch, jack pine, spruce and balsam fir. Yellow birch, sugar maple, red oak and red maple are present in small numbers at the head of Lake Timiskaming and basswood is scattered along the rivers throughout the region together with some white elm and black ash.

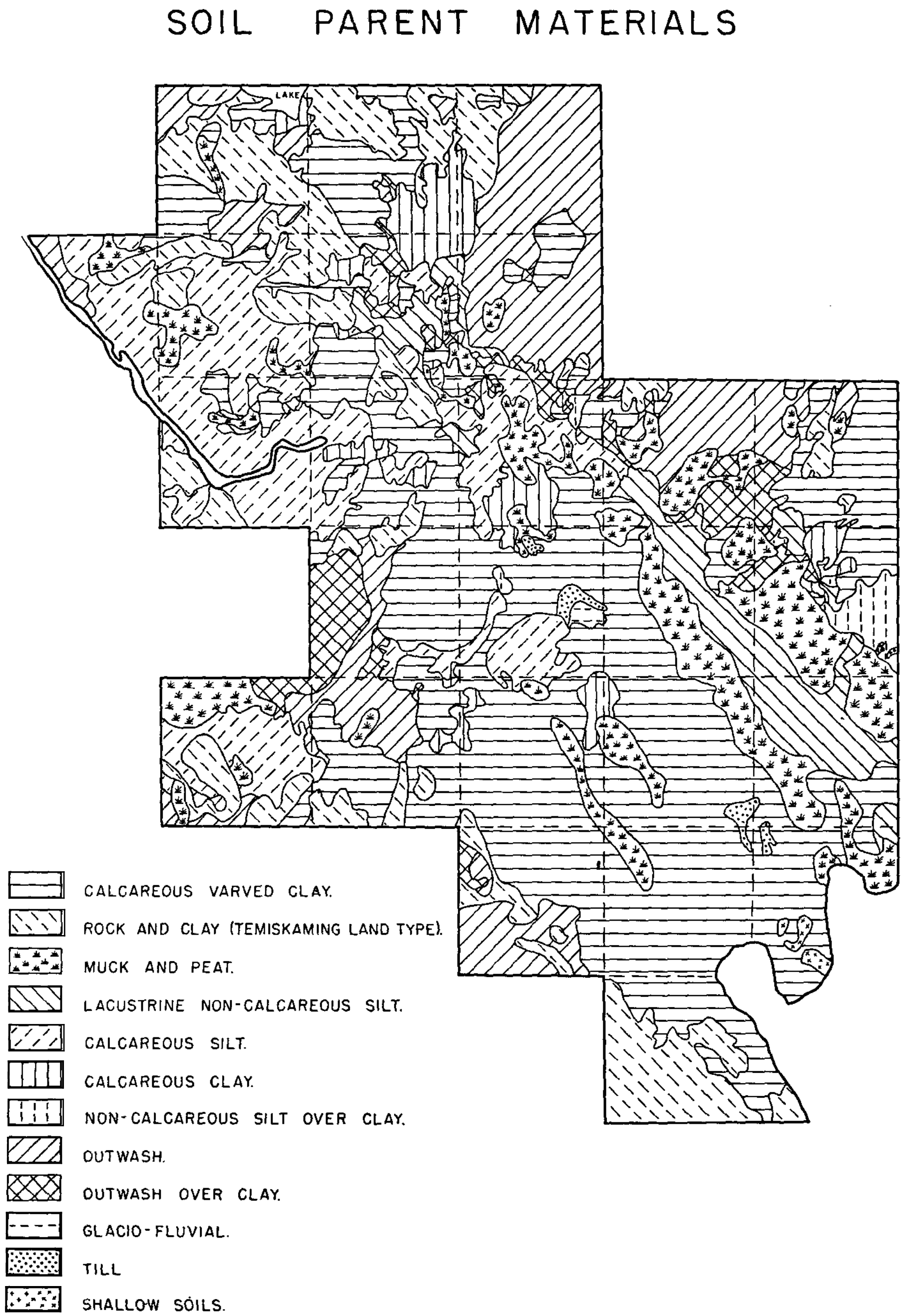


FIG. 4. Outline Map Showing Distribution of Soil Materials.

Poplar predominate in this woodlot located on an imperfectly drained lacustrine soil.

Climate

There are three meteorological stations in the New Liskeard-Englehart Area located at Haileybury, New Liskeard and Heaslip. Climatic data is presented in Tables 1 and 2 from Haileybury and other selected points. Data from Kapuskasing are included to represent the northern coniferous region and that from Huntsville the transitional zone between hardwoods and conifers. Records from Brantford represent the hardwood region in Southern Ontario.

According to Table 2 the winters in the surveyed region are very cold with a mean temperature of 9 degrees F and the summers are warm with a mean temperature of 64 degrees F. Temperature differences between regions are greater in winter than in summer. For instance the difference between Haileybury and Brantford is 12 degrees in February and 3 in July. In May the mean temperature at Haileybury has risen about 42 degrees which is sometimes used as a figure to mark the beginning of crop growth. Freezing temperatures occur in the Haileybury region after the middle of October while towards the end of November the highest temperatures on most days fail to rise above the freezing point.

The growing season begins in the New Liskeard-Englehart Area about April 25 and ends about October 17. Considerable local variation occurs in the incidence of frosts. The lay of the land, the presence of lakes, the type of soil and the size of the clearings all have an effect. Low ground is frosty particularly where the depressions are bogs. Even when the bog is on higher ground the crops growing on it are much

TABLE 2

TEMPERATURE AT HAILEYBURY AND OTHER SELECTED POINTS

Month	Temperature in Degrees F			
	Haileybury (36) *	Kapuskasing (19)	Huntsville (30)	Brantford (51)
December	13	6	19	26
January	7	— 2	14	22
February	8	2	12	20
Winter	9	2	15	23
March	20	14	24	31
April	37	31	39	43
May	51	46	52	55
Spring	36	30	38	43
June	62	57	61	65
July	66	62	66	70
August	63	60	64	67
Summer	64	60	64	67
September	55	51	57	61
October	43	39	45	48
November	28	22	32	37
Fall	42	37	45	49
ANNUAL	38	32	41	45
May 1 to Oct. 1	59	55	60	64

* Years observed.

more susceptible to frost than those on adjacent clay soil at the same elevation. Small clearings are considered to be frost traps but the exact effect of opening up a broad tract of land for farms is hard to appraise. It is to be expected then that frost dates will vary throughout the region and that variations may occur between neighbouring weather stations. The frost free period is about 110 days in the New Liskeard-Englehart Area.

Precipitation includes both rain and snow with the latter recalculated to its rainfall equivalent in inches according to a ratio of ten to one. The average annual precipitation at Haileybury is 31.58 inches, half of which falls during the growing season.

Throughout northern Ontario there is a winter minimum and a summer maximum in precipitation. This is pronounced at Kapuskasing where the February average precipitation is 1.06 inches and the July average is 3.43. It is also expressed at Haileybury where figures of 1.77 inches and 3.79 inches apply to February and July. The coincidence of warmth and rain in midsummer is perhaps the best feature of the climate as it affects agriculture. The light rainfall in March and April is favourable as it tends to allow the land to dry up so that it may be cultivated. The fairly heavy precipitation in September and October in the surveyed area often makes the harvest-

TABLE 3

PRECIPITATION AT HAILEYBURY AND OTHER SELECTED POINTS

Month	Precipitation in Inches			
	Haileybury (36) *	Kapuskasing (19)	Huntsville (30)	Brantford (51)
December	2.18	1.90	3.28	2.24
January	2.01	2.00	3.09	2.61
February	1.77	1.06	2.45	2.12
Winter	5.96	4.96	8.82	6.97
March	2.19	1.56	2.78	2.16
April	2.04	1.82	2.09	2.54
May	2.69	2.12	2.85	2.90
Spring	6.92	5.50	7.74	6.60
June	2.83	2.33	3.69	2.65
July	3.79	3.43	2.96	3.05
August	2.93	2.94	2.70	2.93
Summer	9.55	8.70	9.35	8.63
September	3.62	3.54	3.84	2.63
October	3.08	2.50	3.44	2.47
November	2.45	2.39	3.24	2.40
Fall	8.15	8.43	10.52	7.50
ANNUAL	31.58	27.59	36.41	30.70
May 1 to Oct. 1	15.86	14.36	16.04	14.16

* Years observed.

ing of grain difficult. The annual snowfall at Haileybury is 92 inches.

A considerable amount of the 28 to 37 inches of precipitation which falls in the area is transpired by plants or is lost by evaporation while the remainder of surplus water percolates through the soil or runs off the surface. According to Chapman* the annual water surplus for the New Liskeard-Englehart Area varies from 8 to 12 inches. A surplus of rainfall means muddiness, and conditions underfoot, especially on fine-textured soils, have a strong bearing on the day-to-day life of the community. Construction is difficult under muddy conditions and work on the land is prohibited. Soil development is influenced by the amount of surplus water; muck or peat accumulation, podzolization and glei formation being promoted by water surplus.

From the above data it appears that the climate is marginal for many valuable crops and presents difficulties to the farmer in handling the soil and crops.

Relief

The area is one of low relief, with elevations less than 1,000 feet above sea level. Rock ridges are present in the surveyed area which rise up to about 1,500 feet. A

*Chapman L. J., The Climate of Northern Ontario. Can. Jour. Ag. Sci. Vol. 33, 41–73, 1953.

height of land extending from Lake of the Woods to Kirkland Lake separates the New Liskeard-Englehart Area from the Northern Clay Belt. The land slopes gently in a southerly direction from this height of land.

The distribution of the topographic classes is shown in Figure 5.

Drainage

Rivers draining the New Liskeard-Englehart Area generally flow in a southeasterly direction. The largest river in the area is the Blanche which, with its tributaries, drains a large part of the northern and eastern part of the region. The land in the southwestern part of the surveyed area around New Liskeard is drained by the Wabi River.

The drainage pattern of the Little Clay Belt is shown in Figure 6.

A prominent rock ridge in the surveyed area.

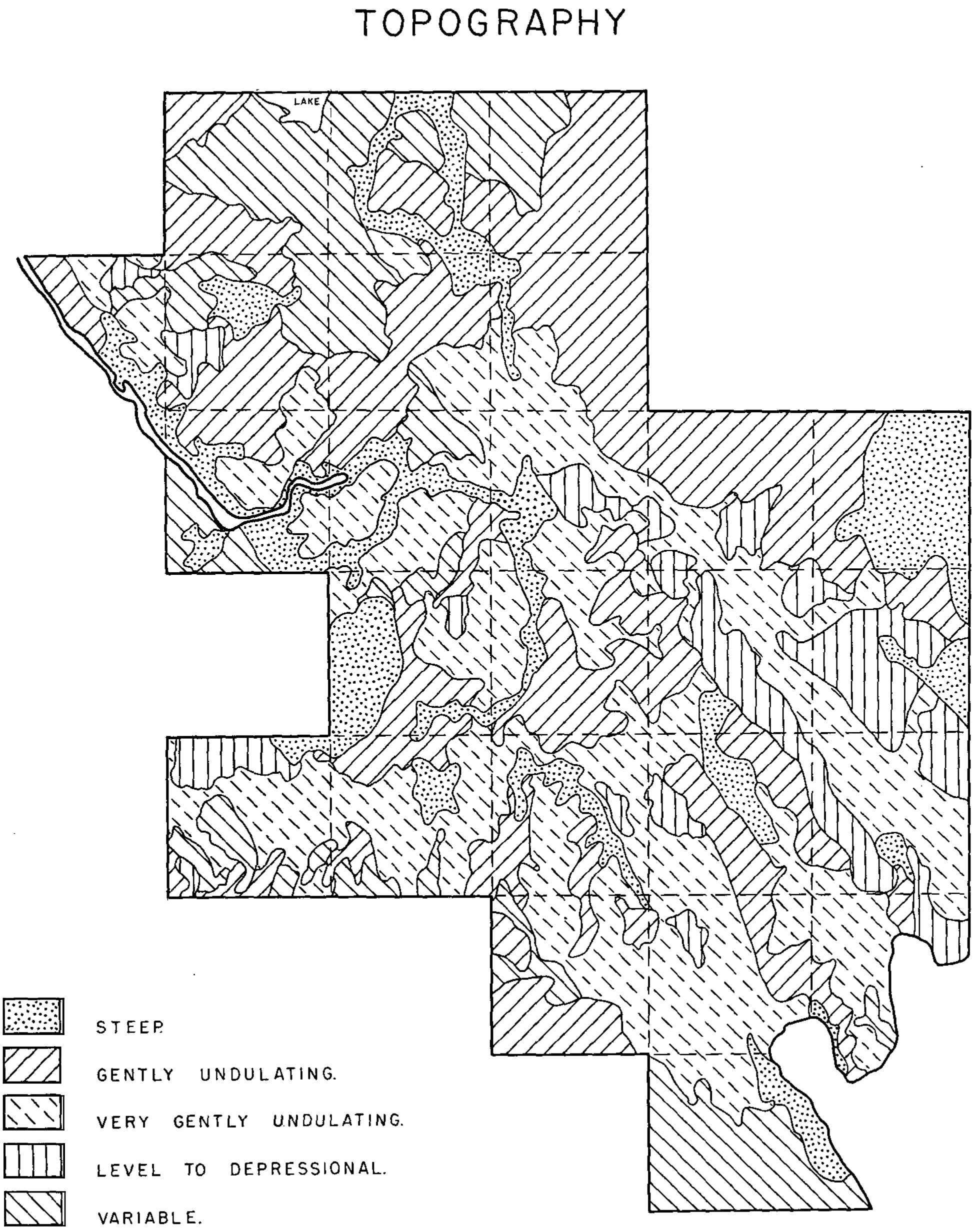


FIG. 5. Outline Map Showing Distribution of Topographic Classes.

Logs for the paper industry are transported down the larger rivers.

DRAINAGE SYSTEMS

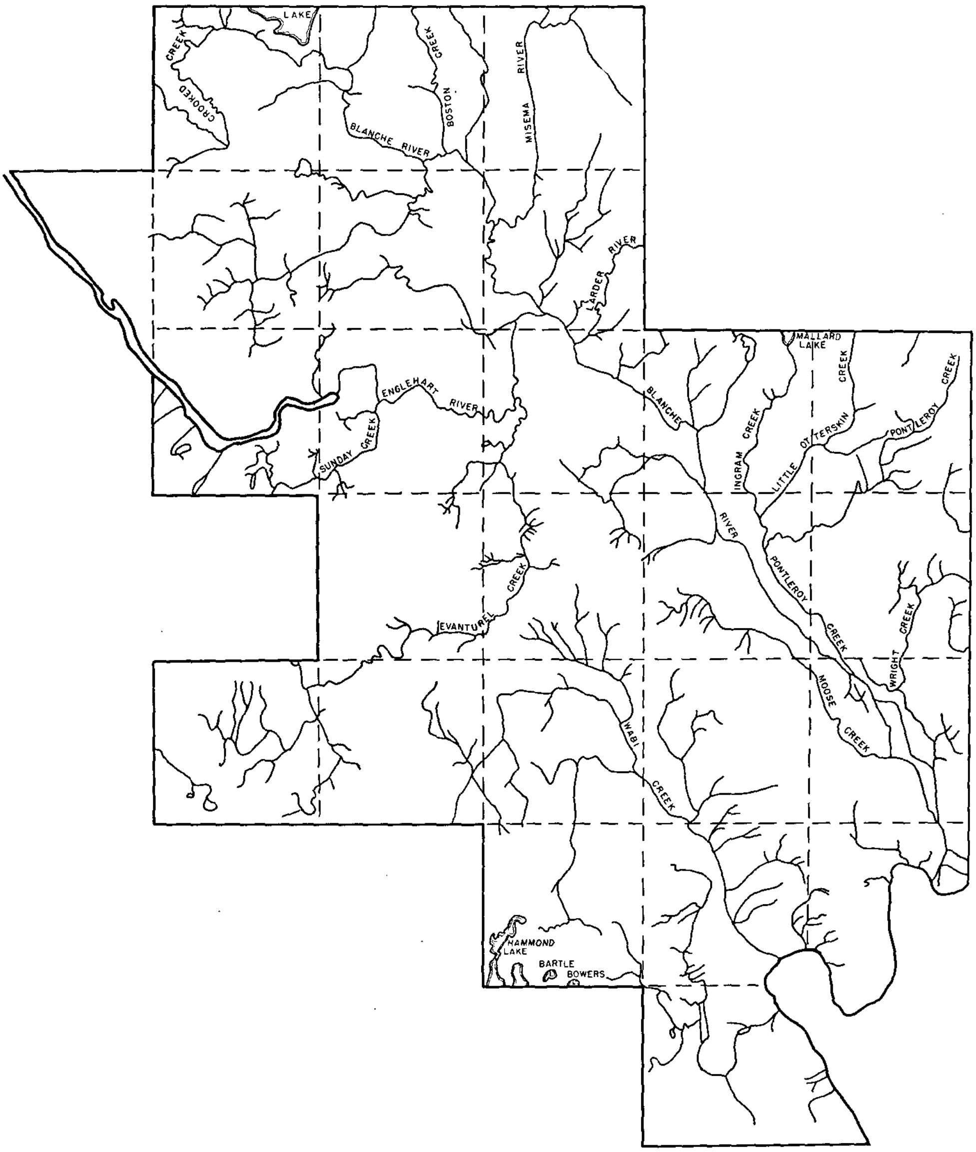


FIG. 6. Outline Map Showing the Drainage System.

PART III

THE CLASSIFICATION AND DESCRIPTION OF SOILS OF THE NEW LISKEARD-ENGLEHART AREA

Soils are differentiated on the character of the soil to a depth of approximately three feet, not on surface alone. Under the influence of vegetation, climate and drainage acting on raw soil material, called parent material, different soil layers develop over a period of time. In a vertical cut through the soil two or more layers may be observed above the parent material. The different layers make up what is known as the soil profile.

Sixty-two different soils were recognized and mapped in the surveyed area of the Timiskaming District. These soils differ from one another in one or more of the following features of the soil profile—number, colour, thickness, structure and composition of the different horizons. They also differ from one another in certain external features such as topography and stoniness.

Four distinct kinds of profile occur in the Little Clay Belt, each representing what is called a Great Soil Group. Soils characteristic of the Brown Forest, Grey Wooded, Podzol and Dark Grey Gleisolic Great Soil Groups are dominant in the surveyed area.

The Brown Forest soils in Timiskaming have developed on high lime materials and have the following characteristics. There is a thin organic mat (A_0 horizon) on the surface consisting of leaf litter and semi-decomposed organic material. Below the A_0 horizon is a dark greyish brown A_1 horizon approximately 1 inch thick underlain by a brown B horizon which grades into brown or pale brown parent material. A generalized description of a Brown Forest soil follows.

A_0 — 1–0 inches litter of twigs and leaves.

A_1 — 0–1 inches dark brown to very dark grey mineralized layer.

B — 1–18 inches brown layer.

C — Brown or pale brown, calcareous parent material.

On other well drained sites where the lime has been partially lost from the soil material the kind of profile that commonly occurs is classified as Grey Wooded. Under forest the Grey Wooded soils have a layer of partially decomposed leaves and twigs. The A_1 horizon generally is from 0 to 1 inch thick, dark greyish brown in colour, friable, slightly to moderately acid and moderately high in organic matter. The A_1 horizon is underlain by a light brownish grey or white A_2 horizon which is low in organic matter and slightly to moderately acid in reaction.

Under the A_2 horizon lies the B horizon. This horizon is brown or dark brown in colour and contains more clay and sesquioxides than any other horizon in the profile. It is generally slightly acid to neutral in reaction. The B horizon rests on the unaltered or only slightly weathered parent material. The following is a generalized profile description of a Grey Wooded soil.

A_0 — $\frac{1}{2}$–0 inches litter of twigs and leaves.

A_1 — 0–2 inches dark greyish brown to very dark mineralized layer.

Soils of Brown Forest Great Soil Group exhibit shallow profiles and a brownish colour in the subsoil

A_2 — 2–8 inches light brownish grey layer.

B — 8–20 inches brown layer.

C — Greyish brown calcareous parent material.

In many of the Grey Wooded soils in Timiskaming there is a tendency for a secondary profile to develop in the A horizons of the Grey Wooded soils. Generally this secondary development is evidenced by the establishment of a distinct brownish colour in the upper part of the A_2 horizon and the formation of a distinct light grey A_2 horizon under the thin A_1 horizon. This secondary profile in the upper part of the soil resembles the Podzol soils in its morphological characteristics. This secondary profile can best be observed under virgin conditions as the distinguishing features are readily destroyed on cultivation.

This profile exhibits the characteristics of the Grey Wooded Great Soil Group. The A_1 horizon is very thin.

In well drained positions on materials that were originally low in lime or are so open in texture that leaching has rapidly removed lime, profiles representative of the Podzol Great Soil Group have developed. Under natural conditions, the Podzol soils have a light grey leached layer (A_2 horizon) immediately below a thin dark organic layer (A_0 horizon) which in turn is underlain by a yellowish brown or reddish brown B horizon. A generalized description of a Podzol soil follows.

A_0 — 1–0 inches litter of twigs and needles.

A_1 — 0–1 inches grey mineral layer.

B_2 — 1–12 inches reddish brown material.

B_3 — 12–21 inches yellowish brown material.

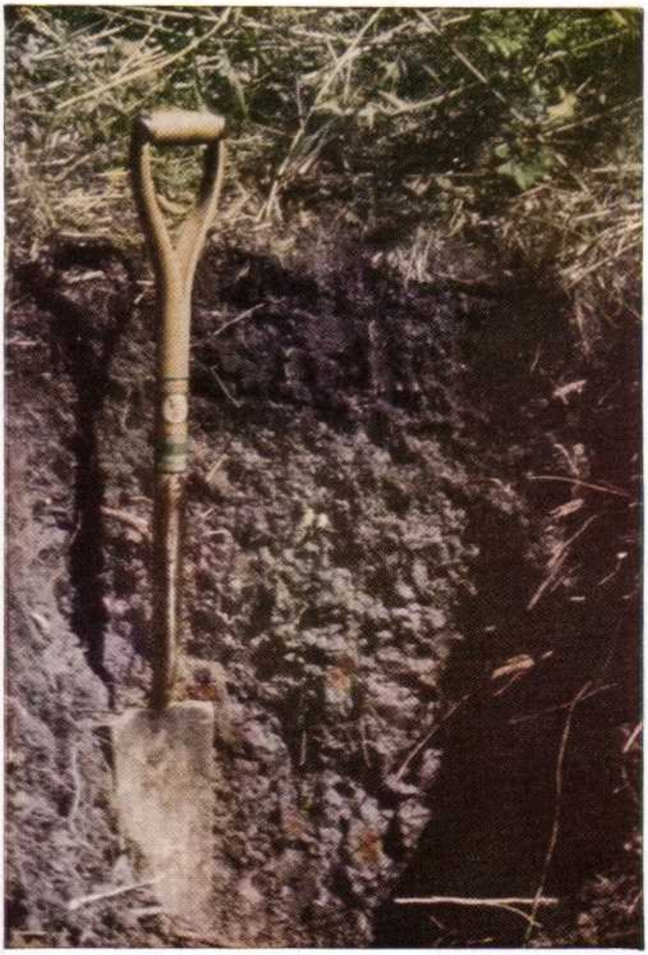
Soils of the Podzol Great Soil Group exhibit an ashy grey A_2 horizon.

C — Light yellowish brown, non-calcareous parent material.

A large proportion of the soils in the surveyed area have developed under poorly drained conditions. The poorly drained soils of the New Liskeard-Englehart Area are representative of the following Great Soil Groups: Dark Grey Gleisolic, Organic and Shallow Organic.

The Dark Grey Gleisolic soils have a very dark grey surface layer, generally 7 to 8 inches thick underlain by a mottled greyish brown "glei" horizon that grades into the parent material. A generalized description of a Dark Grey Gleisolic soil is presented below:

A_0 — ½–0 inches of matted leaf litter.



Note profile characteristics of a Dark Grey Gleisolic Soil—Surface soil is dark grey colour; subsoil a drab grey with reddish brown mottling.

A_1 — 0–7 inches very dark grey mineral material.

G — 7–19 inches mottled greyish brown material.

C — light brownish grey parent material.

The Shallow Organic soils have a dark brown to black organic surface soil 4 to 18 inches deep. The underlying G horizon is bluish grey with rusty specks and streaks.

The Organic Soils consist of organic accumulation greater than 18 inches deep and may be underlain by sand, silt, clay or rock. They may differ considerably depending on the type of vegetation from which the organic accumulation has been formed and on the degree of decomposition of the organic materials.

Soil Type, Soil Series, Phase and Catena

The principal unit of soil mapping is the soil type. The soil type consists of a group of soils with profiles having similar horizons developed from similar parent materials. Soil types do not occur at random for their character is determined by a number of factors. The soil types are described in the following pages.

Two or more soil types developed on similar parent material, under similar drainage conditions, but differing in texture of the surface soil are grouped together as a Soil Series.

Soil types or series in some cases may differ significantly in external characteristics such as stoniness, relief, extent of erosion, etc. These differences have been mapped as phases of the individual soil types. The phases are of great importance in land use.

Soil series developed on similar parent material but differing in profile characteristics due to relief or drainage are classified as a soil catena.

KEY TO THE SOILS

	Acreage	% of Total
A. Soils Developed on Till		
1. Loam Textured Non-Calcareous Till		
(a) Well drained (P)		
(1) Wabi loam	600	0.10
(2) Wabi sandy loam	300	0.05
(b) Imperfectly drained (P)		
(1) Coutts loam	100	0.02
(2) Coutts sandy loam	1,100	0.2
(c) Poorly drained (D.G.G.)		
(1) Moose loam	600	0.1
(2) Moose sandy loam	300	0.05
2. Loam Textured Calcareous Till		
(a) Well drained (B.F.)		
(1) Dawson loam	500	0.09
(2) Dawson sandy loam	800	0.1
(b) Imperfectly drained (B.F.)		
(1) Dymond loam	600	0.1
(2) Dymond sandy loam	500	0.09
(c) Poorly drained (D.G.G.)		
(1) Sutton Bay loam	200	0.04
(2) Sutton Bay sandy loam	300	0.05
B. Soils Developed on Kame Moraine Materials		
1. Gravelly Materials.		
(a) Well drained (P)		
(1) Elk Pit sand	800	0.1
2. Sandy Materials		
(a) Well drained (P)		
(1) Henwood sand	6,100	1.1
C. Soils Developed on Outwash Materials		
(a) Well drained (P)		
(1) Wendigo sand	45,900	8.7
(2) Wendigo sandy loam	1,800	0.3
(3) Wendigo gravelly sand	6,000	1.1
(b) Imperfectly drained (P)		
(1) Mallard sand	2,800	0.5
(2) Mallard sandy loam	1,000	0.2
(3) Mallard gravelly sand	400	0.07

(c) Poorly drained (D.G.G.)		
(1) Kenabeek sandy loam	3,100	0.6
(2) Kenabeek sand	400	0.07

D. Soils Developed On Outwash Materials Underlain by Clay

(a) Well drained (P)		
(1) Bucke sand	2,200	0.4
(2) Bucke sandy loam	1,200	0.2
(b) Imperfectly drained (P)		
(1) Otterskin sandy loam	11,500	2.2
(c) Poorly drained (D.G.G.)		
(1) Englehart sandy loam	7,700	1.3

E. Soils Developed on Lacustrine Deposits

1. Silt loam low in calcium carbonate over clay		
(a) Well drained (P)		
(1) Thwaites silt loam	2,400	0.4
(b) Imperfectly drained (P)		
(1) Casey silt loam	1,300	0.2
(c) Poorly drained (D.G.G.)		
(1) Brethour silt loam	400	0.07
2. Silt loam or silty loam low in calcium carbonate		
(a) Well drained (G.W.)		
(1) Blanche silt loam	6,100	1.1
(b) Imperfectly drained (G.W.)		
(1) Pense silt loam	2,900	0.5
(2) Pense silty clay loam	1,900	0.4
(c) Poorly drained (D.G.G.)		
(1) Falardeau silty clay loam	12,500	2.4
(2) Falardeau silt loam	3,600	0.7
3. Calcareous silt loam		
(a) Well drained (G.W.)		
(1) Evanturel silt loam	9,800	1.9
(2) Evanturel silty clay loam	6,800	1.3
(b) Imperfectly drained (G.W.)		
(1) Earlton silt loam	11,500	2.3
(2) Earlton silty clay loam	5,600	1.0
(c) Poorly drained (D.G.G.)		
(1) Cane silt loam	20,400	3.9
(2) Cane silty clay loam	7,300	1.4
4. Varved Calcareous Clay		
(a) Well drained (G.W.)		
(1) Haileybury silty clay	24,700	4.7
(2) Haileybury clay	4,900	0.9
(3) Haileybury silty clay loam	3,500	0.6
(b) Imperfectly drained (G.W.)		
(1) Hanbury clay	29,000	5.4
(2) Hanbury silty clay	11,800	2.2
(3) Hanbury silty clay loam	3,800	0.7
(4) Hanbury clay—stony phase	500	0.09
(c) Poorly drained (D.G.G.)		
(1) New Liskeard clay	55,400	10.5
(2) New Liskeard silty clay loam	10,700	2.0
(3) New Liskeard clay—stony phase	800	0.1
(d) Very poorly drained (S.O.)		
(1) Milberta muck	8,900	1.7
5. Calcareous Clay		
(a) Well drained (B.F.)		
(1) Dack clay	4,600	0.9
(b) Imperfectly drained (B.F.)		
(1) McCool clay	6,800	1.3

(c) Poorly drained (D.G.G.)		
(1) Thornloe clay	5,800	1.0
F. Soils Developed From Organic Material		
(a) Very poorly drained (O)		
(1) Muck	53,900	10.1
(2) Peat	600	0.1
G. Soil Complexes		
1. Areas composed of Haileybury, Hanbury, New Liskeard, Milberta and Muck series with rock.		
(1) Timiskaming	71,400	13.4
H. Soils Developed on Shallow Till over Bedrock.		
(a) Well drained (P)		
(1) Brentha loam	1,700	0.3
(2) Brentha sandy loam	1,000	0.2

A—Alluvial Soils; G.W.—Grey Wooded Soils; D.G.G.—Dark Grey Gleisolic Soils; P—Podzol Soils; O—Organic soils; S.O.—Shallow Organic Soils

A. SOILS DEVELOPED ON TILL

The unsorted material deposited by glacial ice is generally referred to as till and is an accumulation of mineral particles of all possible sizes that is clay, silt, sand and gravel with a varying proportion of stones and boulders. Two loam textured tills occur in the New Liskeard-Englehart Area which differ chiefly in their content of calcium.

1. LOAM TEXTURED NON-CALCAREOUS TILL

The soil series classified in this category are developed on non-calcareous till. The Wabi series occurs on the well drained sites. The Coutts and Moose series are the imperfectly and poorly drained members respectively of the Wabi catena.

(a) Well drained

Wabi Series (900 acres)

The soils of the Wabi series are Podzols and occur in small areas in the Townships of Harley and Armstrong on moderately rolling ridges. They are developed on a till which has been derived from limestone and igneous and metamorphic rocks, however the influence of the limestone is weak and the depth at which free carbonates are reached is usually at six feet or more. The open nature of the soil and the rolling topography provide good drainage. Danger of harmful erosion is slight on these soils, so long as the steepest slopes remain covered with trees or grass. The tree cover on the virgin soils is made up largely of silver birch and aspen poplar.

The stony nature of the Wabi soils is the main handicap to their utilization. The large numbers of stones and boulders on the surface and throughout the profile make their removal impractical.

The soil types mapped in the Wabi series are the loam and sandy loam. Over most of the till ridges the soil is of a loam texture but sandy loams occur where the soil is influenced by nearby soils developed from sand.

Except for a difference in surface texture the loam and sandy loam types have the same profile characteristics. A description of Wabi loam developed under forest vegetation follows.

A_0 — 1–0 inches partially decomposed litter of twigs, leaves and needles, very dark grey (10 YR 3/1); pH—5.0.

A_1 — 0–1 inches loam, very dark brown (10 YR 2/2); medium crumb structure; friable consistency; very stony, pH — 5.2.

A_2 — 1–3 inches sandy loam, light grey (10 YR 7/2); weak platy; friable; very stony; pH—5.4.

B_2 — 3–18 inches loam; yellowish brown (10 YR 5/6); weak medium nuciform; friable; very stony; pH — 5.5.

C — Loam till; light grey (10 YR 7/1); non-calcareous; pH — 5.5.

In areas where the soil has been disturbed the A_2 horizon is more or less mixed with the horizons above it and a portion of the horizon below it. As a result the A_2 horizon is not evident in some locations.

Agriculture:

The Wabi soils are used chiefly for woodlots and pasture. Because the soils are stony the cleared areas are not easily cultivated and pastured plots are rough and weedy. Some of this land could be improved by removing the stones with power machinery. However, it is doubtful that such a practice would be economical.

The large number of stones on the surface of the Wabi soils makes cultivation impractical.

When left in forest the Wabi soils produce stands of poplar and silver birch. Fuel wood, pulpwood and some lumber are the main products from this land.

(b) *Imperfectly drained*

Coutts Series (1,200 acres)

The soils of the Coutts series are Podzols and are mapped in association with the Wabi soils and are the imperfectly drained members of the Wabi catena. The topography is gently rolling. The surface soil is strewn with stones and boulders of granitic origin. Poplar and silver birch are the dominant tree species on these soils but a great variety of other trees are also found.

The soil types included in the series are the Coutts loam and Coutts sandy loam. A description of an average profile of Coutts loam follows.

A_0 — 1–0 inches raw humus and roots, very dark grey (10 YR 3/1); pH 5.2.

A_1 — 0–2 inches loam; very dark brown (10 YR 2/2); medium crumb structure; friable consistency; very stony; pH — 5.3.

A_2 — 2–4 inches sandy loam; white (10YR 8/2); weak platy; friable; very stony; pH — 5.4.

B_2 — 4–16 inches loam; yellowish brown (10YR 5/8); mottled; weak medium nuciform; friable; very stony; pH — 5.5.

C — Loam till; light grey (10 YR 7/1); stony; non-calcareous; pH — 5.5.

The B horizon of the Coutts soils sometimes contains reddish brown iron concretions and the A_2 horizon is not present in locations where the soil has been mixed.

Agriculture

The Coutts soils are generally too stony for cultivation and hence are usually not cleared. The trees growing on these soils are generally small and are used chiefly for fuel wood. In some areas these soils are used for rough pasture.

(c) *Poorly drained*

Moose Series (900 acres)

The Moose series is the poorly drained member of the Wabi catena and is characteristic of the Dark Grey Gleisolic Great Soil Group. Similar to the other members of the Wabi catena, the Moose soils are very stony.

The soil drainage is poor due to the depressional topography. The land is covered with tree vegetation which consists mainly of poplar and alder. A description of Moose loam follows.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–4 inches loam, black (10 YR 2/1); medium crumb structure; friable consistency; very stony, pH — 5.2.

G — 4–15 inches loam; dark grey (10 YR 4/1); very mottled; weak coarse nuciform; friable; very stony; pH — 5.6.

C — Loam till; light grey (10 YR 7/1); stony; non-calcareous; pH—5.6.

Both Moose loam and Moose sandy loam have been mapped.

Agriculture:

The Moose soils are non-agricultural. Little of the land has been cleared and the trees occurring on the land at present are best used for fuel wood. A vigorous reforestation program conducted on these soils could increase their value.

2. LOAM TEXTURED CALCAREOUS TILL

The materials on which the oils of this group have developed are highly calcareous and profiles characteristic of the Brown Forest Great Soil Group occur on the better drained sites. The Dawson series is the well drained member of the Dawson catena which includes the Dymond and Sutton Bay series as imperfectly and poorly drained members respectively.

(a) Well drained

Dawson Series (1,300 acres)

The Dawson soils are developed on calcareous loamy till and are found in ridges and hills in the Townships of Dymond, Harris and Harley. The land has a moderately rolling topography. Dawson loam covers an area of 500 acres and Dawson sandy loam covers an area of 800 acres.

The soils are well drained due to rapid percolation and good run-off. The natural vegetation consists chiefly of poplar with some stands of silver birch. A description of Dawson loam is given below.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–1 inches loam; very dark greyish brown (10 YR 3/2); fine crumb structure; friable consistency; very stony; pH — 7.1.

B_2 — 1–13 inches loam; yellowish brown (10 YR 5/8); weak fine nuciform; friable; very stony; pH — 7.4.

C — Loam till; light yellowish brown (10 YR 6/4); very stony; calcareous; pH — 7.8.

Occasionally the entire profile is calcareous. The underlying bedrock is limestone of the Trenton and Lockport formations and is usually within six feet of the surface. Limestone outcrops occur on the sides of the hills in some locations.

Agriculture

Only a small portion of the Dawson soils is under cultivation, the remainder of the land being used for woodlots. The cultivated areas are used chiefly for pasture although oats and hay are grown in a few locations.

Although these soils are not as stony as those of the Wabi catena the number of

Dawson loam is characteristic of the Brown Forest soils, having little profile development.

stones present is the main handicap to their full utilization. They are open, well drained and high in lime.

Oat yields are generally low except where organic matter and commercial fertilizers have been added.

(*b*) *Imperfectly drained*

Dymond Series (1,100 acres)

The Dymond soils occur on gently rolling topography and are imperfectly drained. There is a large quantity of stones distributed on the surface and throughout the profile, consisting of granite, quartz, feldspar and limestone. Most of the land is covered by trees particularly poplar.

Sandy loam (500 acres) and loam (600 acres) types were mapped and they have similar profile characteristics except for surface texture. A description of a virgin Dymond loam is given below.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–1 inches loam; very drak greyish brown (10 YR 3/2); medium crumb structure; friable consistency; very stony; pH — 7.2.

B_2 — 1–12 inches loam, brownish yellow (10 YR 6/6); mottled; weak medium nuciform friable; very stony; pH — 7.4.

C — Loam till; light yellowish brown (10 YR 6/4); very stony; calcareous; pH—7.8.

The organic matter content of the cultivated surface is usually low.

Agriculture

The Dymond soils are alkaline throughout their profile; the cultivated surface has a reaction ranging generally between pH 7.2 and pH 7.6. None of the land is used for cultivated crops and nearly all is still wooded. Some cleared areas exist that are used for rough pasture. Cultivation of the Dymond soils is almost prevented by the stones and boulders on the soil surface. In general, the Dymond soils are used for woodlots. An active reforestation program would increase the returns from this land.

Soils of the Dymond series are used for rough pasture in some localities.

(c) *Poorly drained*

Sutton Bay Series (500 acres)

One of the minor series found in the New Liskeard-Englehart Area, is the Sutton Bay series, the poorly drained member of the Dawson catena and a Dark Grey

Gleisolic soil. The area occupied by these soils is 500 acres or 0.1 per cent of the surveyed area.

The soils occur on level to very gently rolling topography and the drainage is poor. All of the land is wooded and the trees are generally small. The tree vegetation consists chiefly of poplar and alder.

The surface textures of the Sutton Bay soils consist of sandy loam and loam. A description of a typical uncultivated soil is as follows.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–6 inches loam; black (10 YR 2/1); medium granular structure; friable consistency; very stony; pH — 7.4.

G — 6–14 inches loam; dark grey (10 YR 4/1); very mottled; weak medium nuciform; friable; very stony; pH—7.6.

C — Loam till; light yellowish brown (10 YR 6/4); very mottled; very stony; calcareous; pH — 7.8.

Agriculture

These soils, as well as the Moose soils, are perhaps the least suitable for agricultural purposes of the soils occurring in the New Liskeard-Englehart Area. At the present time the clearing of this land is not advisable.

The chief problems connected with these soils are those of stoniness and drainage. The removal of the stones is impractical and the drainage cannot be improved because of the stoniness and of the difficulty in finding an outlet for tiles or ditches.

The land now supports a vegetation of scrub, alders and small poplar. However, the value of the land would increase if reforested.

B. SOILS DEVELOPED ON KAME MORAINE MATERIALS

Kame moraine materials are those deposited by moving water from glacial streams. As a result the sediments range abruptly from coarse to fine. Pockets of till may occur in association with the sand and gravel. The materials are non-calcareous and the relief is strongly rolling.

Two series have been mapped. The Henwood series is developed on materials which are dominantly sand and the Elk Pit series on materials which are chiefly gravel.

1. GRAVELLY MATERIALS

(a) *Well drained*

Elk Pit Series (800 acres)

The Elk Pit soils are found in the Townships of Beauchamp and Henwood. The deposition of the materials on which the soil has developed is dominantly in the form of kames and kettles and the topography is strongly rolling.

The soil is well drained, open and porous. The natural vegetation consists chiefly of jack pine, silver birch, poplar, and blueberry bushes.

A description of the Elk Pit sand profile is given next page.

A_0 — 1–0 inches partially decomposed leaves, twigs and needles; very dark grey (10 YR 3/1); pH—5.3.

A_2 — 0–2 inches sand; light grey (10 YR 7/1); single grain structure; loose consistency; gravelly; pH — 4.8.

B_2 — 2–11 inches gravelly sand; yellowish brown (10 YR 5/6) single grained; loose; moderately to very stony; pH — 5.5.

B_3 — 11–23 inches; gravelly sand; light yellowish brown (10 YR 6/4); single grained; loose; moderately to very stony; pH — 5.6.

C — Gravelly sand; pale brown (10 YR 6/3); single grained; loose; very stony; non-calcareous; pH—5.8.

The cultivated soil is of a yellowish brown colour and has a reaction of about 5.4. In some locations cobbles and large stones are scattered over the surface.

Agriculture

The soils of the Elk Pit series are all wooded. The large trees, for the most part, have been removed, leaving only the smaller trees and scrub.

The land is not suited to agriculture. However, there is a ready market for the blueberries growing on the land. Potatoes could be grown on the more level areas and yields would be adequate where fertilizer was used. However, the numerous small stones would be a nuisance when harvesting with machinery.

2. SANDY MATERIALS

(*a*) *Well drained*

Henwood Series (6,100 acres)

The Henwood soils occupy about 1 per cent of the surveyed area and occur chiefly in the Townships of Henwood and Beauchamp. The topography is steeply rolling and is therefore unsuitable for cultivated crops. The soil is droughty due to rapid internal drainage and free surface run-off. Most of the land is covered with trees particularly jack pine, silver birch and poplar. Blueberry bushes are plentiful in areas that have recently been burned over.

The material is dominantly sand although a few stones and boulders are present. Occasionally small pockets of sandy till occur in association with the sand. The soil has the characteristic Podzol profile consisting of an organic surface layer followed by a bleached grey layer and this in turn is underlain by a brownish yellow layer. In areas where the vegetation is thin or burned off the surface soil has been blown by the wind and the natural sequence of layers is destroyed.

A description of an average Henwood sand is given below.

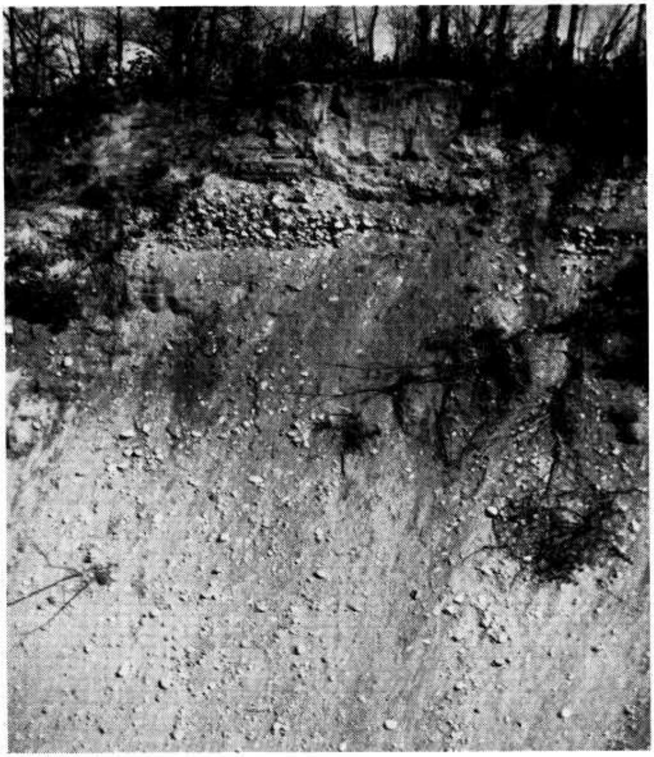
A_0 — 0–2 inches partially decomposed leaves, twigs, needles, etc., very dark brown (10 YR 2/2); pH — 5.2.

A_2 — 2–4 inches sand; light grey (10 YR 7/1); single grain structure; loose consistency; slightly stony; pH — 5.0.

B_2 — 2–13 inches sand; brownish yellow (10 YR 5/8); single grained; loose; slightly stony; pH — 5.2.

B_3 — 13–27 inches sand; brownish yellow (10 YR 6/6); single grained; loose; slightly stony; pH — 5.4.

C — sand; pale brown (10 YR 6/3); slightly stony; non-calcareous; pH — 5.6.



Parent material of the Henwood series.

Agriculture

Only small areas of these soils are used for agricultural purposes. They should be considered as non-agricultural and be permitted to return to forest vegetation.

C. SOILS DEVELOPED ON OUTWASH MATERIALS

Coarse textured materials that have been deposited by moving water are referred to as outwash. There is considerable variation in grain size depending on the speed at which the water was moving and the materials are in the form of sand bars, outwash plains or beaches. In the New Liskeard-Englehart Area these materials are non-calcareous and consist predominantly of sand.

The Wendigo, Mallard and Kenabeek series, the well drained, imperfectly drained and poorly drained members respectively of the Wendigo catena are the soils mapped in the New Liskeard-Englehart Area that have developed on outwash materials.

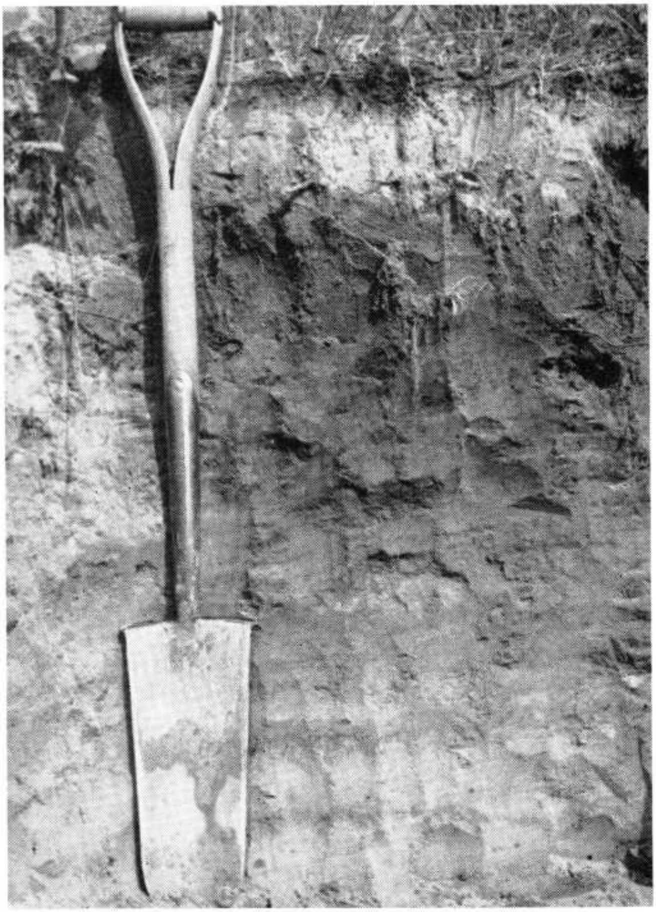
(a) *Well drained*

Wendigo Series (53,700 acres)

The Wendigo soils occupy large areas on the west and north sides of the surveyed area and cover about 10 per cent of the total area. These soils have been formed from pale brown, water-worked, stratified medium to fine sands which occasionally contain lenses or layers of fine to medium gravel.

The land has a gently rolling topography and is well drained due to the porous nature of the sand. The natural vegetation on the Wendigo soils is dominantly poplar, jack pine, silver birch, with undergrowth consisting chiefly of blueberry and labrador tea.

Most of the land has been burned over at one time or another but much of it has been reforested or permitted to re-seed itself. Only a small proportion of these soils is being cultivated.



Wendigo sand. A podzol soil developed on sandy outwash.

The Wendigo soils are typical members of the Podzol Great Soil Group. The Wendigo series consists of three types: Wendigo sand (45,900 acres), Wendigo sandy loam (1,800 acres) and Wendigo gravelly sand (6,000 acres). A generalized description of an undisturbed Wendigo sand profile is given below.

A_0 — 1–0 inches raw humus and roots; very dark grey (10 YR 3/1); pH—5.2.

A_2 — 0–2 inches sand; light grey (10 YR 7/1); single grain structure; loose consistency; stonefree; pH — 5.0.

B_2 — 2–11 inches sand; yellowish brown (10 YR 5/8); single grain; loose; stonefree; pH — 5.5.

B_3 — 11–23 inches sand; light yellowish brown (10 YR 6/4); single grain; loose; stonefree; pH — 5.5.

C — Sand; very pale brown (10 YR 7/2); single grain; loose; stonefree; non-calcareous; pH — 5.5.

The cultivated surface of the Wendigo soils is light brownish gray, loose, and contains very little organic matter and plant nutrients.

The Wendigo sand and sandy loam are generally stonefree but the Wendigo gravelly sand contains a number of small rounded stones throughout the profile.

Agriculture

The soils of the Wendigo series are unsuitable for hay, pasture and small grains. Grain and hay yields are very poor and usually prove unprofitable due to the droughty nature and low fertility of the soil. However, the soils can be used for special crops and yields of 400 bushels per acre of potatoes have been reported in a few isolated cases where there was sufficient moisture and heavy fertilization. Blueberries do well on these soils but the wild varieties are the only ones growing. A good income might be realized from the cultivation of the blueberry crop. Raspberries, strawberries and garden vegetables are grown on a very small scale mostly for home consumption.

In the management of the Wendigo soils for crop production organic matter must be given major consideration. This may be supplied in the form of barnyard manure, muck or peat, or by incorporating green crops such as clovers, alfalfa, rye or buckwheat. The organic matter not only adds the needed nitrogen but also increases the moisture holding capacity of the soil. Complete commercial fertilizers are required for the production of most crops. The rate of application and the type of mixture used varies greatly with the crops grown and the amount of manure used. Lime is required for nearly all crops, except blueberries.

It is unlikely that Wendigo soils will be used for agriculture since they are not suitable for general farm crops. The short growing season, distance from large markets and the high cost of fertilizer make it uneconomical to grow specialized crops.

(b) *Imperfectly drained*

Mallard Series (4,200 acres)

The Mallard soils are very gently rolling to level and are imperfectly drained. Surface and internal drainage are slow. These soils have developed from materials similar to those of the Wendigo series.

The vegetation on the Mallard soils consists of poplar, spruce, pine and some silver birch. The land has not been cleared for cultivation.

Mallard sand (2,800 acres), Mallard sandy loam (1,000 acres), and Mallard gravelly sand (400 acres) are the soil types included in the Mallard series. The profile of the sand is decribed below.

A_0 — 2–0 inches raw humus and roots, very dark grey, (10 YR 3/1); pH — 5.0.

A_2 — 0–3 inches sand; light grey (10 YR 7/1); single grain structure; loose consistency; stonefree; pH — 4.5.

B_2 — 3–18 inches sand; brown (10 YR 5/3); mottled; single grain; occasionally cemented; stonefree; pH — 5.3.

C — Sand; very pale brown (10 YR 7/3); mottled; single grain; calcareous; pH — 5.5.

The formation of "ortstein" in the B_2 horizon is probably due to the cementation of the sand particles by iron and organic matter. In some instances ortstein is not present.

Small rounded stones occur in only the Mallard gravelly sand profile.

Agriculture

The Mallard soils are very acid and of low fertility. Forest fires and wood cutters have taken toll of the forest vegetation at one time or another but the land has been allowed to revert to forest and in time it will produce valuable timber.

Little of the Mallard soils are cleared. Where agriculture is practised the land is used for hay and pasture with small areas devoted to garden crops.

(c) *Poorly drained*

Kenabeek Series (3,500 acres)

Small areas of the Kenabeek soils have been mapped in association with the Wendigo series. Two soil types occur: Kenabeek sandy loam (3,100 acres) and Kenabeek sand (400 acres).

They are formed on sandy deposits and are very gently rolling to depressional. The drainage is poor and these soils are wet a large proportion of the year. The tree vegetation consists mainly of poplar, spruce, tamarack and some willow. The profile description of Kenabeek sandy loam follows.

A_1 — 0–5 inches sandy loam; very dark brown (10 YR 2/2); highly organic; fine crumb structure; friable consistency; stonefree; pH — 5.2.

G — 5–18 inches sand; grey (10 YR 6/1); very mottled; single grain; loose; stonefree; pH — 5.5.

C — Sand; very pale brown (10 YR 7/3); very mottled; single grain; loose; stonefree; non-calcareous; pH — 5.6.

Agriculture

The Kenabeek soils are unsuited to agriculture due to low fertility, acidity and poor drainage. Because of excess moisture the soils are cold and it is unlikely that crops other than hay, would mature in the short growing season unless the soils were drained.

Where the land was cleared it has been allowed to revert to forest and none of it is being cultivated.

D. SOILS DEVELOPED ON OUTWASH MATERIALS UNDERLAIN BY CLAY

There are tracts in the New Liskeard-Englehart Area where outwash sand occurs as a shallow deposit over clay. The depth of the sandy overburden varies from six inches to three feet. In general the profile is developed in the sandy materials and the clay occurs at the bottom of the B_2 horizon.

Three series were mapped, the Bucke series occurring on the well drained sites, the Otterskin on the imperfectly drained locations and the Englehart on the poorly drained areas.

(*a*) *Well drained*

Bucke Series (3,400 acres)

The Bucke soils occupy small tracts of land scattered throughout the surveyed area. The topography is gently to moderately rolling and the soils are well drained. Much of the land has been cleared but some of it is being allowed to revert to forest. The natural tree vegetation consists mainly of poplar, silver birch and some pine.

The sandy material from which the soil has developed rests on clay at depths ranging from a few inches to three feet. The sand is deep on the knolls and shallow in the depressions.

The Bucke series consists of two types; the sandy loam and sand. The following is a description of a typical Bucke sand profile found under natural vegetation.

A_0 — 1–0 inches raw humus and roots; very dark grey; (10 YR 3/1); pH — 5.2.

A_2 — 0–2 inches sand; light grey (10 YR 7/2); single grain structure; loose consistency; stonefree; pH — 5.0.

B_2 — 2–14 inches sand; yellowish brown (10 YR 5/8); single grain; loose; stonefree; pH — 6.3.

D — Clay; light brownish grey (10 YR 6/2); varved; very plastic when wet; very hard when dry; stonefree; calcareous; pH — 7.8.

Occasionally a B_3 horizon similar in appearance to that described for the Wendigo soils occurs below the B_2 horizon. Large stones are sometimes found on the surface.

Under cultivation the A_0 and A_2 horizons have been more or less intermixed with the upper portion of the underlying B_2 horizon resulting in a greyish brown surface layer about six inches deep.

Agriculture

The Bucke soils are dry, strongly acid and of low fertility. Less than 25 per cent of the land has been cleared and most of the cleared land is used for rough pasture. Very small acreages of garden crops are grown in a few localities.

These soils are fair soils for potatoes and garden crops but yields are medium to low unless adequate amounts of commercial fertilizer, lime and manure are added. As the land is dry good management should tend to conserve as much moisture as possible.

(*b*) *Imperfectly drained*

Otterskin Series (11,500 acres)

The Otterskin series, of which Otterskin sandy loam is the only soil type mapped, covers 2.2 per cent of the surveyed area. Slight depressions and gently rising knolls produce a gently undulating topography. These soils are imperfectly drained.

The vegetation on the Otterskin sandy loam which has not been cleared consists of spruce, tamarack, poplar and some pine.

The newly-cultivated surface soil of the Otterskin series is a colourful patchwork of white, yellow, pale brown and dark brown. With continued cultivation the various colours become mixed and diluted to a common yellowish brown shade.

The Otterskin sandy loam is an acid, leached soil and belongs to the group of soils known as Podzols. The common characteristics of an undisturbed Otterskin sandy loam profile are given below.

A_0 — 2–0 inches raw humus and roots; very dark grey (10 YR 3/1); pH — 5.0.

A_2 — 0–2 inches sand; light grey (10 YR 7/1); single grain structure; loose consistency; stonefree; pH — 4.8.

B_2 — 2–18 inches sand; yellowish brown (10 YR 5/6); mottled; single grain; loose; stonefree; pH — 5.4.

B_3 — 18–25 inches sand; brownish yellow (10 YR 6/6); mottled; single grain; loose; stonefree; pH — 5.8.

D — Clay; light brownish grey (10 YR 6/2); varved; very plastic when wet; very hard when dry; stonefree; calcareous; pH — 7.8

Agriculture

A large part of the Otterskin sandy loam is in forest but some of it is cultivated. Where cultivated, it is used for general farming and sometimes for gardening. The natural fertility of the soil is low but can be improved considerably by adding manure and fertilizer.

The Otterskin sandy loam gives the following yields per acre where management practices common to the area are followed: hay $\frac{3}{4}$ to 2 tons, oats 20 to 35 bushels, potatoes 100 to 200 bushels. Lime is necessary for the normal growth of clover especially alfalfa. Garden crops grow well where green or barnyard manure is used but yields can be increased through the use of commercial fertilizer.

(*c*) *Poorly drained*

Englehart Series (7,700 acres)

The Englehart series, of which Englehart sandy loam is the only type mapped, occurs in small areas scattered throughout the northern part of the surveyed area. The topography is very gently undulating to level. The drainage is poor and a highly organic black surface is present where the soil is cultivated. It is likely that at one time the soil was covered by a deep organic layer but most of this has been burned off by forest fires. The natural tree vegetation is composed chiefly of spruce, tamarack and some poplar.

The soil profile of Englehart sandy loam is described below.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–5 inches sandy loam; very dark brown (10 YR 2/2); fine crumb structure; very variable consistency; stonefree; pH — 5.2.

G — 5–18 inches sand; grey (10 YR 6/1); very mottled; single grain structure; loose consistency; stonefree; pH — 5.4.

D — Clay; light brownish grey (10 YR 6/2); varved; very plastic consistency when wet; very hard when dry; stonefree; pH — 7.8.

The depth of sand over the clay varies from 1 to 3 feet but is usually about 2 feet deep. The cultivated soil is a dark grey acid sandy loam.

Agriculture

Only a small part of the Englehart sandy loam is under cultivation. Where cultivated it is used chiefly for pasture and hay crops. Some oats are grown but yields are low being about 20 to 30 bushels per acre.

Because of the excess moisture the soil is cold. Fertility is generally low and the soil is strongly acid. Fertilizer, lime, and improved drainage will increase the productivity of the land but such improvements may not be economical.

E. SOILS DEVELOPED ON LACUSTRINE DEPOSITS

During glacial times Lake Timiskaming occupied a much larger area than it does at the present time. This glacial lake was called Lake Barlow. The water carried, in suspension, soil materials of various sizes which slowly settled to the bottom. It is apparent that a deposition of four different materials occurred in the area which range in texture from silt loam to clay and in colour from dark brown to light brownish grey. They may or may not be calcareous.

1. SILT LOAM LOW IN CALCIUM CARBONATE OVER CLAY

Small areas occur in the eastern part of the surveyed area where soils have developed on silt loam low in calcium carbonate underlain by reddish brown, calcareous clay. The silt loam is 3 feet or less in depth.

The soils of the Thwaites catena have developed on this silt loam over clay complex. The Thwaites series is found on moderately to steeply rolling topography where drainage is good. The Casey series and the Brethour series are the imperfectly and poorly drained members respectively of the Thwaites catena.

(*a*) *Well drained*

Thwaites Series (2,400 acres)

The Thwaites silt loam occurs chiefly in Brethour and Pense Townships along the edge of the Blanche River valley. The topography is moderately sloping except where stream water has dissected the land causing steep slopes. External drainage is rapid because of the rolling topography but percolation of water through the soil is slow due to the fineness of the materials.

The following is a description of the virgin Thwaites silt loam.

A_0 — 1–0 inches raw humus and roots; very dark grey; (10 YR 3/1); pH — 5.2.

A_{2p}— 0–2 inches silt loam; white (10 YR 8/2); fine platy structure; soft consistency; stonefree; pH — 5.2.

B_{2p}— 2–10 inches silt loam; yellowish brown (10 YR 5/6); weak platy; soft; stonefree; pH — 5.3.

A_{2GW}— 10–18 inches silt loam; very pale brown (10 YR 7/3); weak platy; soft; stonefree; pH — 5.3.

B_{2GW}— 18–26 inches silty clay loam; yellowish brown (10 YR 5/5); medium nuciform; friable; stonefree; pH — 5.6.

D — Clay; dark yellowish brown (10 YR 4/4); massive structure; very plastic when wet; very hard when dry; stonefree; calcareous; pH — 7.8.

In undisturbed areas the typical double profile of a Podzol soil superimposed on a Grey Wooded soil occurs as described above. However, when the soil is cultivated the A_0, A_{2p} and most of the B_{2p} horizons are more or less intermixed to form an A_c horizon and the Podzol characteristics of the profile are no longer evident.

The cultivated surface is greyish brown in color and is strongly acid. It is fairly well supplied with potash but is low in phosphate and organic matter.

Agriculture

Practically all of the Thwaites silt loam has been cleared and is used, where topography permits, for hay, pasture, oats and some wheat. Both winter and spring wheat are grown but the amount of the crop yield is governed by climate.

Slopes too steep for cultivation have been left in trees or grass to reduce soil loss by erosion. Gully erosion is severe in some localities where streams have cut deep ravines.

The natural productivity of the Thwaites silt loam is medium. Hay yields from 2 to 3 tons, oats from 30 to 40 bushels and wheat from 20 to 30 bushels per acre.

Yields can be increased considerably by additions of nitrogen and phosphorus. The maintenance of organic matter is important and barnyard manure should be used to maintain the organic matter content of the soil. The use of lime would benefit the crops, particularly the clovers.

(b) *Imperfectly drained*

Casey Series (1,300 acres)

The Casey soils occupy only a small part of the surveyed area and small acreages occur in the central part of the district. The land is gently undulating and is imperfectly drained. Surface run-off is low and internal drainage is slow because of the presence of clay at depths of 3 feet or less. The vegetation on the Casey soils consists mainly of poplar.

Casey silt loam is the only type mapped and it is described as follows.

A_0 — 1–0 inches raw humus and roots; very dark grey; (10 YR 3/1); pH—5.3.

A_{2p}— 0–2 inches silt loam; white (10 YR 8/2); fine platy structure; soft consistency; stonefree; pH — 5.0.

B_{2p}— 2–8 inches silt loam; yellowish brown (10 YR 5/8); slightly mottled; weak platy; soft; stonefree; pH — 5.2.

A_2 — 8–15 inches silt loam; very pale brown (10 YR 7/3); mottled; weak platy; soft; stonefree; pH—5.2.

B_2 — 15–24 inches silty clay loam; brown (10 YR 5/3); mottled; medium nuciform; friable; stonefree; pH — 5.7.

D — Clay; dark yellowish brown (10 YR 4/4); massive; very plastic when wet; very hard when dry; stonefree; calcareous; pH — 7.8.

Occasionally a pale brown mottled B_3 horizon occurs below the B_2 horizon. Sometimes, where the silt is somewhat shallower, the clay D horizon occurs immediately below the A_2 horizon. On cultivation the upper horizons are intermixed to form a greyish brown A_c horizon which is medium to low in organic matter and phosphorus, medium in potash and low in calcium.

Agriculture

The main crops grown on the Casey silt loam are hay, pasture, oats and some barley. Yields are medium to low and could be improved by additions of commercial fertilizer and manure. Lime would benefit all crops, particularly the clovers. Pastures are fair but the acidity of the soil favours the growth of weeds such as horsetail and sorrel.

In spite of inadequate drainage the Casey soil produces the crops commonly grown in the district. Improved drainage through the use of ditches would increase yields.

(c) *Poor drainage*

Brethour Series (400 acres)

Brethour silt loam is found in Brethour Township on very gently undulating topography. There is very little run-off and nearly all the rainfall that moves through the silt loam is held up by the clay which occurs at a depth of from 2 to 4 feet. This has produced a permanent high water table which has favoured the development of a highly organic surface.

Some of the land is cleared. The remainder has a tree cover consisting mainly of poplar. A generalized profile description of Brethour silt loam is as follows.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–6 inches silt loam; very dark greyish brown (10 YR 3/2); medium granular structure; friable consistency; stonefree; pH — 5.4.

G_1 — 6–18 inches silt loam; light yellowish brown (10 YR 6/4); very mottled; weak nuciform; friable; stonefree; pH—5.5.

G_2 — 18–27 inches silt loam; olive-grey (5 YR 5/2); very mottled; massive; firm; stonefree; pH — 5.7.

D — Clay; dark yellowish brown (10 YR 4/4); massive structure; very plastic when wet; very hard when dry; stonefree; calcareous; pH — 7.8.

The clay material is mottled but the colour of the mottles is masked by the dark colour of the materials.

Agriculture

The Brethour soil is used for hay, pasture and oats. Yields of hay average about 1½ to 2 tons per acre and oat yields average 20 to 30 bushels per acre. However, prolonged rains and early frosts make the harvesting of the oat crop difficult on these wet soils.

This soil would be improved by drainage, and the use of shallow ditches to take away the surface water would seem to be satisfactory and economical. Usually the land is fairly well supplied with organic matter but additions of fertilizers such as 0-16-8 and 0-12-12 are recommended to increase the quantity and quality of spring grains.

2. SILT LOAM OR SILTY CLAY LOAM LOW IN CALCIUM CARBONATE

These materials are found in the Blanche River valley and apparently were deposited over the varved calcareous clay. The materials are comparatively deep and are low in calcium carbonate.

Three series were mapped. The Blanche, Pense, and Falardeau series are the well drained, imperfectly drained and poorly drained members, respectively, of the Blanche catena.

(a) Well drained

Blanche Series (6,100 acres)

The Blanche soils are well drained and are found on steeply, rolling topography. The rolling topography usually occurs near stream courses where gullies and some steep banks have been formed by the running water. Run-off is rapid but the fine materials prevent the percolation of moisture through the soil to some extent. The tree vegetation consists mainly of poplar.

In virgin areas the Blanche silt loam is a Grey Wooded soil with a Podzol profile developed in the upper portion of the solum. When cultivated the upper horizons are intermixed and the Podzol profile can no longer be identified. A description of Blanche silt loam developed under tree vegetation follows.

A_0 — 1–0 inches raw humus and roots; very dark grey (10 YR 3/1); pH — 5.2.

A_1 — 0–1 inches silt loam; dark grey (10 YR 4/1); medium granular structure; friable consistency; stonefree; pH — 5.2.

A_{2p} — 1–3 inches silt loam; white (10 YR 8/2); fine platy; soft; stonefree; pH — 5.0.

B_{2p} — 3–8 inches silt loam; yellowish brown (10 YR 5/6); weak platy; soft; stonefree; pH — 5.2.

A_2 — 8–20 inches silt loam; very pale brown (10 YR 7/3); weak platy; soft; stonefree; pH — 5.3.

B_2 — 20–28 inches silty clay loam; brown (10 YR 5/3); medium nuciform; firm; stonefree; pH — 5.6.

B_3 — 28–34 inches silt loam; yellowish brown (10 YR 5/4); weak medium nuciform; friable; pH — 5.8.

C — Silt loam; pale brown (10 YR 6/3); laminar; friable; stonefree; non-calcareous; pH — 6.2.

Free carbonates are present at depths of 5 feet or more. The cultivated surface is a greyish brown silt loam which is low in organic matter, nitrogen and phosphorus and medium in potassium. The profile is very acid.

Agriculture

Although much of the Blanche silt loam is cleared most of it is used for pasture since the steep slopes make the cultivation of other crops difficult. The soil is very susceptible to erosion and the steep slopes should be kept under a permanent cover of grass or trees. The moderately rolling land can be used for spring grains and, in some areas, potatoes.

The use of commercial fertilizers will increase yields. Lime is required for most crops and will especially benefit the clovers. The Blanche soils are probably best used for grazing. Care should be taken to prevent overgrazing since it may result in the loss of clover and the weakening of the grasses. With the removal of the sod erosion becomes serious.

(b) Imperfectly drained

Pense Series (4,800 acres)

The Pense soils occur on gently undulating topography and are associated with the Blanche and Falardeau soils. They are characteristic of the Grey Wooded soils. The surface run-off of these soils is low and percolation through the solum is slow. The parent materials are similar to those of the Blanche soil except that in some places they contain more clay.

Approximately 60 per cent of the Pense soils are cleared. Wooded areas consist chiefly of poplar, willow and alder.

Two types have been mapped in this series, the silt loam (2,900 acres) and the silty clay loam (1,900 acres). A description of Pense silt loam follows.

A_0 — 1–0 inches raw humus and roots; very dark grey (10 YR 3/1); pH — 5.1.

A_1 — 0–2 inches silt loam; dark greyish brown (10 YR 4/2); medium granular structure; friable consistency; stonefree; pH — 5.1.

A_2 — 2–8 inches silt loam; very pale brown (10 YR 7/3); mottled; weak platy; friable; stonefree; pH — 5.0.

B_1 — 8–13 inches silt loam; greyish brown (10 YR 5/2); mottled; weak medium nuciform; friable; stonefree; pH — 5.3.

B_2 — 13–27 inches silty clay loam; brown (10 YR 5/3); mottled; medium nuciform; plastic when wet; hard when dry; stonefree; pH — 5.4.

C — Silt loam; pale brown (10 YR 6/3); laminar; friable; stonefree; non-calcareous; pH 6.2.

The silty clay loam profile is similar to that described above except for the texture of the surface horizon which is silty clay loam. The B_1 horizon is characterized by a covering of lighter coloured material over the aggregates.

The cultivated surface is a greyish brown silt loam or silty clay loam, approximately 6 inches deep, that is generally low in organic matter and phosphorus. The potassium content is medium to low.

Agriculture

The Pense soils are used for growing hay, pasture, spring grains and potatoes. In normal years the Pense soils will yield 30-50 bushels of oats per acre. Timothy with clover produces 2 to 3½ tons per acre. Potato yields of more than 600 bushels per acre have been reported but the average yield is 350 to 400 bushels per acre where fertilizer is used.

Yields can be substantially increased by additions of fertilizer and crops give best response to fertilizers high in nitrogen and phosphorus. Lime is required to reduce the acidity of the soil and should be used particularly where clovers are grown. The clovers soon die out on the acid Pense soils. However, lime should be used sparingly if potatoes are grown in the rotation and it should be applied after the potato crop.

Organic matter is very important for successful crop production. Green crops such as legumes, buckwheat and rye can be ploughed down to maintain the organic matter content of the soil when the supply of manure is limited.

(c) *Poorly drained*

Falardeau Series (16,100 acres)

The Falardeau soils occupy approximately 3 per cent of the surveyed area and occur along the eastern side of the district in the Blanche River valley. The land is very gently undulating. The percolation of water through the soil is slow and excess water runs off very slowly due to the flatness of the land. As a result the drainage of these soils is poor. The tree cover which may be observed in the remaining woodlots is chiefly composed of poplar, spruce and willow.

Two types have been mapped in the Falardeau series, the silt loam (3,600 acres) and the silty clay loam (12,500 acres). A profile description of Falardeau silty clay loam is given below.

A_1 — 0–7 inches silty clay loam; dark greyish brown; (10 YR 4/2); medium granular structure; friable consistency; stonefree; pH — 5.6.

G_1 — 7–19 inches silty clay loam; light yellowish brown (2.5 Y 6/4); very mottled; laminar; firm; stonefree; pH — 5.8.

G_2 — 19–28 inches silty clay loam; pale olive (5 Y 6/3); very mottled; massive; firm; stonefree; pH — 6.2.

C — Silty clay loam; pale brown (10 YR 6/3); laminar; firm; stonefree; non-calcareous; pH — 6.4.

At one time the Falardeau soils were covered by a deep organic deposit. However, almost all of this organic layer has been burned off since settlement began and the land was cleared. In nearly all of the area little or none of the valuable organic matter was left to incorporate into the mineral portion of the soil. As a result the surface soil is usually low in organic matter and of poor physical condition.

Agriculture

A large part of the Falardeau soils is under cultivation. Mixed farming is followed most on these soils although considerable dairying is also prastised.

The Falardeau soils are potentially fertile and they produce good yields in dry seasons. Optimum climatic conditions are especially important on poorly drained soils because of the short period in the spring when moisture conditions are such that a good seed-bed can be prepared and the seeding operations executed.

The cultivated surface of the Falardeau soils is acid and has an average reaction of pH 5.5. The periodic application of lime in one part of the rotation is a practice which should be adopted. The lime helps the growth of clover and alfalfa which are the most important crops of dairy farms. It also improves soil structure, making the surface more permeable to air and water and favours better root development.

Phosphorus and nitrogen are the most deficient elements and applications of phosphatic and nitrogenous fertilizers benefit most crops. Crop yields can be considerably increased by the use of a complete fertilizer such as 4-12-6. Good barnyard manure supplemented by superphosphate is also beneficial. The need for putting barnyard manure on the land cannot be too strongly emphasized. Poor structure can be improved by sod crops and the generous additions of organic matter.

Excess water tends to accumulate on the land in the spring and after heavy rains and a good drainage system is essential to drain this water away rapidly.

The yields obtained on unfertilized Falardeau soils are medium. Mixed hay produces 1½ to 2½ tons per acre but it is difficult to maintain good stands of clover on unlimed land. Oat yields are from 35 to 45 bushels per acre.

3. CALCAREOUS SILT LOAM

The calcareous silt loam materials are located chiefly on the western and central parts of the surveyed area. These materials are comparatively deep and are underlain by dark brown or pale brown varved clay deposits.

The Evanturel, Earlton and Cane series, the well drained, imperfectly drained and poorly drained members respectively of the Evanturel catena, are developed on the calcareous silt loam materials.

(a) *Well drained*

Evanturel Series (16,600 acres)

The Evanturel soils are found along Evanturel Creek and the Englehart River where these streams and their tributaries have cut steep banks giving the soils a steeply rolling topography. Water percolation is slow and run-off is high. The natural vegetation consists mainly of poplar. Silt loam (9,800 acres) and silty clay loam (6,800 acres) are the types mapped.

Evanturel silt loam. A typical profile of Grey Wooded development on silt textured materials. Thick, light colored A_2 with darker colored structural B horizon below.

The soil profile description given below was taken in a woodlot and is representative of the Evanturel silt loam in the surveyed area.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–2 inches silt loam; very dark grey (10 YR 3/1); fine granular structure; friable consistency; stonefree; pH — 6.1.

A_{21}— 2–7 inches silt loam; yellowish brown (10 YR 5/6); medium granular; friable; stonefree; pH — 5.6.

A_{22}— 7–13 inches silt loam; very pale brown (10 YR 8/3); fine platy; friable; stonefree; pH — 5.5.

B_2 — 13–20 inches silty clay loam; yellowish brown (10 YR 5/4); medium nuciform; firm; stonefree; pH — 6.2.

B_3 — 20–25 inches silty clay loam; pale brown (10 YR 6/3); mottled; mottles are brownish yellow (10 YR 6/6); laminar; firm; stonefree; pH — 7.4.

C — Silt loam; light brown (7.5 YR 6/4); laminar; friable; stonefree; calcareous; pH — 8.0.

In a few locations, particularly in the Charlton area, a Podzol profile, similar to that described for the Blanche soils, has developed in the A_2 horizon of this Grey Wooded soil. The A_{21} horizon is usually absent in the cultivated soil because it is usually mixed with A_1 horizon to form a brownish grey surface layer about 6 inches deep. The reaction of the cultivated surface varies from pH—5.3 to pH—6.8.

Agriculture

A large proportion of the Evanturel soils is in forest. Where the land is cleared it is used for hay, pasture and oats. The steep slopes are best kept under a permanent tree cover. The moderate slopes can be cultivated but good management will include practices preventing excessive loss of soil by erosion.

The soils are fertile and good yields of crops commonly grown in the area can be obtained.

Organic matter in the form of barnyard manure should be added to the soil. The need for lime should be determined by a soil test since there is a wide variation in surface reaction from field to field.

(b) *Imperfectly drained*

Earlton Series (17,100 acres)

The Earlton soils are found in association with the Evanturel and Cane soils, the largest area occurring just south of Earlton. The land is gently sloping and as a result the external drainage is slow. The internal drainage is low because of the fineness of the materials. The tree vegetation consists mainly of poplar but some spruce, silver birch, elm and alder also occur.

Two soil types have been mapped in this series: the silty clay loam (5,600 acres) and the silt loam (11,500 acres). The characteristics of Earlton silt loam are shown in the following profile description.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–2 inches silt loam; very dark greyish brown (10 YR 3/2); fine granular structure; friable consistency; stonefree; pH — 6.0.

A_2 — 2–7 inches silt loam; light grey (2.5 Y 7/2); mottled; fine platy; friable; stonefree; pH — 5.6.

B_1 — 7–17 inches silty clay loam; light yellowish brown (2.5 Y 6/4); mottled; fine nuciform; firm; stonefree; pH — 6.5.

B_2 — 17–26 inches silty clay loam; light olive-brown (2.5 Y 5/4); mottled; medium nuciform; firm; stonefree; pH — 7.0.

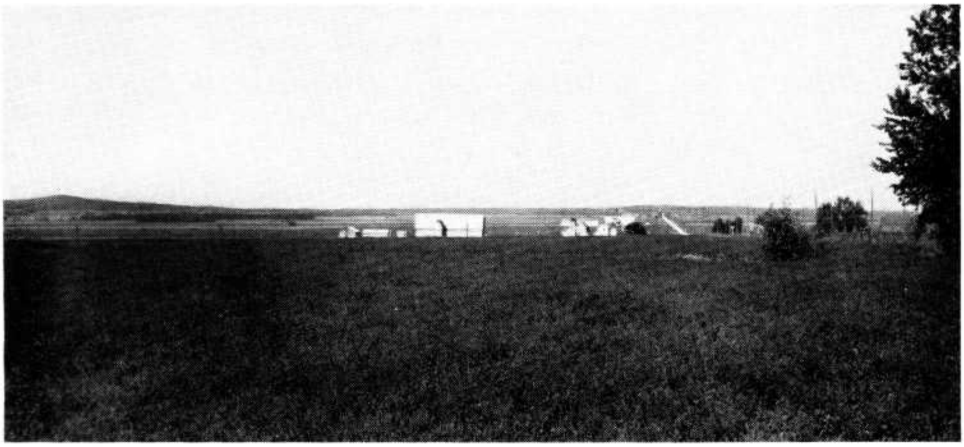
C — Silt loam; light grey (10 YR 7/2); laminar; friable; stonefree; calcareous; pH — 8.0.

In some locations a B_3 horizon, similar to that described for the Evanturel silt loam, occurs below the B_2 horizon. The colour of the C horizon varies from a light brown to a light grey.

The cultivated surface is a fertile, easily worked, greyish brown silt loam about 6 inches deep.

Agriculture

The Earlton soils are among the most fertile soils in the district. They are used for dairying and mixed farming and crops such as hay, pasture, spring grains and wheat are grown. Hay yields 2 to 3 tons per acre. Excellent stands of red clover have been observed and alfalfa does well when climatic conditions are good and where there is sufficient lime. The need for lime should be determined by a soil test since the reaction of the surface soils varies considerably. The average surface reaction is pH 6.5. Oat yields of over 100 bushels to the acre have been reported from fields receiving additions of manure only.



Clovers grow well on the Earlton silt loam.

The Earlton soils, although quite productive, are usually low in organic matter and nitrogen. The use of barnyard manure or the ploughing down of sod will help to maintain the organic matter and nitrogen contents and will also improve the physical condition of the soil. Nitrogenous fertilizers usually give beneficial results on the Earlton soils.

One of the most serious problems on the Earlton soils is one of weed control. Perennial sow thistle is becoming a menace to agriculture in the area and efforts should be made to eradicate the weed from these soils. The weed can be controlled by pasturing, crop rotation, cultivation in hot dry weather, tile drainage or spraying with chemical weed killers.

(c) ***Poorly drained***

Cane Series (27,000 acres)

Large acreages of the Cane soils occur in Cane, Robillard, Savard, Sharpe, and Evanturel Townships. The percolation of water through the silt is low and excess water runs off very slowly due to the flatness of the land. As a result the drainage of these soils is poor. The tree cover consists mainly of poplar although spruce and alder are also common.

Silty clay loam (7,300 acres) and silt loam (20,400 acres) are the two types in the series which have been mapped. The following is a description of a virgin Cane silt loam profile.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–6 inches silt loam; very dark brown (10 YR 2/2); medium granular structure; friable consistency; stonefree; pH — 7.2.

G_1 — 6–17 inches silt loam; pale yellow (2.5 Y 7/4); very mottled; mottles are olive-yellow (2.5 Y 6/8); laminar; friable; pH — 7.2.

G_2 — 17–27 inches silt loam; light yellowish brown; (2.5 Y 6/4); very mottled; massive; friable; stonefree; pH — 7.4.

C — Silt loam; light grey (10 YR 7/2); laminar; friable; stonefree; calcareous; pH — 8.0.

At one time the Cane soils were covered by a deposit of muck. This layer was subsequently destroyed by fire or mixed with the underlying mineral material to form the A_1 horizon.

Agriculture

Although large areas of the Cane soil have been cleared, much of it has been invaded by brush and scrub growth and is not being cultivated. A mixed type of farming is practised and hay, pasture and oats are grown.

The land is not reliable because of poor drainage so many of the farms have been abandoned. In order to prevent water-logging of the soil, ditches or drains with good outlets are needed. Surface drainage can be improved by ploughing the land up in ridges and leaving a dead furrow between the ridges. Surface water then runs from the ridges into the furrow, and down to the drainage outlet.

Abandoned farm on Cane silt loam.

The Cane soils, when drained, will produce high crop yields but present yields are medium to low. The following yields per acre may be considered as averages: hay 1 to 2½ tons; oats 25 to 35 bushels; mixed grains 25 to 30 bushels; potatoes 200 bushels. The Cane soils are generally not suitable for potatoes because of the danger of scab. Alfalfa can be grown only with good drainage.

4. VARVED CALCAREOUS CLAY

Almost 30 per cent of the surveyed area is occupied by soils developed on varved calcareous clay materials. These materials consist of yellowish brown and white clays occurring as definite bands or layers.

(*a*) *Well drained*

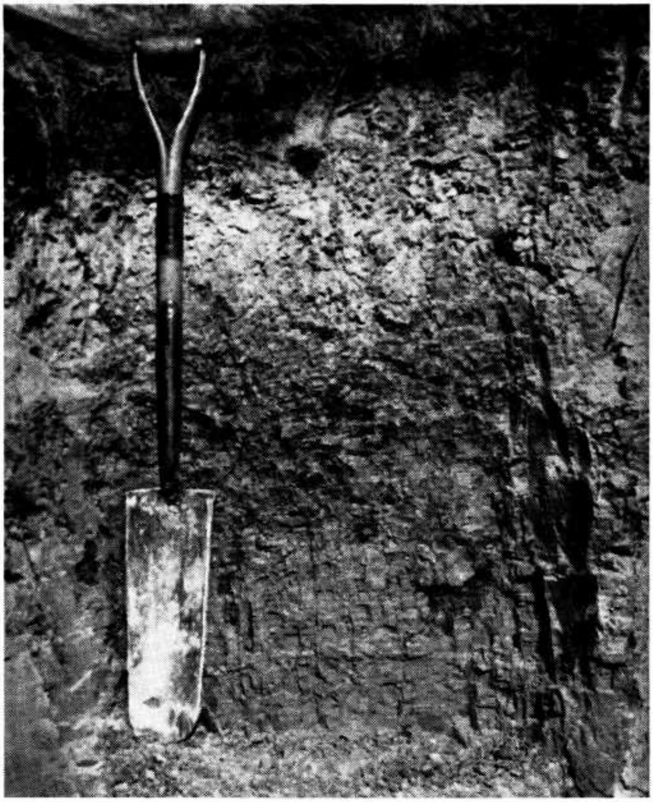
Haileybury Series (43,100 acres)

The Haileybury soils may occur anywhere in the surveyed area but are found chiefly in the southern and northern sections. The land is steeply rolling and as a result external drainage is very rapid. The percolation of water through the soil is low due to the impermeability of the clay.

Although the parent material of the Haileybury soils consists of yellowish brown and white clays occurring in layers, pockets of light brownish grey clay cover these clays in some areas. The parent material of these soils has a clay content of about 65 per cent.

Clay (4,900 acres), silty clay (24,700 acres) and silty clay loam (3,500 acres) types are mapped in this series. The following is a description of Haileybury clay developed under tree cover.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.



The well drained Haileybury clay is characteristic of the Grey Wooded soils. Note the well developed A_2 and B horizons.

A_1 — 0–1 inches clay; very dark grey (10 YR 3/1); medium granular structure; friable consistency when dry, plastic when wet; stonefree; pH — 6.0.

A_2 — 1–5 inches silty clay; light grey (10 YR 7/2); fine platy; friable when dry, plastic when wet; stonefree; pH — 5.6.

B_1 — 5–12 inches clay; brown (10 YR 5/3); coarse blocky; very hard when dry, very plastic when wet; stonefree; pH — 6.2.

B_2 — 12–26 inches clay; dark brown (10 YR 4/3); fine blocky; very hard when dry, very plastic when wet; stonefree; pH — 7.0.

B_3 — 26–34 inches clay; dark yellowish brown (10 YR 4/4); coarse blocky; very hard when dry, very plastic when wet; stonefree; pH — 7.4.

C — Clay; white (10 YR 8/2); and yellowish brown (10 YR 5/4); varved; very hard when dry; very plastic when wet; stonefree; calcareous; pH — 7.8.

The B_3 horizon is often absent and the A_0 horizon, on soils located in virgin areas is usually a layer of raw humus and roots, 1 inch thick and black in colour.

The cultivated surface is a greyish brown clay, silty clay or silty clay loam about 6 inches deep.

Agriculture

Because of the steep slopes only a small part of the Haileybury soils is under cultivation. The land is very susceptible to erosion and deep gullies have been cut in many areas. The steep slopes should be kept under a permanent cover of trees or grass to reduce the rate of movement of water and thus give the water more time to soak into the soil.

The more gentle slopes are cultivated and hay, pasture, oats and mixed grains are grown. Clover and alfalfa grow well and yields of mixed hay average 2½ to 3 tons per acre. Average oat yields are from 35 to 45 bushels per acre but higher yields have been reported.

The moderately rolling slopes of the Haileybury clay can be cultivated.

Phosphorus and nitrogen are generally the elements most deficient in the Haileybury soils and yields have been increased as much as 30 per cent by additions of nitrogenous and phosphatic fertilizer.

The generous addition of organic matter in the form of barnyard or green manure will benefit the land by improving soil structure, increasing the waterholding capacity and supplying nitrogen. Lime may be needed in some fields to increase the clover and alfalfa yields.

(b) *Imperfectly drained*

Hanbury Series (45,100 acres)

The Hanbury soils occupy about 8.4 per cent of the surveyed area and are widely distributed. They occur on gently rolling, dissected clay plains. The external drainage is sufficiently rapid to drain the surplus water from the cultivated land but percolation through the solum is slow.

The Hanbury soils have been formed from clay deposits similar to those described for the Haileybury soils. In some places the land contains stones and boulders rafted in by glacial ice.

All of the Hanbury soils are cleared except for woodlots where poplar and some spruce are found. Three soil types and one phase were mapped namely, clay, silty clay, silty clay loam and clay-stony phase.

The description of the virgin profile of the Hanbury clays is as follows.

A_0 — Thin layer of partially decomposed leaves; twigs, etc.

A_1 — 0–1 inches clay; very dark grey (10 YR 3/1); medium granular structure; friable consistency when dry; plastic when wet; stonefree; pH — 6.1.

A_2 — 1–9 inches silty clay; light grey (10 YR 7/2); mottled; fine platy; friable when dry, plastic when wet; stonefree; pH — 5.8.

B_1 — 9–13 inches clay; light yellowish brown (10 YR 6/4); mottled; coarse blocky; very hard when dry; very plastic when wet; stonefree; pH — 6.2.

B_2 — 13–22 inches clay; brown (10 YR 5/3); mottled; medium blocky; very hard when dry; very plastic when wet; stonefree; pH — 7.2.

C — Clay; white (10 YR 8/2); and yellowish brown (10 YR 5/4); varved; very hard when dry; very plastic when wet; stone free; calcareous; pH—7.8

Where the Hanbury clay-stony phase is mapped stones are scattered over the surface which interfere with cultivation. The stones, mostly granites, are very numerous and may also occur through the profile.

Agriculture

The Hanbury soils are among the most fertile soils in the area and are used for mixed farming and dairying. The land is well suited to hay which produces 2 to 3 tons of mixed hay to the acre. Good stands of red clover have been observed and high yields of alfalfa have been produced. Oats yield on the average 60 to 70 bushels per acre and peas 20 to 25 bushels per acre. The growth of timothy for seed is important in the area and good yields are obtained.

These soils, although quite productive, are usually low in organic matter and nitrogen. Additions of barnyard manure will help to maintain the organic matter and nitrogen contents and will also improve the physical condition of the soil. Crop response is obtained from the use of nitrogenous and phosphatic fertilizers.

Erosion and poor physical condition are the most serious problems on these soils. Sheet erosion is usually not serious but where run-off water is concentrated into narrow runways, fully formation with its self evident damage to the land occurs. A permanent cover of grass or trees will do much to prevent the formation of new gullies and will help to impede the widening of old gullies. Due to heavy texture, these soils are difficult to work and must be cultivated at optimum moisture conditions. If the soil is worked when too wet it will puddle and bake, the bad effect of which cannot be overcome during the growing season. The tramping of cattle on the wet clay has similar effects and clover and grass plants are often injured and killed On the other hand, if the soil is too dry the soil breaks into massive clods when cultivated and is unsuitable for a seed-bed. Poor physical condition can be improved by increasing the organic matter content and by fall ploughing which permits the surface to be granulated by frost.

The stony phase of Hanbury clay is generally too stony to cultivate and is used for rough pasture. The stones could be removed by heavy machinery but this may prove to be uneconomical.

(c) *Poor drainage*

New Liskeard Series (66,900 acres)

Occupying 12.6 per cent of the surveyed area, the New Liskeard series covers more of the district than any other series. Drainage is poor because the percolation of water through the clay is slow and the excess water runs off very slowly because of the flatness of the land. The tree cover in the woodlots is chiefly composed of poplar. Silver birch, spruce and alder occur in smaller amounts.

Clay (55,400 acres), silty clay loam (10,700 acres), and clay-stony phase (800 acres) have been mapped in the New Liskeard series. A profile description of a cultivated New Liskeard clay is given below.

A_c — 0–8 inches clay; very dark brown (10 YR 2/2); fine nuciform structure; very hard consistency when dry; very plastic when wet; stonefree; pH — 6.8.

G_1 — 8–14 inches clay; greyish brown (10 YR 5/2); very mottled; mottles are strong brown (7.5 YR 5/8); coarse blocky; very hard when dry, very plastic when wet; stonefree; pH — 7.0.

G_2 — 14–23 inches clay; light brownish grey (10 YR 6/2); very mottled; massive; very hard when dry; very plastic when wet; stonefree; pH — 7.2.

C — Clay; white (10 YR 8/2) and yellowish brown (10 YR 5/4); varved; very hard when dry; very plastic when wet; stonefree; calcareous; pH — 7.8.

The G_2 horizon is not always present and the profile often consists of an A_c horizon and a greyish brown G horizon about 12 inches deep. At one time the New Liskeard soils were covered by a deep layer of decomposed organic material. However, this layer has been destroyed by fire and is no longer present.

Agriculture

A large proportion of the New Liskeard soils is under cultivation. Mixed farming

New Liskeard clay is poorly drained and typical of the Dark Grey Gleisolic Soils.

is dominant although considerable dairying is practised while on some farms peas and the growing of timothy for seed constitute the main cash crops. These soils produce large quantities of hay which is sold when the market value of the crop is high.

The New Liskeard soils are fertile and produce good yields of hay and oats. Hay yields of 4 tons to the acre have been reported and oat yields average 80 bushels per acre. Excess moisture in the spring retards planting and a wet fall prevents harvesting especially on these flat, poorly drained soils. These soils should be worked under optimum moisture conditions. If the soils are worked when too wet they puddle and bake on drying, which has a poor effect on the growing crop. If the soils are cultivated when too dry they will remain too lumpy for a satisfactory seed bed.

After prolonged rainy periods during the growing season, water often remains on the land and either drowns out the growing plants or delays their growth. In order to improve surface drainage, a type of ploughing, which is often referred to as the "Richard" type, has been widely adopted on these soils with variable success. This method consists of ploughing the land up in gently sloping ridges and leaving a dead furrow between the ridges. The excess water runs off these ridges into the furrows and down to the drainage outlet. Considerable skill is needed in order to obtain good

Timothy being grown for seed on the New Liskeard soils.

results. For best results it is advisable to make the furrow as narrow as possible with the sides rising at about a 45 degree angle so that only a small amount of the sticky subsoil is exposed. The ridges should not be too rounded as this causes too great an accumulation of surface soil in the centre of the ridge and exposes the subsoil in broad furrows. Fields with too rounded ridges and broad furrows give uneven and patchy growth. Heavy manuring along the furrows will result in a more even growth of crops.

A more efficient way to remove excess water than by the above method of plough-

Buckwheat, a late seeded crop, being grown on the New Liskeard soils.

ing is by underdrainage. However, the cost of installation of a good tile drainage system may be high and monetary returns from the crops grown may not be great enough to make it profitable.

Yields on the undrained New Liskeard soils can be increased by additions of fertilizers high in nitrogen and phosphorus. Although the land, for the most part, is neutral in reaction areas exist that might benefit from the use of lime. The need for lime should be determined by a soil test.

The stony phase of the New Liskeard clay is too stony for cultivation and is probably best used for trees or rough pasture.

(*d*) *Very poorly drained*

Milberta Series (8,900 acres)

The Milberta series is included with the shallow organic group of soils and occurs in association with the New Liskeard series or the Muck soils.

The topography is level to depressional and the external drainage is very slow. Percolation of water through the solum is very slow. The natural vegetation consists mainly of poplar, spruce and alder.

A commonly occurring Milberta muck soil is described below.

A_0 — 12–0 inches well decomposed organic material; very dark brown (10 YR 2/2); pH — 6.5.

G — 0–9 inches clay; grey (10 YR 6/1); mottled; mottles are yellow (2.5 Y 7/6); massive structure; very hard consistency when dry; very plastic when wet; stonefree; pH — 7.0.

C — Clay; white (10 YR 8/2); and yellowish brown (10 YR 5/4); varved; very hard when dry, very plastic when wet; stonefree; calcareous; pH — 7.8.

The mottles in the solum are not so numerous as those occurring in the solum of the New Liskeard soils.

Agriculture

Much of the Milberta soil is still in forest. Small areas are used for pasture and in a few places spring grains are being grown.

The muck surface of the soil is high in nitrogen and lodging of grain is common. Phosphorus and potassium are low and these elements should be supplied by fertilizers in order to ensure better crop growth.

Cleared areas of Milberta muck that are to be cropped should undergo controlled burning in order to get rid of the excess organic matter. Sufficient humus should be left so that it can be mixed with the underlying mineral material. The organic matter incorporated into the mineral soil will keep it in good physical condition. This soil can then be used in the same way as the New Liskeard soils.

5. CALCAREOUS CLAY

In some areas there is a deposit of dark yellowish brown clay 4 feet thick over the varved clay. Three series have been mapped which have developed on these materials. They are the Dack, McCool and Thornloe series, the well drained, imperfectly drained and poorly drained members respectively of the Dack catena.

(a) *Well drained*

Dack Series (4,600 acres)

Dack clay most commonly occurs in the northern part of the surveyed area and is considered to be a Brown Forest soil. The parent material consists of dark yellowish brown clay that is very calcareous. Compared with the parent material of the Haileybury soils the Dack clay is considerably heavier in texture and generally has a clay content of about 90 per cent.

The soil profile given below was taken in a woodlot and is representative of the Dack clay soils.

A_0 — Thin layer of partially decomposed leaves, twigs, etc.

A_1 — 0–1 inches clay; dark greyish brown (10 YR 4/2); fine nuciform structure; hard consistency when dry; very plastic when wet; stonefree; pH — 6.2.

B_1 — 1–11 inches clay; dark brown (7.5 YR 4/2); medium blocky; very hard when dry; very plastic when wet; stonefree; pH — 5.8.

B_2 — 11–19 inches clay; dark brown (10 YR 4/3); medium nuciform; very hard when dry, very plastic when wet; stonefree; pH — 6.8.

C — Clay; dark yellowish brown (10 YR 4/4); massive; very hard when dry; very plastic when wet; stonefree; calcareous; pH — 8.0.

Since the land is severely dissected by many streams the topography is steeply rolling and generally the soil is not cultivated. Run-off is very rapid and the internal drainage is very slow. The tree vegetation is poplar with lesser amounts of silver birch, spruce and pine.

Free carbonates are sometimes found in the solum.

Agriculture

Because of the steep topography little of the Dack clay is under cultivation. The steep slopes are under a permanent tree cover. Where slopes are more gentle the land is generally used for pasture.

Dack soils are fertile but difficult to handle. Farm implements cannot be used on the steep slopes and since the texture is heavy the soil is plastic and stickey.

The Dack soil should be used for forestry or pastures.

(b) *Imperfectly drained*

McCool Series (6,800 acres)

Soils of the McCool series occur mostly in the vicinity of Krugersdorf. They occur on gently undulating land. Both the external and internal drainages are slow;

the mottling in the subsoil is the result of imperfect drainage. The trees commonly found on the McCool soils are poplar and silver birch.

Only one soil type, the McCool clay has been mapped in this series and it is described below.

A_c — 0–5 inches clay; dark greyish brown (10 YR 4/2); fine nuciform structure; friable consistency when dry; very plastic when wet; stonefree; pH — 6.0.

B_1 — 5–9 inches clay dark brown (7.5 YR 4/2); mottled; blocky; very hard when dry; very plastic when wet; stonefree; pH — 6.2.

B_2 — 9–15 inches clay; dark brown (10 YR 4/3); mottled; medium nuciform; very hard when dry; very plastic when wet; stonefree; pH — 7.0.

C — Clay; dark yellowish brown (10 YR 4/4); massive; very hard when dry; very plastic when wet; stonefree; calcareous; pH — 8.0.

The horizons of the McCool soils are not well defined and much of the mottling is masked by the dark brown colour. In some places a thin C_1 horizon occurs just below the B_2 horizon which is calcareous, stonefree and brown (10 YR 5/3) in colour. Free carbonates sometimes occur in the B_2 horizon.

Agriculture

Approximately half of the area occupied by McCool clay is under cultivation. General farming is generally practised on this heavy clay and field crops grown include mixed hay and oats.

McCool soils are moderately to slightly acid, fertile, but very difficult to handle. They contain more clay than most of the soils in the district and consequently are very plastic and sticky. Ploughing and other cultivation practices require much power and can be carried out only when the land has an optimum amount of moisture.

The maintenance of good structure is of prime importance on this soil. Apart from cultivating at proper moisture conditions, the granulated structure can be maintained or improved by draining, by liming and by generous addition of organic matter.

Although no definite data have been obtained on the yields of the different crops the following estimates may be given: mixed hay 1½ to 2½ tons per acre; oats 30 to 40 bushels per acre. The yields on the McCool soils are greatly dependent on the proper amount of rainfall.

(*c*) *Poorly drained*

Thornloe Series (5,800 acres)

The largest areas of Thornloe soils occur in Henwood and Evanturel Townships. The land has a very gentle slope and is not susceptible to erosion. The external drainage is slow and the internal drainage is very slow. Poplar dominates in the woodlots and small numbers of spruce and alder also occur.

Thornloe clay is the only type mapped. A description of the cultivated profile follows.

A_c — 0–8 inches clay; very dark brown (10 YR 2/2); fine nuciform structure; friable consistency when dry, very plastic when wet; stonefree; pH — 6.5.

G_1 — 8–12 inches clay; greyish brown (10 YR 5/2); very mottled; coarse blocky; very hard when dry; very plastic when wet; stonefree; pH — 6.7.

G_2 — 12–18 inches clay; greyish brown (10 YR 5/2); very mottled; massive; very hard when dry; very plastic when wet; stonefree; pH — 6.8.

C — Clay; dark yellowish brown (10 YR 4/4); massive; very hard when dry, very plastic when wet, stonefree; calcareous; pH — 8.0.

Because of the high moisture holding capacity of the clay the lower horizons of the soil are moist almost all through the year, although there is little colour difference between the G_1 and G_2 horizons, differences in structure are quite evident.

Agriculture

At one time nearly all of the Thornloe clay was under cultivation but much of the soil is no longer cultivated because of poor drainage and poor physical conditions. Such abandoned areas are now covered with alders and willows.

The soil where cultivated, is commonly used for general farming and the principal crops grown are oats and mixed hay. Yields are dependent on the proper amount of rainfall.

Drainage problems are serious on the Thornloe soils since the clay is comparatively impervious and the land is flat. Rounded ploughing or tile drainage can be used to get rid of excess water as quickly as possible.

Great care should be taken to keep the cultivated soil in good physical condition. Additions of organic matter will help in maintaining soil structure.

F. SOILS DEVELOPED FROM ORGANIC MATERIAL

(a) *Very poorly drained*

Muck (53,900 acres)

Muck soils occupy about 10 per cent of the surveyed area. These organic deposits are formed mainly by the decomposition of grasses, sedges and wood debris. The upper 12 to 15 inches are well decomposed. The black muck rests on varved clay, silt loam or sand. The muck varies from 18 inches to 10 feet deep but is generally about 5 feet deep.

Agriculture

Few of the muck soils are cultivated, most of them are covered by tree vegetation composed of spruce, willow and alder. In the Little Clay Belt muck soils have not been used to any extent for vegetables because of the long, cold winters. The cultivated areas are used for pasture or growing of vegetables for home consumption. The muck may be used as a source of organic matter for the mineral soils.

Muck soils are high in nitrogen and low in phosphorus and potassium. Additions of fertilizer high in these elements are required to obtain yields as high as in the good mineral soils.

Peat (600 acres)

The peat areas occur in depressions where the water is ponded and where plant remains have accumulated for a long time. The organic material is only partly decomposed and has a brown colour. They are generally not used for cultivated crops.

G. SOIL COMPLEXES

Soil complexes are mapped where two or more soils series occur in association with one another and which cannot be separated on the soil map. Only one complex is mapped. This complex is called Timiskaming.

Timiskaming Complex (71,400 acres)

The Timiskaming complex is moderately to steeply rolling and the drainage is variable. The various soil series included in the complex are Haileybury, Hanbury, New Liskeard, Milberta and Muck among rock outcrop. The natural vegetation

Jack pine are common on the dry, rock outcrops.

consists mainly of poplar, jack pine, white pine, and some silver birch. Blueberry plants are commonly found on the rock.

The bedrock is exposed over much of the Timiskaming complex and it cannot be used for agriculture. In a few areas there is enough grass so the land can be used for rough pasture.

H. SOILS DEVELOPED ON SHALLOW TILL OVER BEDROCK

In a few sections in the south eastern part of the surveyed area limestone bedrock is within one foot of the surface and may or may not be covered by a thin layer of till. The Brentha series is mapped in places such as these.

Brentha Series (2,700 acres)

Brentha loam (1,700 acres) and Brentha sandy loam (1,000 acres) are the members of the Brentha series. The topography is gently sloping and the drainage is good. The natural vegetation consists of jack pine, spruce, silver birch, poplar and alder. Soils of the Brentha series belong to the Podzol Great Soil Group.

The following is a general description of Brentha loam.

A_0 — 1–0 inches raw humus and roots; very dark brown (10 YR 2/2); pH — 5.8.

A_1 — 0–1 inches loam; very dark grey (10 YR 3/1); fine granular structure; friable consistency; moderately stony; pH — 6.2.

A_2 — 1–2 inches loam; white (10 YR 8/2); weak platy; friable; moderately stony; pH — 5.6.

B_2 — 2–6 inches loam; yellowish brown (10 YR 5/8); weak medium nuciform; friable; moderately stony; pH — 6.5.

B_3 — 6–11 inches loam; brownish yellow (10 YR 6/6); weak medium nuciform; friable; moderately stony; pH — 6.6.

D — Limestone bedrock.

Agriculture

The most common uses and probably the best uses for these soils are grazing and forestry. Since the till is less than a foot deep the land cannot be cultivated. It is possible that the limestone in these locations could be quarried and crushed for use as agricultural limestone.

PART IV

AGRICULTURAL METHODS AND MANAGEMENT

Because of the climate only a limited number of crops can be grown in this region. Timothy, clover, alfalfa, oats, barley, wheat and pasture are the main crops grown. Most of these crops are used for livestock feed. Vegetables and some small fruits are grown on a minor scale for family needs and the surplus is sold to nearby markets. A small acreage of peas is grown for the cannery located at New Liskeard. Potatoes are the main cash crop particularly on the acid silt loam and sandy loam soils.

Oats is the main grain crop grown in the New Liskeard-Englehart Area.

Crops are generally grown in a four-year rotation. The first year of the rotation includes: oats, barley, barley-oats mixture, or potatoes. The second year oats or barley—oats mixture are seeded down with a mixture of red clover, alsike clover, timothy and sometimes alfalfa. Hay is harvested during the two following years and hay aftermaths may be used to supplement the pasture. On farms where there is little or no permanent pasture the rotation may be lengthened to six years and the hay fields used as pastures for the last two years.

All the farm manure is spread on the land. The quantity of manure used varies greatly depending on the number of cattle kept. On farms where large quantities of manure are used annually the soils are rich in humus, have a high fertility level and good physical condition.

Creameries, such as this, process raw milk for local consumption.

Very little commercial fertilizer is used by the farmers because of the cost of transportation. High cost of transportation has also prevented the use of lime on the farms.

Soil Management

There are specific management requirements for each soil type which if neglected result in disappointing yields. These requirements are discussed in the following paragraphs.

Drainage

No poorly drained soil can be consistently productive. The natural drainage of many of the soils in the surveyed area is satisfactory but almost 35 per cent of the total land area is occupied by poorly drained and very poorly drained soils. On these poorly drained soils tile or surface ditches must be used. Although tile drains are effective, in many areas the cost of installation is prohibitive since there are few cash crops to pay for the tile. However, where deep rooted plants such as alfalfa are to be grown, tile drainage may be necessary. Properly installed surface ditches will provide adequate drainage for the crops commonly grown in the area. The use of surface ditches will permit earlier cultivation and the use of heavy farm implements during the usually wet harvesting season.

Poor drainage is one of the main problems that has to be dealt with in the use of the soils of the New Liskeard Englehart Area. The distribution of the various drainage classes is shown in Figure 7 and their acreage in Table 4.

A family garden in the New Liskeard area.

TABLE 4

DRAINAGE OF THE SOILS OF THE NEW LISKEARD-ENGLEHART AREA

Drainage Class	Acreage	% of Total
Good	131,400	24.6
Imperfect	94,100	17.6
Poor	129,500	24.2
Very Poor	63,400	11.8
Variable	116,300	21.7

Fertility

The removal of crops from the land year after year and the leaching action of rain depletes the soil of plant nutrients. However, since large acreages of soil building grasses and legumes are being grown in the surveyed area this depletion has not been as severe as in other districts where these crops are not grown.

Soils tests conducted on some of the soils of the Little Clay Belt show them to be low in nitrogen and phosphorus. Additions of nitrogenous and phosphatic fertilizers to the Falardeau, New Liskeard, Hailbeybury and Cane soils have increased yields of oats 20 to 50 per cent. In some instances crop yields have been doubled through the use of commercial fertilizer. The phosphate available to the plant can be increased by using superphosphate or any mixed fertilizer high in phosphate.

Adequate supplies of nitrogen and decaying organic matter in the soil are necssary to obtain vigorous crop growth and maximum productivity. Unlike phosphorus and potassium, nitrogen is not a constituent of the soil minerals. It comes largely from leguminous organic matter. It is therefore important to grow crops that will leave in the soil a good supply of organic matter high in nitrogen. Nitrogen can be purchased in mixed fertilizer and can be used at a profit when grain prices are high. In general,

NATURAL DRAINAGE

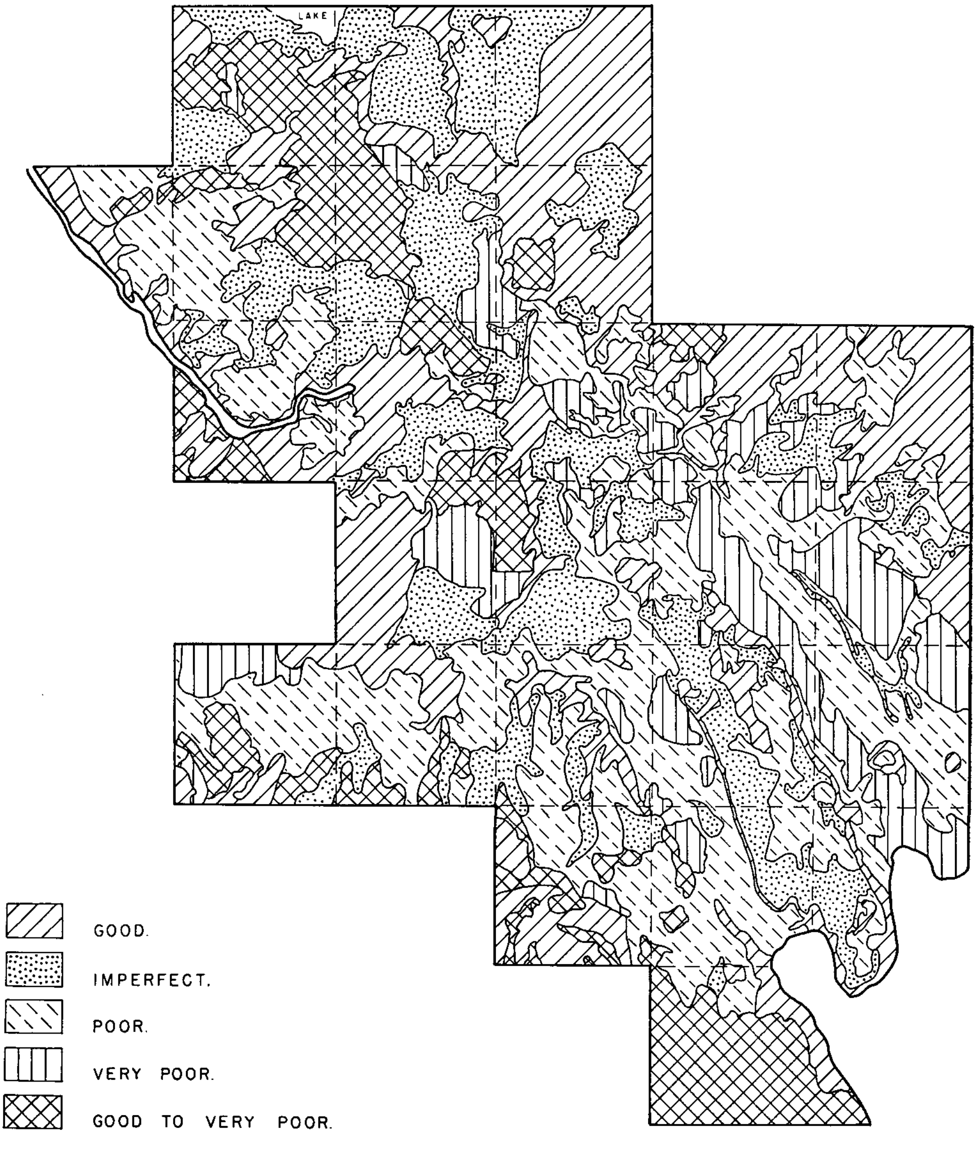


FIG. 7. Outline Map Showing Distribution of Drainage Classes.

Gully-erosion is serious on the lacustrine clay and silt soils when not protected.

however, it is better to supply most of the nitrogen needed for the grain crops by growing legumes. In this way the nitrogen is supplied and the soil is kept in good physical condition.

Lime is deficient in many of the soils in the Little Clay Belt. Lime is required on the soils of the Wabi, Thwaites and Blanche catenas and on the coarse textured soils. Soil tests should be used to determine the need for lime on the other soils in the surveyed area. The limestone rock in the area could probably be used as a source of lime if crushed and finely pulverized. For quick effects, it is desirable to use a product the most of which will pass through a 100-mesh screen.

Erosion

In the New Liskeard-Englehart Area as a whole, erosion is not a major problem. The steeply sloping soils such as the Haileybury, Dack, Evanturel and Blanche which are very susceptible to gully erosion, are usually kept under a permanent cover of grass or trees. This is the only solution to the erosion problem on the steeply sloping land.

The more gentle slopes of the Hanbury, Blanche, Casey, Earlton and McCool soils are subject to harmful erosion but good farming methods will give satisfactory control.

Any or all of the following practices may be needed: (1) protecting the soil with a vegetative convering as much of the year as practicable, (2) fertilizing the soil in such a way as to encourage vigorous plant growth, (3) ploughing down all crop residues, (4) ploughing in the spring rather than in the fall, (5) building grass waterways. In most cases, soil management on the gently rolling soils is such that erosion losses are kept at a minimum.

Physical Condition

Soils that are to produce maximum crop yields must be kept in good physical condition. The physical condition of many of the soils in the New Liskeard-Englehart Area is good because of the large acreages of soil building grasses and legumes that are grown.

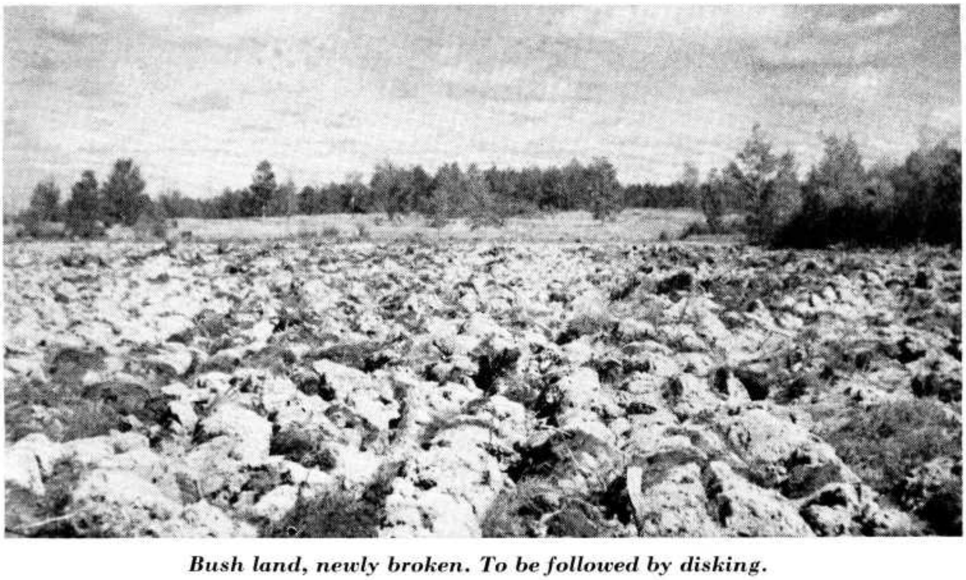
The use of these crops, the turning down of crop residues, the tilling of the soil under the proper moisture conditions, and the addition of barnyard manure to the soil are effective ways of maintaining good physical condition in the soil.

The above practices should be continued on all the soils of the area, particularly the Falardeau soils whose structure has severely deteriorated in many locations.

Land Clearing

Although this area has been settled for 50 years much of the land is uncleared, some of which is suitable for potential settlement. The establishment of farms in much of the region requires the removal of the forest cover before cultivation of the soil is possible. The rapid, efficient and inexpensive improvement of these lands is essential to the establishment of any future settlement on a full-time farming basis.

In some instances lack of cash or of power equipment have made it necessary for farmers in bush areas to improve their farms by the slow laborious hand method—the axe and grub hoe. Farmers using hand methods are able to improve 4 to 8 acres of land per year depending on the density and size of tree cover. At this rate it is obvious



Bush land, newly broken. To be followed by disking.

Weedy pasture consisting of Ox-eye Daisy.

that many years must elapse before a farming unit of economic size can be developed.

The machinery used to improve bush land consists of the crawler tractor to provide power, the brush cutter, the brush piler and the breaking plough. The best method of land clearing seems to entail the use of the brush cutter.

The brush should be cut while the leaves are on the trees since roots decay more rapidly if clearing is done during the summer months. The debris is then piled and disposed of by burning. During the same season the land is broken with the breaker plough and prepared for crop. The cost can be reduced by eliminating the piling of the debris. When the debris is not piled it is left on the land for two years. During this time the land is not pastured and a thick mat of grass is allowed to form. In the spring of the second year the field is burned; the accumulated dead grass aiding in securing a good burn. Unfortunately by avoiding the piling of the debris the use of the land has been postponed for two years. After the removal of slash by burning the land is broken and cultivated.

Certain practices used in breaking and preparing the land for crop aid in the elimination of root picking. Good results have been obtained by breaking to a depth of 10 inches during the month of September. This deep breaking allows the roots to be broken up and turned well under. During the same fall the land should be disked with a heavy disk and packed. By using a one-way disk the land can be seeded the following spring. Seeding should consist of a legume along with a grain nurse crop for soil improvement purposes. The legume does not need to be ploughed down for 3 or 4 years.

The bulldozer has been used by some farmers for the removal of bush but it is not as efficient as the brush cutter because:

1. It is slower than the brush cutter.
2. It removes a large part of the topsoil.

3. Burning is difficult because of the soil left clinging to the roots and stumps.

Once the land is cleared organic matter and fertilizer should be added to the soil to increase and maintain soil fertility.

Weed Control

Although there is not the variety of weeds in the surveyed area as there is in southern Ontario there are a number that are a menace to agriculture. The weeds most commonly occurring are Perennial Sow Thistle, Twitch or Couch grass, Sheep Sorrel, Leafy Spurge, Ox-eye Daisy, Canada Thistle, and Perennial Vetch.

There are many methods of eradicating weeds but only a few of those most applicable to conditions in the area are discussed here. Crop rotation is of utmost importance in controlling weeds. A rotation of crops should be adopted that will allow the frequent use of the cultivator, the cutting of weeds before seeding and the introduction of smother and hoed crops. A rotation that may be recommended for the area is a five year rotation of grain, potatoes, or other intertilled crop, grain seeded down, hay, hay or pasture. Each farmer must select the rotation most suited to his conditions. The rotation should provide ample opportunity to thoroughly work the land and thereby control weeds satisfactorily.

Summer fallowing is extremely effective in controlling weeds particularly Perennial Sow Thistle. Summer fallowing for the whole season is objectionable because it is costly, a season's crop is lost and considerable labour is required. It is usually better to fallow only for a portion of the season either before putting in a hoed or smother crop or immediately after breaking up meadows or pastures.

Many weeds can be held in check by seeding the land to clover and grass. Cutting the hay early will prevent most weeds from going to seed. The judicious use of fertilizers will free pastures from many weeds. Weeds can be killed by a smother crop. A quick-growing crop such as buckwheat or rape will form a dense shade that deprives the weeds of light and air and they cannot continue to grow. Smother crops give best results when they follow intensive cultivation.

A flock of sheep will do much to keep a farm free from weeds. Sheep will, even when good pasture is provided for them, nip off the blooms and fresh growing parts of many of the common weeds. Thorough cultivation with a systematic rotation of crops combined with the maintenance of as many sheep as can be kept to advantage is a certain and profitable method of keeping weeds under control.

Many chemical weed killers are now on the market. Some of them are very effective and they can often be used to kill patches of such perennial weeds as Field Bindweed, Perennial Sow Thistle and Leavy Spurge. They can be used to kill many roadside and waste place weeds economically but their cost may make their use on large areas prohibitive.

Estimated Yields and Adaptability Ratings.

Although crop yields vary considerably from year to year and from farm to farm on the same soil type an attempt has been made to arrive at the average yield of the main crops grown on each soil type in the area surveyed. These average acre-yields, which are based on information obtained from the farmers, experimental data and personal estimates, are compiled in Table 5. They represent average estimated yields for a number of years under prevailing farm practices. No yield has been given where a crop is not commonly grown or where information is incomplete.

TABLE 5

ACRE YIELDS OF THE MORE IMPORTANT CROPS OF THE NEW LISKEARD-ENGLEHART AREA

Soil Types	Hay of Clover and Timothy Tons	Oats Bu.	Barley Bu.	Potatoes Bu.
Blanche silt loam	2	30	30	—
Brethour silt loam	2½	35	30	—
Bucke sandy loam	¾	25	—	150
Bucke sand	½	20	—	150
Cane silty clay loam	2¾	40	35	200
Cane silt loam	2½	40	35	200
Casey silt loam	2½	40	—	250
Earlton silt loam	3	75	—	350
Earlton silty clay loam	3	75	—	350
Englehart sandy loam	1	25	—	150
Falardeau silty clay loam	2¾	35	35	—
Falardeau silt loam	2½	35	30	—
Hanbury clay	3½	50	45	—
Hanbury silty clay	3½	50	45	—
Hanbury silty clay loam	3¼	50	45	—
McCool clay	3½	45	—	—
New Liskeard clay	4	60	—	—
New Liskeard silty clay loam	4	60	—	—
Otterskin sandy loam	1	25	—	150
Pense silty clay loam	2¾	40	—	400
Pense silt loam	2½	40	—	450
Thornloe clay	2	35	—	—
Wendigo sand	½	10	—	150

In Tables 6, 8, 10, 12, 14, and 16 the adaptability ratings are given for all the soils in the surveyed area. The suitability of the soils to produce crops will vary according to the physical and chemical characteristics of each soil. Comparative ratings for the different soils according to their capability to produce crops commonly grown in the surveyed area are given in descriptive terms because of the lack of definite information on yields of crops for most of the soils. No rating is given where a crop is not commonly grown.

TABLE 6

CROP ADAPTABILITY RATINGS FOR GOOD CROPLAND*

Soil Type	Oats	Mixed Grains	Alfalfa	Red Clover	Alsike	Timothy	Potatoes	Pasture
Earlton silt loam	G	G	G–F	G	G	G	F	G
Earlton silty clay loam	G	G	G–F	G	G	G	F	G
Hanbury clay	G–F	G–F	G–F	G	G	G	F–P	G
Hanbury silty clay	G–F	G–F	G–F	G	G	G	F–P	G
Hanbury silty clay loam	G–F	G–F	G–F	G	G	G	F–P	G

* The crop adaptability rating for each soil is as follows:

G-Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P—Poor

TABLE 7

ACREAGES OF GOOD CROPLAND

Soil Type	Acreage	% of Total	Soil Problem
Earlton silt loam	11,500	2.3	Drainage
Earlton silty clay loam	5,600	1.0	Drainage
Hanbury clay	29,000	5.4	Drainage
Hanbury silty clay	11,800	2.2	Drainage
Hanbury silty clay loam	3,800	0.7	Drainage
Total	61,700	11.6	

TABLE 8

CROP ADAPTABILITY RATINGS FOR GOOD TO FAIR CROPLAND*

Soil Type	Oats	Mixed Grains	Alfalfa	Red Clover	Alsike	Timothy	Potatoes	Pasture
New Liskeard silty clay loam	G–F	G–F	F	G–F	G–F	G–F	P	G–F
New Liskeard clay	G–F	G–F	F	G–F	G–F	G–F	P	G–F
Haileybury clay	F–P	F–P	G–F	G–F	G–F	G–F	P	G–F
Haileybury silty clay	F–P	F–P	G–F	G–F	G–F	G–F	P	G–F
Haileybury silty clay loam	F–P	F–P	G–F	G–F	G–F	G–F	P	G–F
Evanturel silty clay loam	F–P	F–P	G–F	G–F	G–F	G–F	P	G–F
Evanturel silt loam	F–P	F–P	G–F	G–F	G–F	G–F	P	G–F

* The crop adaptability rating for each soil is as follows:

G—Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P—Poor.

TABLE 9

ACREAGES OF GOOD TO FAIR CROPLAND

Soil Type	Acreages	% of Total	Soil Problem
New Liskeard silty clay loam	10,700	2.0	Drainage
New Liskeard clay	55,400	10.5	Drainage
Haileybury clay	4,900	0.9	Soil erosion, rough topography
Haileybury silty clay	24,900	4.7	Soil erosion, rough topography
Haileybury silty clay loam	3,500	0.6	Soil erosion, rough topography
Evanturel silty clay loam	6,800	1.3	Soil erosion, rough topography
Evanturel silt loam	9,800	1.9	Soil erosion, rough topography
Total	115,800	21.9	

TABLE 10

CROP ADAPTABILITY RATINGS FOR FAIR CROPLAND*

Soil Type	Oats	Mixed Grains	Alfalfa	Red Clover	Alsike	Timothy	Potatoes	Pasture
McCool clay	F	F	F	F	G–F	F	P	F
Cane silty clay loam	F	F	F–P	F	F	F	F–P	F
Cane silt loam	F	F	F–P	F	F	F	F–P	F
Pense silty clay loam	F	F	P	F–P	F	F–P	G	F–P
Pense silt loam	F	F	P	F–P	F	F–P	G	F–P
Casey silt loam	F	F	P	F–P	F	F–P	G	F–P

* The crop adaptability rating for each soil is as follows:

G—Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P—Poor

TABLE 11

ACREAGES OF FAIR CROPLAND

Soil Type	Acreage	% of Total	Soil Problem
McCool clay	6,800	1.3	Drainage
Cane silty clay loam	7,300	1.4	Drainage
Cane silt loam	20,400	3.9	Drainage
Pense silty clay loam	1,900	0.4	Acidity, drainage
Pense silt loam	2,900	0.5	Acidity, drainage
Casey silt loam	1,300	0.2	Acidity, drainage
Total	40,600	7.7	

TABLE 12

CROP ADAPTABILITY RATINGS FOR FAIR TO POOR CROPLAND*

Soil Type	Oats	Mixed Grains	Alfalfa	Red Clover	Alsike	Timothy	Potatoes	Pasture
Blanche silt loam	F–P	F–P	F–P	F–P	F	F	F–P	F
Thwaites silt loam	F–P	F–P	F–P	F–P	F	F	F–P	F
Falardeau silty clay loam	F–P	F–P	P	F–P	F–P	F	F	F
Falardeau silt loam	F–P	F–P	P	F–P	F–P	F	F	F
Thornloe clay	F–P	F–P	F–P	F–P	F	F	P	F–P

* The crop adaptability rating for each soil is as follows:

G—Good, G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P-Poor

TABLE 13

ACREAGES OF FAIR TO POOR CROPLAND

Soil Type	Acreages	% of Total	Soil Problem
Blanche silt loam	6,100	1.1	Soil erosion, acidity
Thwaites silt loam	2,400	0.4	Soil erosion, acidity
Falardeau silty clay loam	12,500	2.4	Drainage, acidity
Falardeau silt loam	3,600	0.7	Drainage, acidity
Thornloe clay	5,800	1.0	Drainage, acidity
Total	30,400	5.6	

TABLE 14

CROP ADAPTABILITY RATINGS FOR POOR CROPLAND*

Soil Type	Oats	Mixed Grains	Alfalfa	Red Clover	Alsike	Timothy	Potatoes	Pasture
Bucke sandy loam	F–P	F–P	P	P	F–P	P	F–P	F–P
Bucke sand	P	P	P	P	F–P	P	P	F–P
Otterskin sandy loam	P	P	P	P	F–P	P	P	F–P
Englehart sandy loam	P	P	P	P	P	P	P	P

* The crop adaptability rating for each soil is as follows:

G-Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor; P—Poor.

TABLE 15

ACREAGES OF POOR CROPLAND

Soil Type	Acreage	% of Total	Soil Problem
Bucke sandy loam	1,200	0.2	Fertility, acidity
Bucke sand	2,200	0.4	Fertility, acidity
Otterskin sandy loam	11,500	2.2	Drainage, fertility
Englehart sandy loam	7,700	1.3	Drainage, fertility
Total	22,600	4.1	

TABLE 16

CROP ADAPTABILITY RATINGS FOR SUBMARGINAL CROPLAND*

Soil Type	Oats	Mixed Grains	Alfalfa	Red Clover	Alsike	Timothy	Potatoes	Pasture	Suggested Use
Wendigo sandy loam	P	—	—	—	—	—	F	P	Forestry
Wendigo sand	P	—	—	—	—	—	F-P	P	Forestry
Hanbury clay-stony phase	—	—	—	—	—	—	—	F-P	Forestry, Pasture
New Liskeard clay-stony phase	—	—	—	—	—	—	—	F-P	Forestry, Pasture
Milberta muck	—	—	—	—	—	—	—	F-P	Forestry
Timiskaming complex	—	—	—	—	—	—	—	F-P	Forestry
Dawson loam	—	—	—	—	—	—	—	P	Forestry
Dawson sandy loam	—	—	—	—	—	—	—	P	Forestry
Dymond loam	—	—	—	—	—	—	—	P	Forestry
Dymond sandy loam	—	—	—	—	—	—	—	P	Forestry
Wabi loam	—	—	—	—	—	—	—	P	Forestry
Wabi sandy loam	—	—	—	—	—	—	—	P	Forestry
Coutts loam	—	—	—	—	—	—	—	P	Forestry
Coutts sandy loam	—	—	—	—	—	—	—	P	Forestry
Brentha loam	—	—	—	—	—	—	—	P	Forestry
Brentha sandy loam	—	—	—	—	—	—	—	P	Forestry
Mallard sandy loam	—	—	—	—	—	—	—	—	Forestry
Mallard sand	—	—	—	—	—	—	—	—	Forestry
Mallard gravelly sand	—	—	—	—	—	—	—	—	Forestry
Kenabeek sandy loam	—	—	—	—	—	—	—	—	Forestry
Kenabeek sand	—	—	—	—	—	—	—	—	Forestry
Sutton Bay loam	—	—	—	—	—	—	—	—	Forestry
Sutton Bay sandy loam	—	—	—	—	—	—	—	—	Forestry
Wendigo gravelly sand	—	—	—	—	—	—	—	—	Forestry
Moose loam	—	—	—	—	—	—	—	—	Forestry
Moose sandy loam	—	—	—	—	—	—	—	—	Forestry
Henwood sand	—	—	—	—	—	—	—	—	Forestry
Elk Pit sand	—	—	—	—	—	—	—	—	Forestry
Muck	—	—	—	—	—	—	—	—	Forestry
Peat	—	—	—	—	—	—	—	—	Forestry

*The crop adaptability rating for each soil is as follows: G—Good; G-F—Good to Fair; F—Fair; F-P—Fair to Poor, P-Poor.

TABLE 17

ACREAGES OF SUBMARGINAL CROPLAND

Soil Type	Acreage	% of Total	Soil Problem
Brentha loam	1,700	0.3	Shallowness, droughtiness
Brentha sandy loam	1,000	0.2	Shallowness, droughtiness
Coutts loam	100	0.02	Stoniness, fertility
Coutts sandy loam	1,100	0.2	Stoniness, fertility
Dawson loam	500	0.09	Stoniness, fertility
Dawson sandy loam	800	0.1	Stoniness, fertility
Dymond loam	600	0.1	Stoniness, fertility, drainage
Dymond sandy loam	500	0.09	Stoniness, fertility, drainage
Elk Pit sand	800	0.1	Fertility, droughtiness
Hanbury clay-stony phase	500	0.09	Stoniness, drainage
Henwood sand	6,100	1.1	Fertility, droughtiness
Kenabeek sandy loam	3,100	0.6	Fertility, drainage
Kenabeek sand	400	0.07	Fertility, drainage
Mallard sandy loam	1,000	0.2	Fertility, drainage
Mallard sand	2,800	0.5	Fertility, drainage
Mallard gravelly sand	400	0.07	Fertility, drainage, stoniness
Milberta muck	8,900	1.7	Drainage, fertility
Moose loam	600	0.1	Stoniness, drainage
Moose sandy loam	300	0.05	Stoniness, drainage
Muck	53,900	10.1	Drainage, fertility
New Liskeard clay-stony phase	800	0.1	Stoniness, drainage
Peat	600	0.1	Drainage, fertility
Sutton Bay loam	200	0.04	Stoniness, drainage
Sutton Bay sandy loam	300	0.05	Stoniness, drainage
Timiskaming complex	71,400	13.4	Rockiness
Wabi loam	600	0.1	Stoniness, fertility
Wabi sandy loam	300	0.05	Stoniness, fertility
Wendigo gravelly sand	6,000	1.1	Stoniness, fertility, droughtiness
Wendigo sandy loam	1,800	0.3	Fertility, droughtiness.
Wendigo sand	45,900	8.7	Fertility, droughtness.
Total	257,900	38.14	

APPENDIX

CHEMICAL AND PHYSICAL ANALYSES

Chemical and physical analyses of surface soils and soil profiles are presented in Tables 18, 19 and 20. The chemical analyses of surface soils have some value as indications of the comparative levels of available plant nutrients, while those for the profiles provide information concerning soil development.

The samples for analysis were taken after the Area was surveyed and mapped. In order to eliminate as far as possible variations due to cultural and management practices the samples of surface soils were taken from old pastures where fertilizer applications had not been made recently.

The methods used in the analyses of the profiles in Tables 18, 19, and are given in the following publication.

Matthews, B.C., Hoffman, D.W., and Eagle, D.A. "A Brown Forest-Grey Wooded Soil Sequence in the Timiskaming District in Ontario".

The methods followed in the analyses of the surface sample are as follows:

Mechanical Analysis	Bouyoucos Hydrometer Method Ref:
	Soil Science, Vol. 42, 1936, p. 225.
Reaction	Glass Electrode
Base Exchange Capacity	Schollenberger, Simon Method. Ref:
and Exchangeable Bases	Soil Science 51:1, 194 5
Organic Matter	Allison Method. Ref: Soil Science, October, 1935.

TABLE 18

CHEMICAL AND PHYSICAL ANALYSES OF SOME SOIL PROFILES FROM THE NEW LISKEARD-ENGLEHART AREA.

Soil Type and Location	Horizon	Depth (Inches)	Mechanical Analyses % Sand 1–.05 mm.	% Silt .05–.002 mm.	% Clay less than .002 mm.	pH	% Organic Matter	Exch. Capacity m.e./100gm.	Exchangeable Ca m.e./100gm.	Mg. m.e./100gm.	K m.e./100gm.	% $CaCO_3$
Dack clay	A_1	1– 4	8.4	32.6	59.0	6.3	6.4	23.01	18.92	3.54	0.499	0.11
Conc. III, Lot 7	B_1	4– 9	4.8	16.8	78.4	5.5	2.0	27.55	17.98	4.20	0.662	0.22
Dack Twp.	B_2	9–16	8.4	6.8	84.8	7.1	1.1	29.19	24.01	5.16	0.405	0.16
	C	16–21	4.3	8.2	87.6	7.8	0.7	27.73	36.56	5.51	0.434	13.18
	C	21–27	3.4	7.5	89.1	7.9	—	28.51	37.59	5.78	0.434	15.76
	C	27–33	7.6	2.6	89.8	8.0	—	26.39	36.82	4.44	0.395	16.80
	D	33–40	4.6	32.0	63.4	8.0	—	22.59	23.69	5.43	0.391	6.72
Blanche silt	A_1	0– 1	20.4	58.8	20.8	5.3	5.2	14.28	6.21	1.54	0.216	0.00
loam, Conc. III,	A_{2p}	1– 3	19.2	60.4	20.4	5.4	0.9	8.37	2.65	0.69	0.159	0.00
Lot 11	B_p	3– 6	15.4	63.0	21.6	5.4	0.9	7.86	2.10	0.44	0.174	0.00
Evanturel Twp.	A_2	6–16	14.6	64.2	21.2	5.6	0.2	6.16	1.97	0.54	0.116	0.00
	B_2	16–26	12.4	61.4	26.2	6.2	0.0	14.92	8.08	3.52	0.242	0.10
	B_{22}	26–34	11.4	52.6	36.0	6.5	—	13.74	8.74	4.62	0.200	0.11
	C	34–40	14.7	60.5	24.8	6.5	—	13.84	8.05	4.36	0.262	0.09
	C	40–46	17.5	52.9	29.6	6.9	—	11.34	7.54	4.75	0.218	0.20
	C	46–50	14.9	51.9	33.2	7.4	—	11.60	8.55	5.58	0.209	0.73
	C	8 ft.	5.6	67.3	27.1	8.0	—	8.89	8.86	4.51	0.153	13.22
Evanturel silt	A_1	0– 1	16.7	68.9	14.4	6.1	1.5	9.14	4.82	1.42	0.267	0.18
loam, Conc. IV,	A_{21}	1– 7	15.3	69.9	14.8	5.6	0.8	5.80	1.71	0.69	0.166	0.03
Lot 9	A_{22}	7–13	11.1	74.5	14.4	5.5	0.2	3.57	1.54	0.85	0.046	0.00
Evanturel Twp.	B_2	13–20	12.2	59.6	28.2	6.2	0.2	10.11	5.91	3.93	0.149	0.00
	B_3	20–25	7.4	68.5	24.1	7.4	0.4	9.78	6.76	3.81	0.124	0.17
	C	25–32	8.4	70.8	20.8	8.0	0.3	6.10	7.15	3.62	0.103	10.66
	C	32–40	11.4	63.4	25.2	8.3	0.3	6.25	14.17	3.12	0.101	13.44
	C	40–46	12.6	66.0	21.4	8.3	0.2	5.72	13.74	2.60	0.123	15.44
Haileybury clay	A_1	0– 2	9.6	47.6	42.8	5.8	6.4	24.79	16.86	3.19	0.46	0.05
Conc. IV, Lot 7	A_2	2– 5	7.2	51.4	41.4	6.0	1.6	11.95	7.00	1.24	0.29	0.03
Kerns Twp.	B_1	5– 9	6.0	36.0	58.0	5.9	0.7	22.39	12.54	4.60	0.43	0.03
	B_2	9–20	12.2	19.8	68.0	5.8	0.4	28.19	16.06	7.19	0.48	0.03
	B_3	20–29	11.0	29.0	58.0	5.9	0.4	28.65	16.12	7.30	0.50	2.06
	C	29–40	8.4	21.8	69.8	7.5	0.4	22.03	19.03	7.11	0.38	11.76
	C	40–46	4.7	63.3	32.0	7.9	0.3	21.08	28.70	4.71	0.39	5.24
	C	46–50	2.8	34.2	63.8	8.0	0.2	21.65	28.73	4.85	0.40	14.34

TABLE 19

TOTAL ANALYSIS OF SOME PROFILES FROM THE NEW LISKEARD-ENGLEHART AREA

Soil Type and Location	Horizon	Depth (Inches)	SiO_2 %	R_2O_3 %	Fe_2O_3 %	Al_2O_3 %	CaO %	MgO %	Na_2O %	K_2O %
Dack clay, Conc. III, Lot 7 Dack Twp................	A_1	1- 4	65.9	24.5	7.4	17.1	2.3	1.5	1.9	3.3
	B_1	4- 9	62.0	29.3	8.9	20.4	1.7	1.3	2.0	3.5
	B_2	9-16	59.1	32.4	9.9	22.5	2.1	1.6	2.0	3.7
	C	16-21	53.1	29.5	9.4	20.1	9.8	2.6	1.9	3.5
	C	21-27	53.3	28.9	8.9	20.1	10.8	3.0	1.3	2.7
	C	27-33	52.3	27.9	8.3	19.6	11.4	4.4	1.7	2.8
	D	33-40	62.4	26.3	6.8	19.5	4.8	2.2	2.3	2.6
Blanche silt loam, Conc. III Lot 11, Evanturel twp.......	A_1	0- 1	76.7	15.1	2.8	12.3	2.0	0.8	2.7	2.6
	A_{2p}	1- 3	76.4	15.4	2.6	12.8	2.0	0.9	2.8	2.7
	B_p	3- 6	74.3	16.9	3.2	13.7	2.2	1.0	2.8	2.5
	A_2	6-16	73.2	17.4	3.2	14.2	2.2	1.3	3.0	2.5
	B_2	16-26	69.4	21.4	5.5	16.0	2.3	1.3	2.8	2.6
	B_{22}	26-34	69.9	21.6	5.0	16.6	2.4	1.3	2.9	2.5
	C	34-40	69.3	21.5	5.1	16.4	2.4	1.9	2.7	2.5
	C	40-64	71.1	20.4	4.8	15.6	2.7	1.4	2.8	2.3
	C	46-50	70.5	20.8	4.5	16.3	2.9	1.4	2.6	2.2
	C	8 feet	65.9	19.0	4.0	15.0	6.6	3.5	2.4	2.1
Evanturel silt loam, Conc. IV, Lot 9, Evanturel twp	A_1	0- 1	75.2	15.8	2.4	13.4	3.0	1.2	3.0	2.3
	A_{21}	1- 7	73.9	17.6	3.4	14.2	2.9	1.3	2.9	2.3
	A_{22}	7-13	75.4	16.4	3.1	13.3	3.0	1.3	3.1	2.2
	B_2	13-20	71.9	19.2	4.2	15.0	3.0	1.4	3.1	2.1
	B_3	20-25	72.4	18.2	3.9	14.3	3.0	1.5	3.1	2.5
	C	25-32	68.8	16.9	3.8	13.1	6.3	2.5	3.0	2.3
	C	32-40	66.5	16.5	3.8	12.7	8.0	3.9	2.9	2.2
	C	40-46	67.0	16.5	3.8	12.7	8.0	3.7	3.1	2.1
Haileybury clay, Conc. IV, Lot 7, Kerns Twp...........	A_1	0- 2	70.9	21.1	5.1	16.0	2.5	2.0	3.0	3.2
	A_2	2- 5	72.5	20.3	4.9	15.4	2.2	2.0	2.8	2.9
	B_1	5- 9	66.2	24.8	7.3	17.5	1.9	2.1	3.0	3.1
	B_2	9-20	63.3	28.6	8.5	20.1	1.9	2.1	2.2	3.1
	B_3	20-29	64.1	25.5	7.6	17.9	2.8	2.6	2.2	2.9
	C	29-40	59.5	24.9	7.0	17.9	7.7	3.8	2.4	2.9
	C	40-46	68.5	20.3	4.7	15.6	4.1	2.2	3.0	2.3
	C	46-50	59.3	22.4	6.4	16.0	8.4	3.3	2.4	2.7

TABLE 20

CHEMICAL AND PHYSICAL ANALYSES OF SURFACE SOILS FROM THE NEW LISKEARD-ENGLEHART AREA

Soil Type	Sample No.	Location			% Sand 1-.05 mm.	% Silt .05-.002 mm.	% Clay Less Than .002 mm.	Ex. Cap. m.e./100g.	Exchangeable			pH	Organic Matter %
		Township	Con.	Lot					Calcium m.e./100g.	Magnesium m.e./100g.	Potassium m.e./100g.		
Blanche silt loam	11	Chamberlain	V	2	19.4	63.5	17.1	9.22	3.77	1.16	0.07	5.2	2.5
	14	Evanturel	III	11	20.0	62.4	17.6	12.38	3.81	1.46	0.34	5.5	6.4
Brentha loam....	30	Harris	III	2	47.6	40.4	12.0	20.97	15.21	4.81	0.14	6.7	6.2
	50	Bucke	V	6	44.0	36.0	20.0	15.38	7.66	1.56	0.16	5.8	5.5
Bucke sand......	21	Ingram	V	2	75.2	13.9	10.9	8.89	5.11	1.24	0.09	5.8	2.2
	5	Evanturel	IV	2	75.8	19.4	4.8	7.68	3.98	1.05	0.09	5.5	2.0
	4	Evanturel	V	6	81.2	13.6	5.2	8.92	4.07	1.56	0.12	5.7	2.6
Cane silt loam...	38	Cane	IV	2	7.4	67.6	24.0	19.36	19.18	3.58	0.11	7.2	4.7
	39	Cane	V	7	7.7	76.8	15.5	18.25	17.76	3.16	0.08	7.4	5.0
	6	Robillard	IV	6	8.0	73.0	19.0	17.33	16.41	3.04	0.16	7.2	5.2
	7	Dack	III	11	6.8	70.0	23.2	19.64	19.09	3.67	0.13	7.3	5.0
Dawson loam....	32	Dymond	VI	11	51.8	29.8	18.4	15.87	10.87	2.84	0.13	6.5	5.9
Dymond sandy loam.........	31	Harris	V	1	54.2	29.0	16.8	10.82	7.07	1.24	0.06	6.0	2.8
Earlton silt loam.	1	Armstrong	I	8	10.0	68.4	21.6	20.31	19.16	3.69	0.22	7.2	4.9
	2	Armstrong	II	9	12.1	70.8	17.1	18.79	14.67	4.01	0.18	6.7	3.6
	9	Chamberlain	II	4	8.8	73.0	18.2	19.56	17.33	3.18	0.09	6.9	4.1
	17	Evanturel	V	6	6.6	72.2	21.2	19.81	13.57	3.77	0.21	6.2	3.9
	44	Dack	IV	12	6.8	66.2	27.0	19.26	18.28	3.47	0.09	7.3	4.3
Englehart sandy loam.........	16	Evanturel	V	9	67.6	19.6	12.8	10.08	2.45	0.96	0.05	5.2	3.0
	22	Ingram	V	4	80.8	14.0	5.2	13.56	5.79	1.50	0.09	5.9	4.2
Evanturel silt loam.........	8	Evanturel	I	10	8.2	80.8	12.0	13.65	7.58	1.63	0.16	6.2	3.1
	45	Dack	V	12	7.5	77.0	15.5	12.05	10.83	1.97	0.20	6.7	2.2
	48	Robillard	IV	2	20.3	63.3	16.4	14.94	5.56	1.07	0.14	5.3	3.6

TABLE 20 (Cont'd.)

Soil Type	Sample No.	Location			% Sand 1-.05 mm.	% Silt .05-.002 mm.	% Clay Less Than .002 mm.	Ex. Cap. m.e./100g.	Exchangeable			pH	Organic Matter %
		Township	Con.	Lot					Calcium m.e./100g.	Magnesium m.e./100g.	Potassium m.e./100g.		
Falardeau silty clay loam.....	25	Hilliard	VI	7	14.9	57.9	27.2	20.26	18.19	4.43	0.14	5.9	8.3
	40	Casey	VI	1	13.6	62.2	24.2	16.08	11.83	3.97	0.18	5.7	3.9
	41	Casey	III	6	12.0	60.0	28.0	15.48	10.91	3.10	0.20	6.1	3.5
Haileybury silty clay..........	3	Armstrong	VI	10	8.8	58.6	32.6	15.09	9.55	2.47	0.26	6.2	2.4
	29	Hudson	VI	1	8.2	56.3	35.0	15.13	6.93	1.77	0.33	5.5	2.3
	10	Armstrong	IV	10	9.2	55.8	34.0	14.89	8.71	2.35	0.29	6.3	2.0
	9	Hilliard	I	7	7.6	57.4	35.0	15.62	10.04	2.09	0.21	6.5	2.6
Hanbury silty clay..........	12	Evanturel	II	3	10.0	49.4	49.1	19.48	9.46	1.16	0.45	5.7	5.9
	13	Chamberlain	II	9	6.2	51.4	42.0	21.63	10.67	3.56	0.33	6.3	5.4
	15	Armstrong	V	11	9.0	54.1	36.9	18.81	10.36	2.47	0.24	5.8	2.6
	26	Harley	II	6	6.9	51.1	42.0	25.31	10.95	4.31	0.30	6.5	5.5
	28	Casey	I	6	7.6	55.8	36.6	23.96	10.73	3.93	0.41	6.6	4.9
New Liskeard clay..........	18	Kerns	II	8	32.6	29.8	37.6	43.86	37.83	6.85	0.30	7.0	10.9
	19	Henwood	II	6	22.4	39.6	38.0	39.75	33.51	6.31	0.26	6.6	9.6
	20	Beauchamp	I	2	28.0	35.2	36.8	36.30	29.62	5.10	0.31	6.9	8.9
	27	Harley	II	5	25.1	36.6	38.3	42.56	36.38	6.74	0.28	6.8	12.4
Pense silt loam...	42	Evanturel	IV	10	30.0	60.6	9.4	12.15	1.88	0.41	0.04	5.3	3.1
	46	Robillard	V	1	26.4	64.4	8.7	11.38	1.67	0.28	0.03	5.1	2.9
Thornloe clay....	35	Harley	VI	1	35.0	30.1	34.9	42.41	37.07	7.44	0.32	6.5	10.5
	36	Kerns	VI	1	23.4	29.4	47.2	40.36	31.85	8.40	0.30	6.3	8.0
Wendigo sand....	23	Ingram	IV	8	79.3	14.8	5.8	6.10	2.18	0.64	0.09	5.7	2.0
	24	Ingram	IV	10	75.2	18.0	6.8	7.66	2.89	0.81	0.07	5.3	2.6
	43	Marter	VI	2	81.2	13.6	5.2	6.56	2.05	0.61	0.05	5.1	2.1
Hanbury clay....	33	Dymond	VI	10	17.8	30.9	51.3	37.31	41.77	6.97	0.26	6.8	10.7
	34	Bucke	VI	5	18.0	29.8	52.2	30.64	16.84	5.62	0.31	6.5	6.3
	37	Harris	VI	2	21.6	32.4	46.0	31.97	16.55	6.37	0.36	6.2	6.7