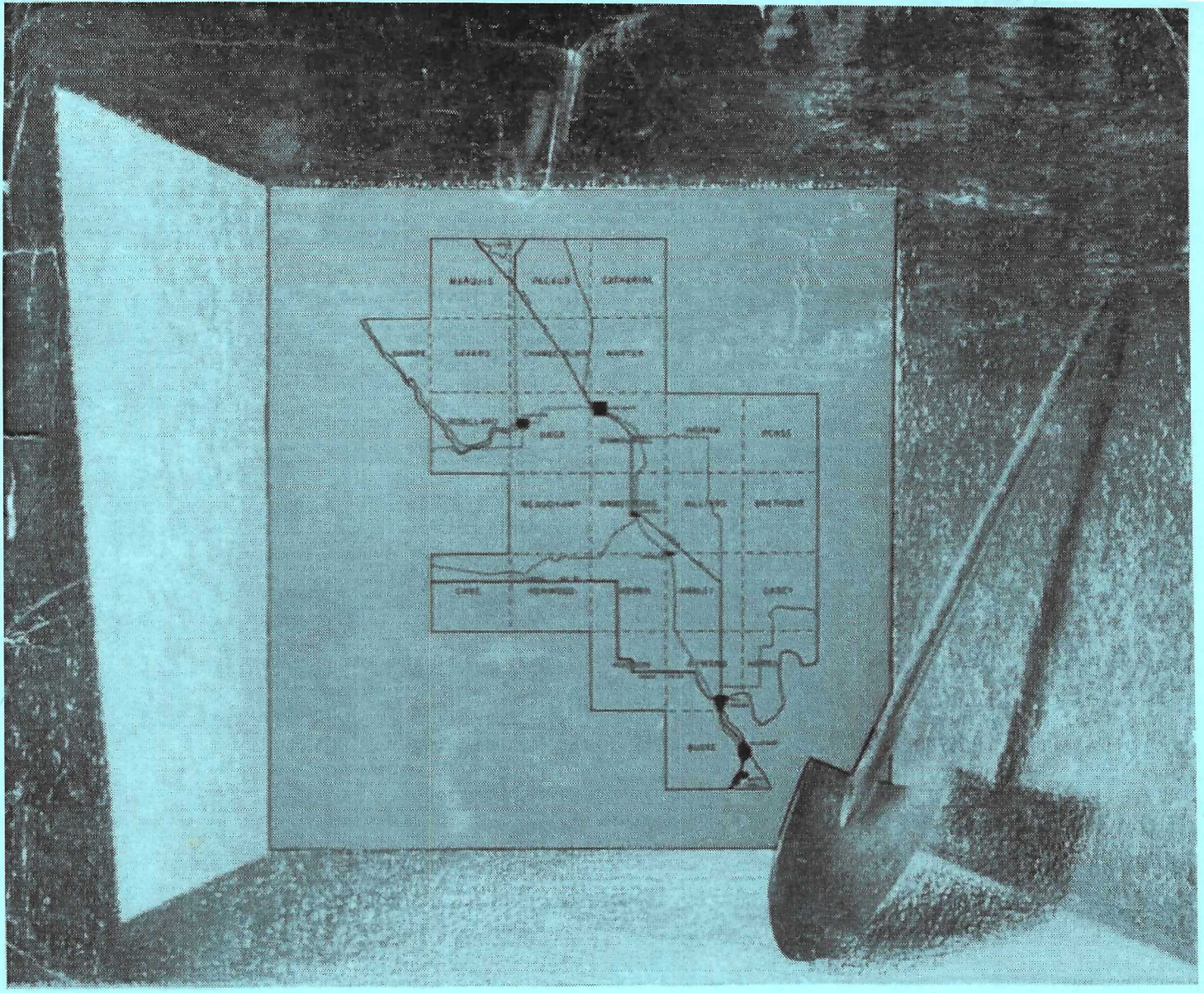
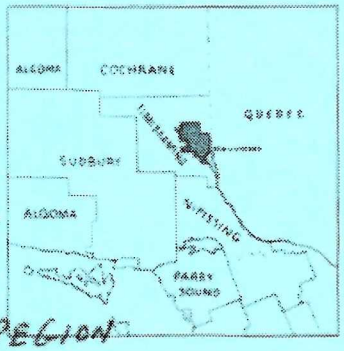


SOIL SURVEY OF NEW LISKEARD–ENGLEHART AREA

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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ACKNOWLEDGMENTS

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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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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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PART I

GENERAL DESCRIPTION OF THE AREA

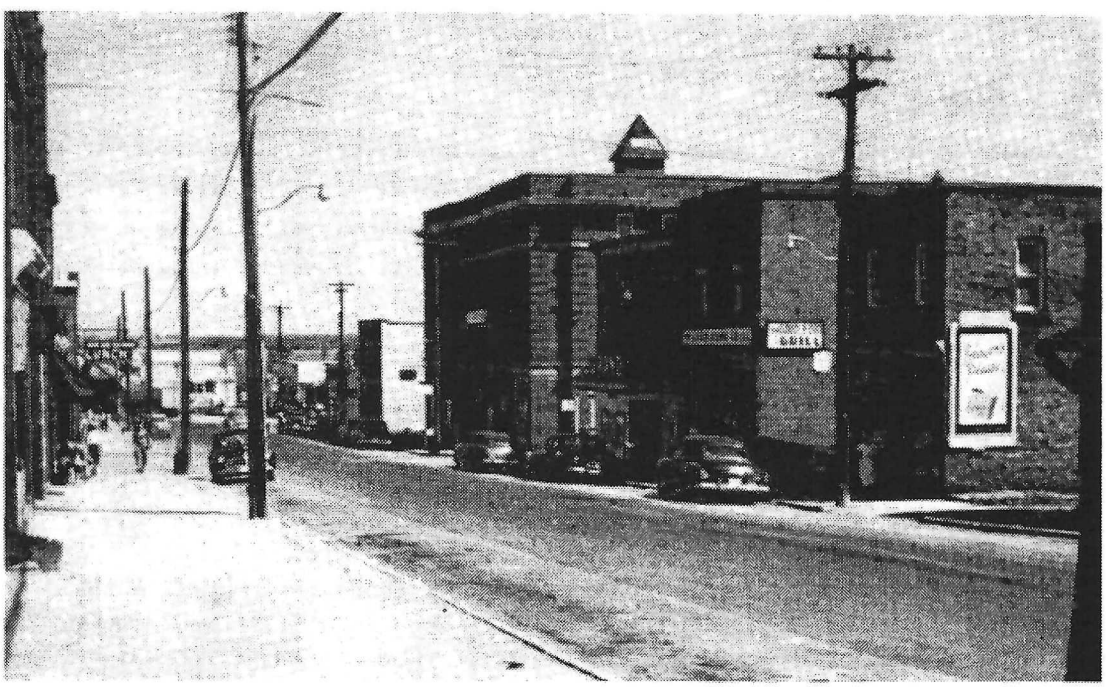
Location and Area

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.

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.

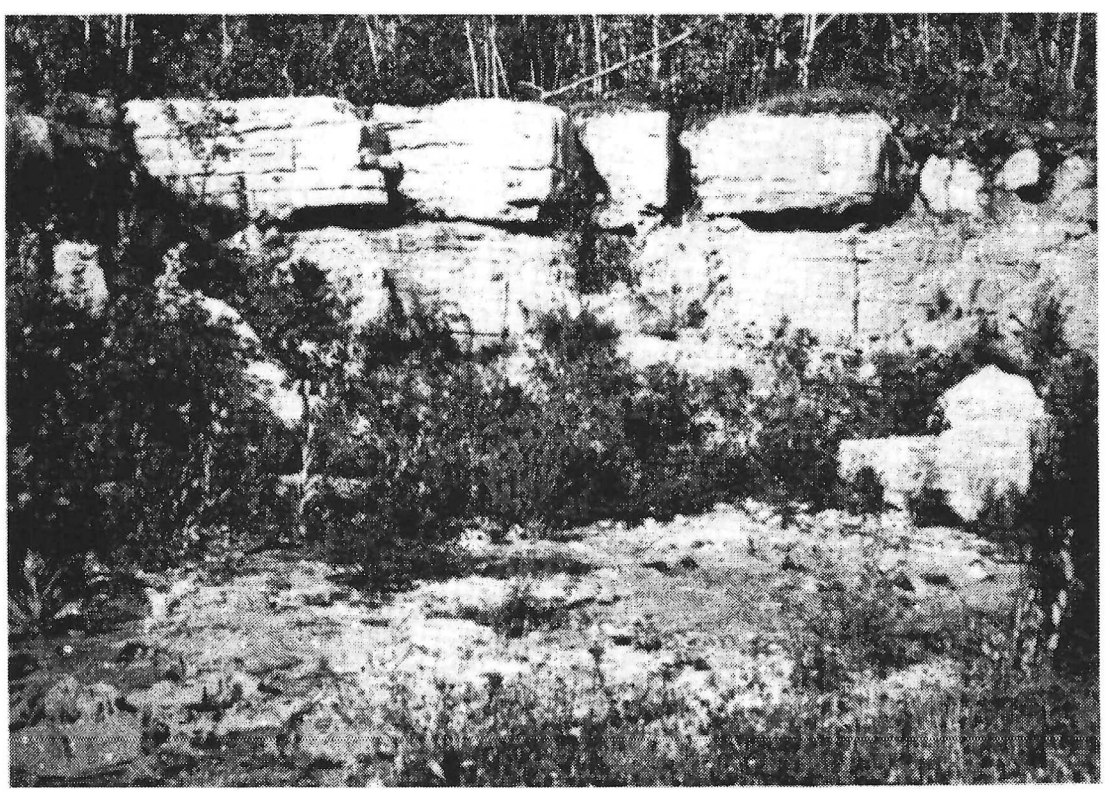
Soil Parent Materials

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.



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,

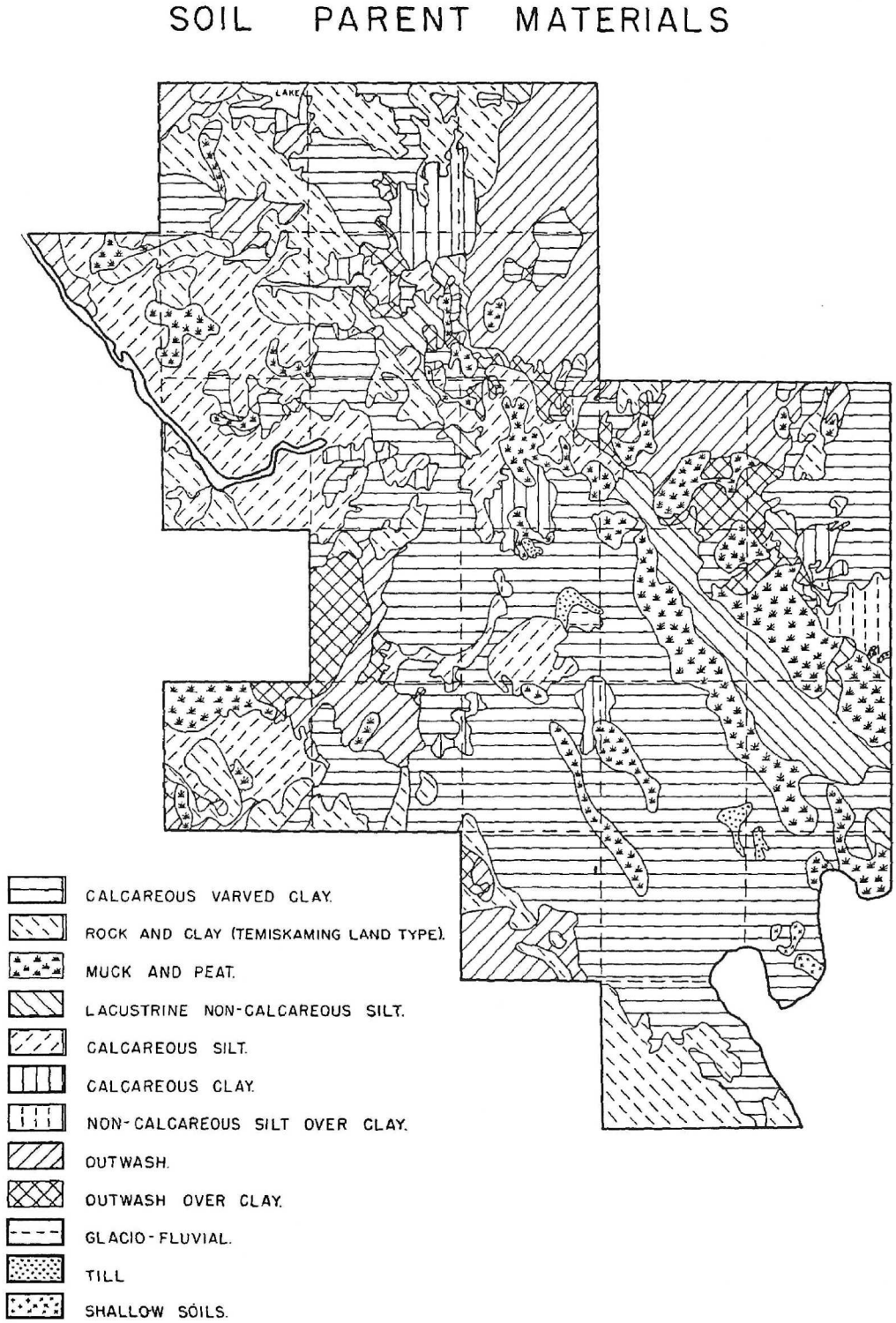


FIG. 4. Outline Map Showing Distribution of Soil Materials.

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-

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.

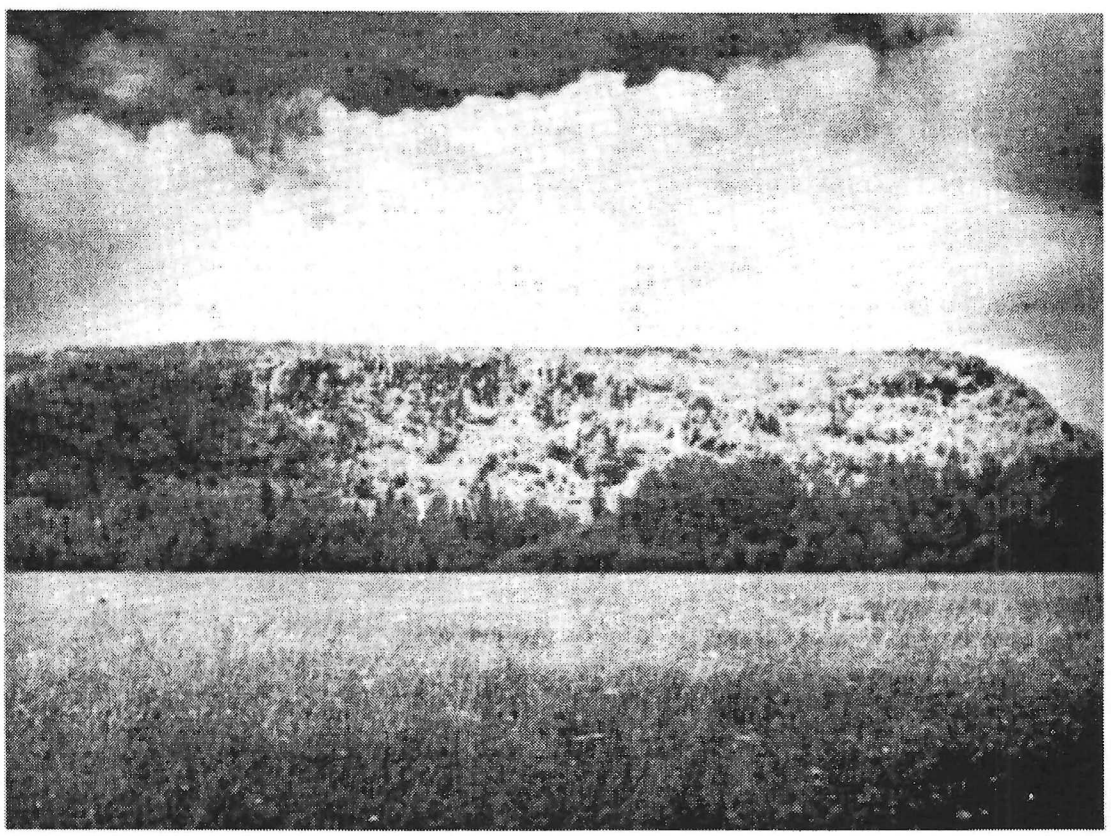
The distribution of the topographic classes is shown in Figure 5.

Drainage

Rivers draining the New Liskeard-Englehart Area generally flow in a south-easterly 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.



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

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.

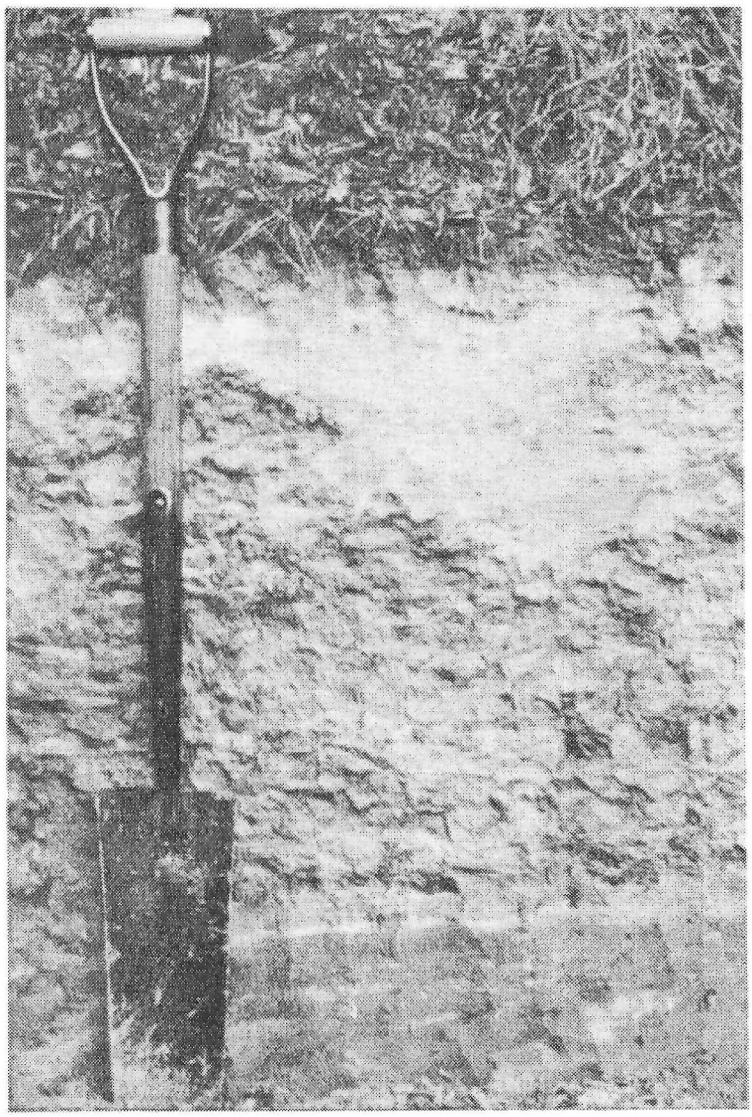
C — Brown or pale brown, calcareous parent material.

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 — ½–0 inches litter of twigs and leaves.

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



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

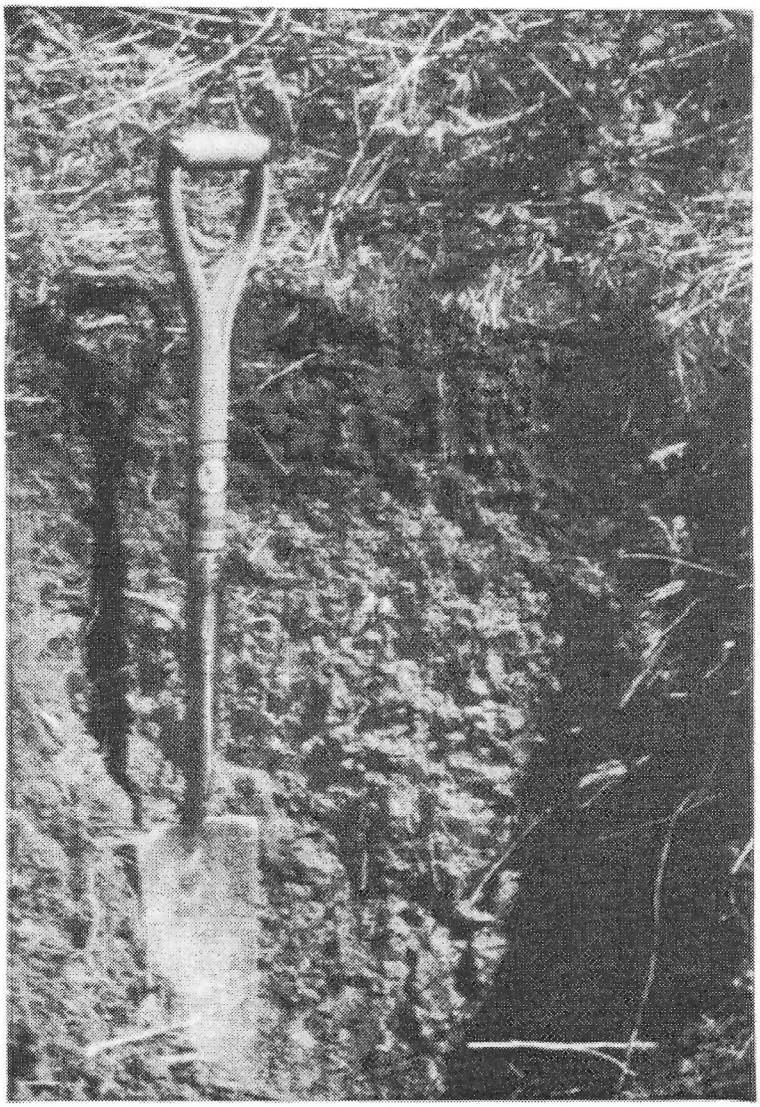
In well drained positions on materials that were originally low in lime or are so open in texture that leaching has rapidly removed lime, profiles representative of the Podzol Great Soil Group have developed. Under natural conditions, the Podzol soils have a light grey leached layer (A_2 horizon) immediately 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.



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.

(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

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.

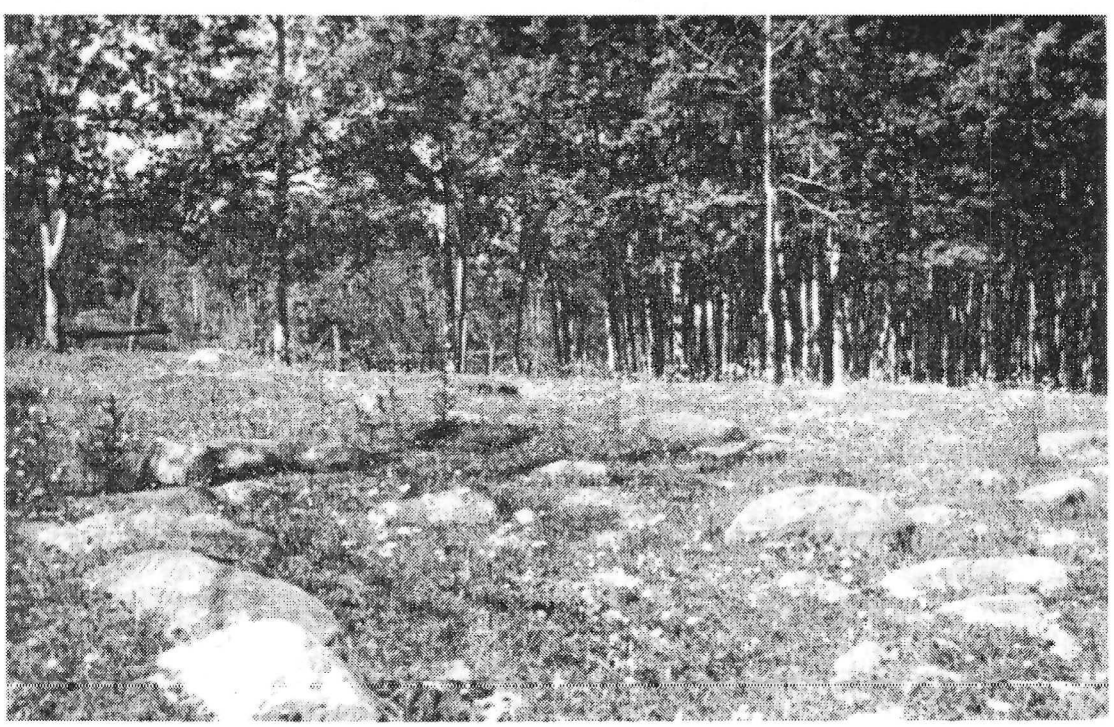
C — Loam till; light grey (10 YR 7 1); non-calcareous; pH — 5.5.

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.



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

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.

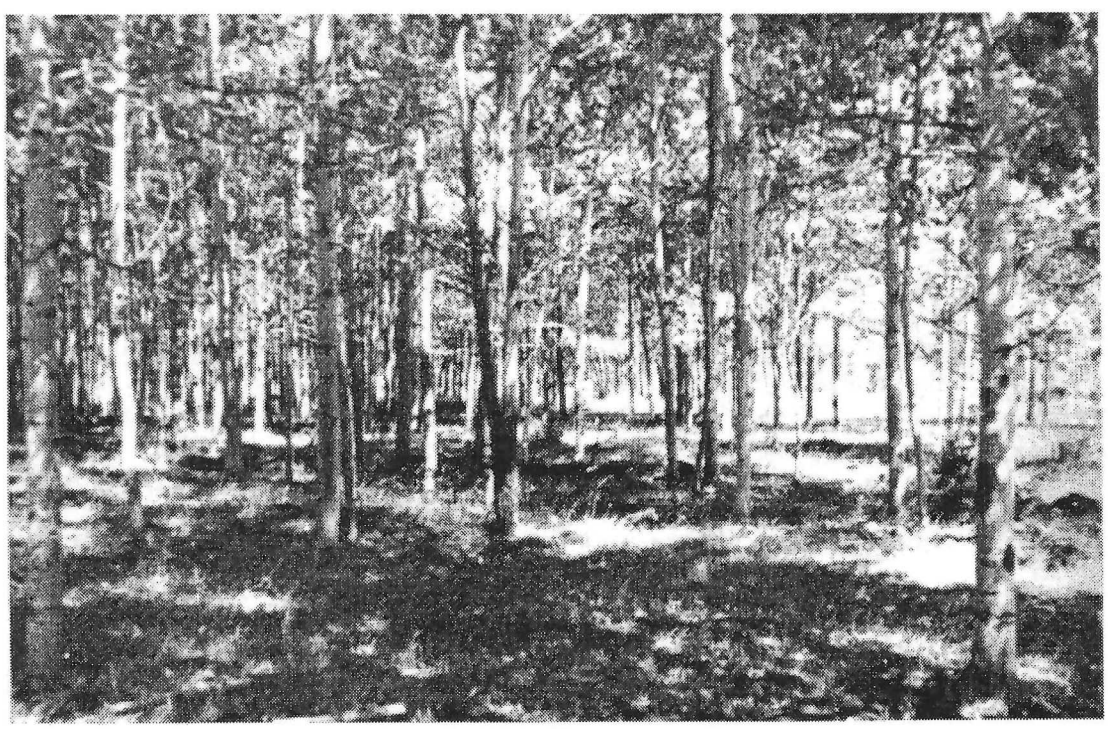
B_2 — 1 12 inches loam, brownish yellow (10 YR 6 6); mottled; weak medium nuciform friable; very stony; pH — 7.4.

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

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.

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.

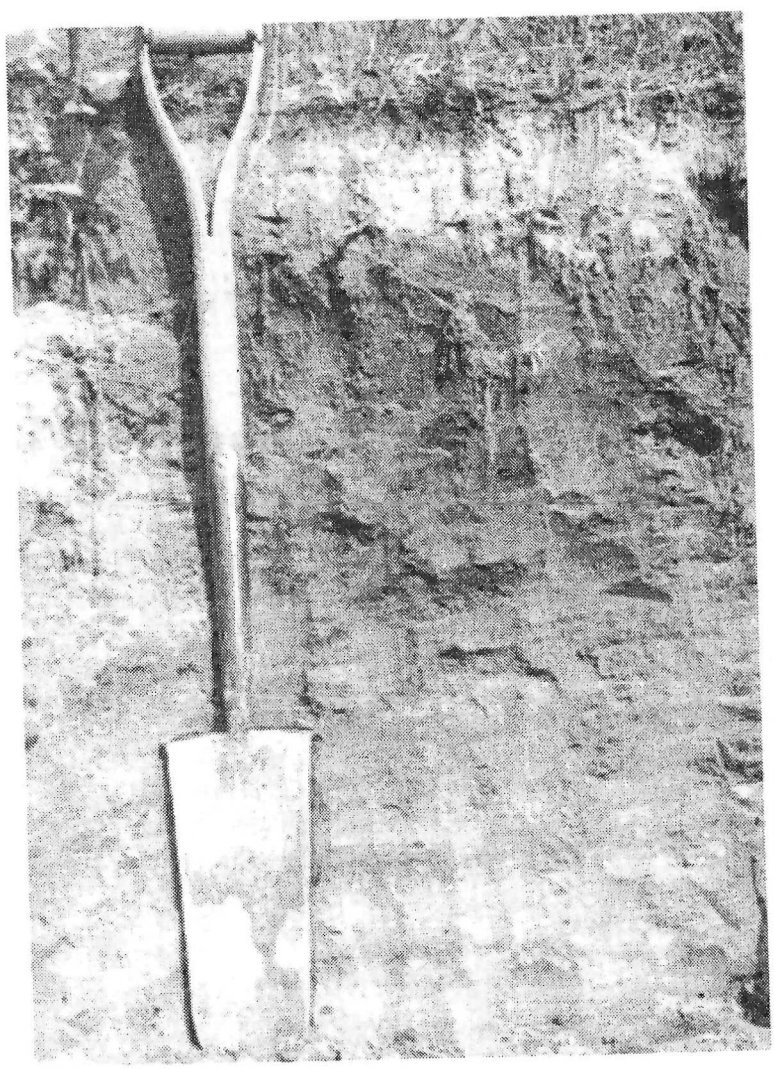
(a) *Well drained*

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 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.

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 ¾ 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,

(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.

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

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

3. CALCAREOUS SILT LOAM

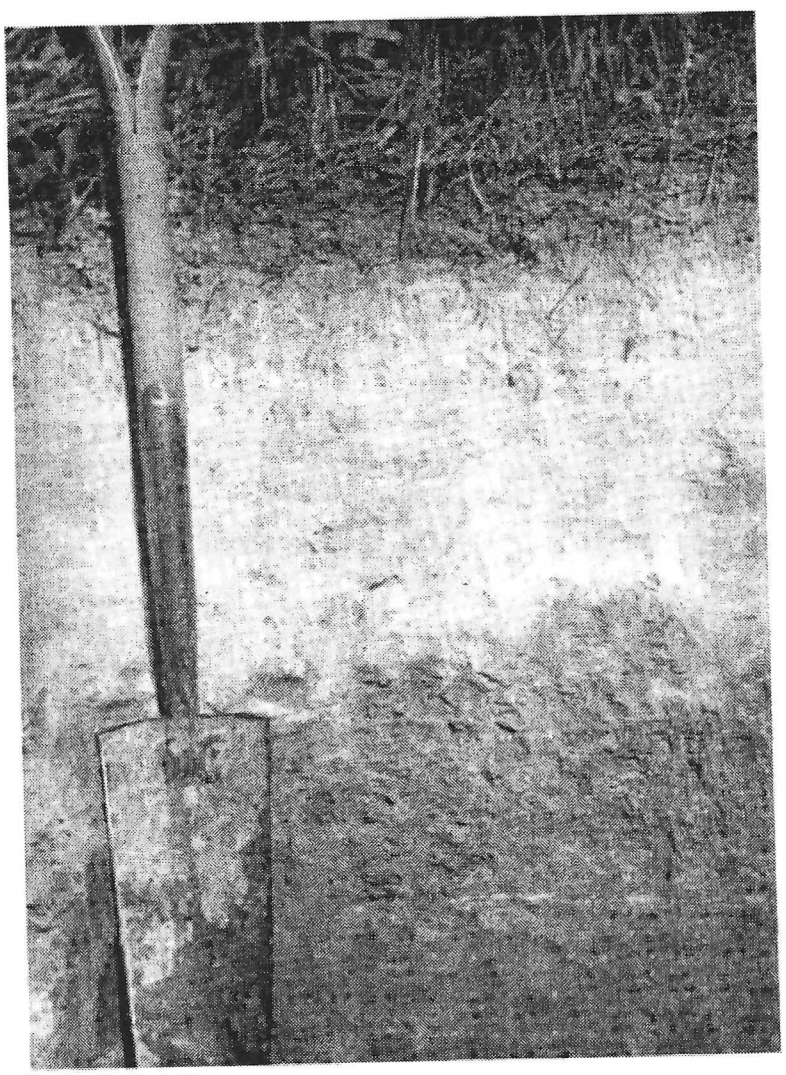
The calcareous silt loam materials are located chiefly on the western and central parts of the surveyed area. These materials are comparatively deep and are underlain by dark brown or pale brown varved clay deposits.

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.

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.

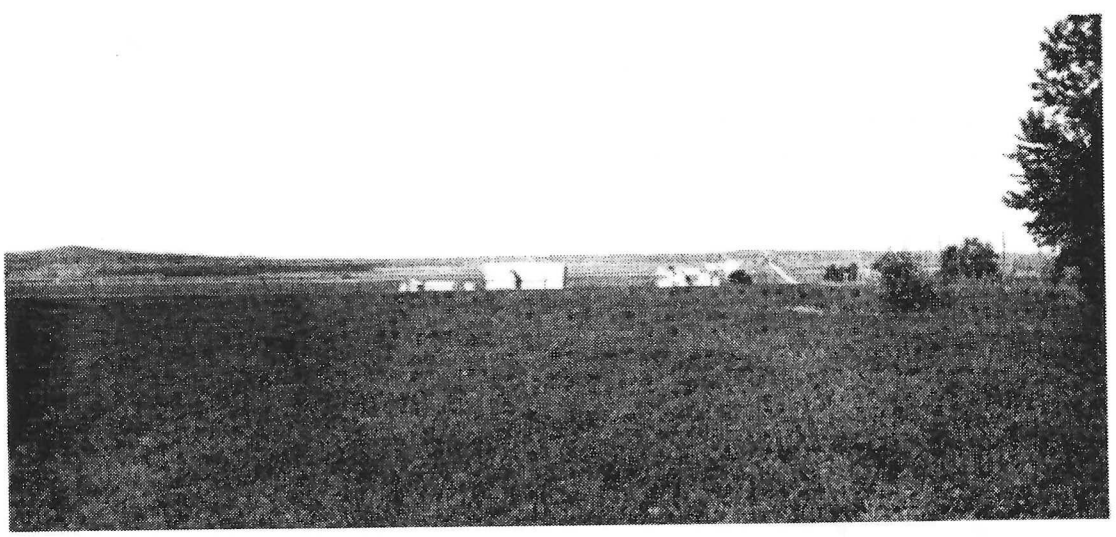
C — Silt loam; light grey (10 YR 7/2); laminar; friable; stonefree; calcareous; pH — 8.0.

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.

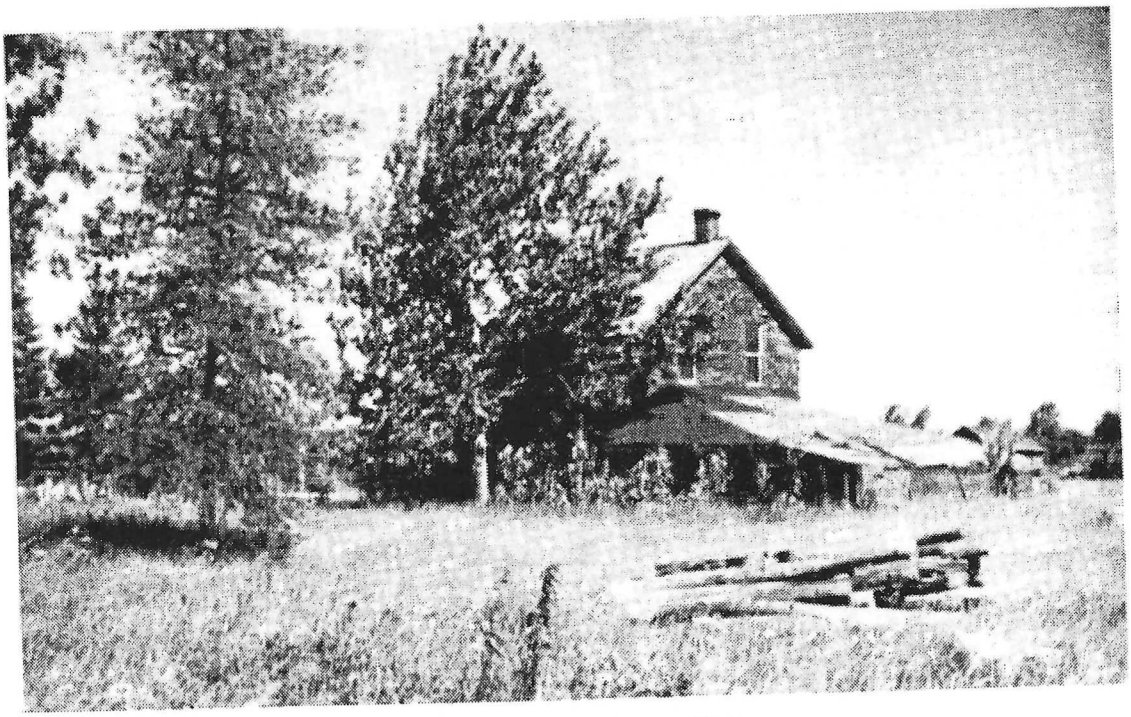
The cultivated surface is a fertile, easily worked, greyish brown silt loam about 6 inches deep.

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.



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.

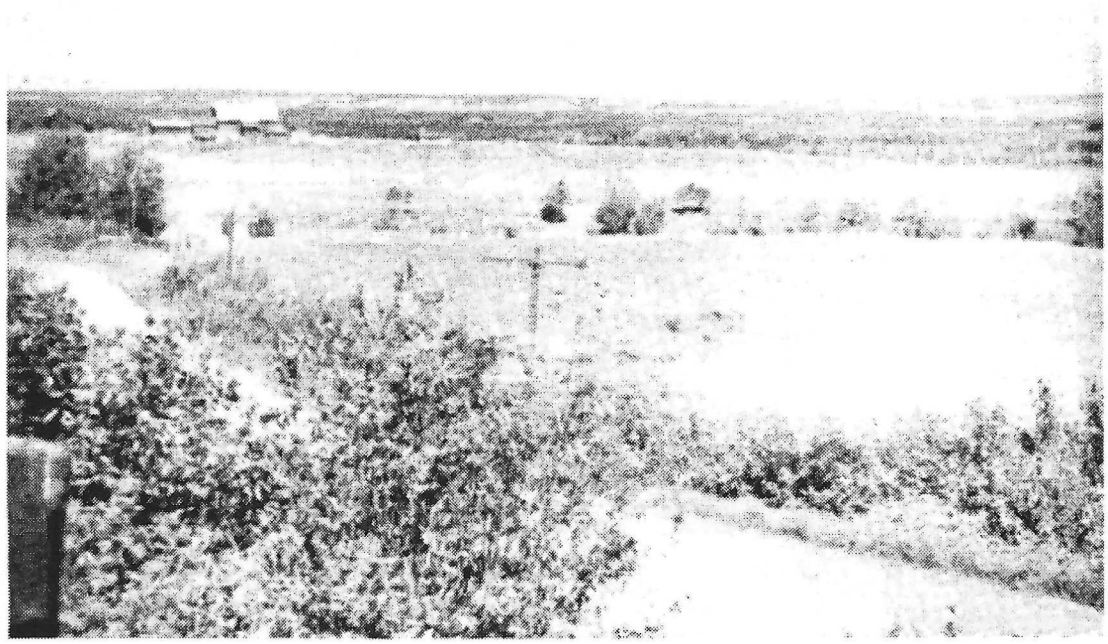
The B_3 horizon is often absent and the A_0 horizon, on soils located in virgin areas is usually a layer of raw humus and roots, 1 inch thick and black in colour.

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.

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

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.

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;

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.

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.

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.

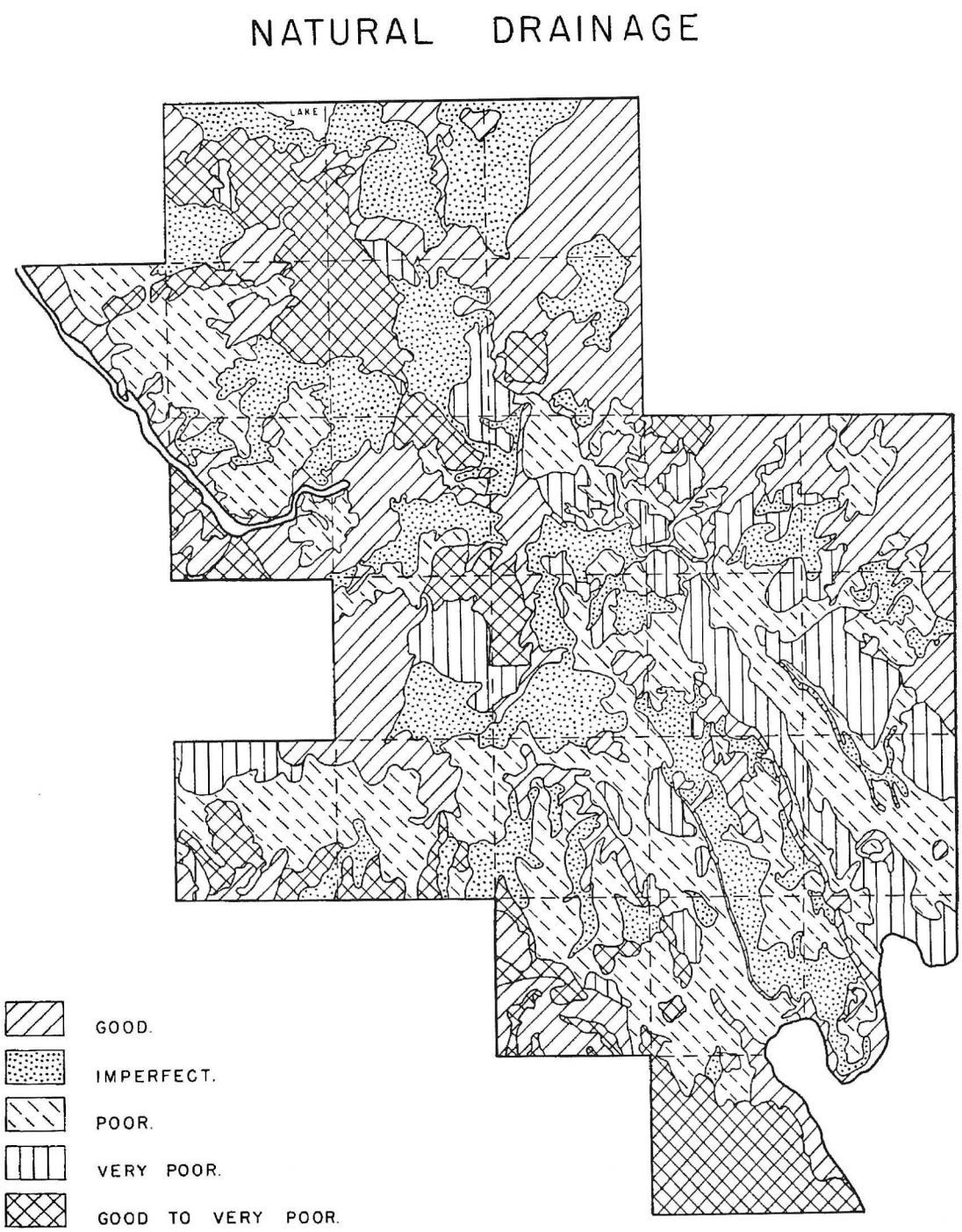


FIG. 7. Outline Map Showing Distribution of Drainage Classes.

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.

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 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 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 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 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	

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			pH	% Organic Matter	Exch. Capacity m.e./100gm.	Exchangeable			% $CaCO_3$
			% Sand 1–.05 mm.	% Silt .05–.002 mm.	% Clay less than .002 mm.				Ca m.e./100gm.	Mg. m.e./100gm.	K m.e./100gm.	
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 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