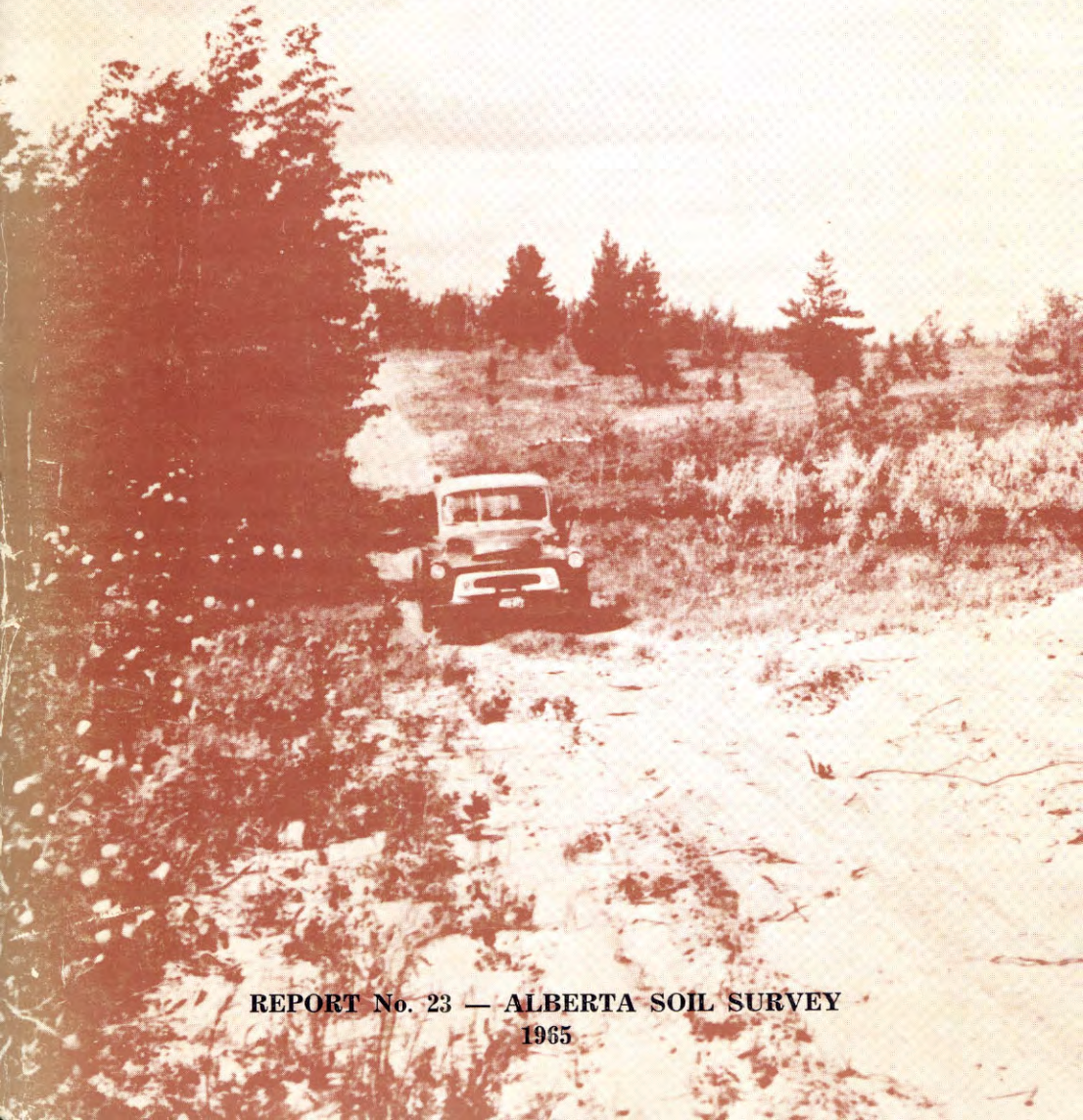
RECONNAISSANCE

Soil Survey

of the

Cherry Point and Hines Creek Area



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RECONNAISSANCE

Soil Survey of the Cherry Point and Hines Creek Area

BY

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Research Council of Alberta

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ALBERTA SOIL SURVEY COMMITTEE

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COVER: *Sand area west of Gage.*

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ACKNOWLEDGMENTS

The soil survey of the Cherry Point and Hines Creek area was conducted by the Research Council of Alberta as part of a joint project involving the Canada Department of Agriculture and the University of Alberta.

The Research Council of Alberta supplied the funds for the field work, for drawing and printing the soil map, and part of the funds for the laboratory work. The Research Branch, Canada Department of Agriculture, supplied part of the funds for the laboratory work and provided the aerial photographs of the area. The University of Alberta provided the office and laboratory accommodation and supplied funds for printing the report. The township plans and the base maps were supplied by the Technical Division, Alberta Department of Lands and Forests.

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Preparation of the final copies of the soil map and soil rating map was made by Technical Division, Department of Lands and Forests, Edmonton.

Mrs. A. Bembridge assisted in the compilation and proof reading of this report.

INTRODUCTION

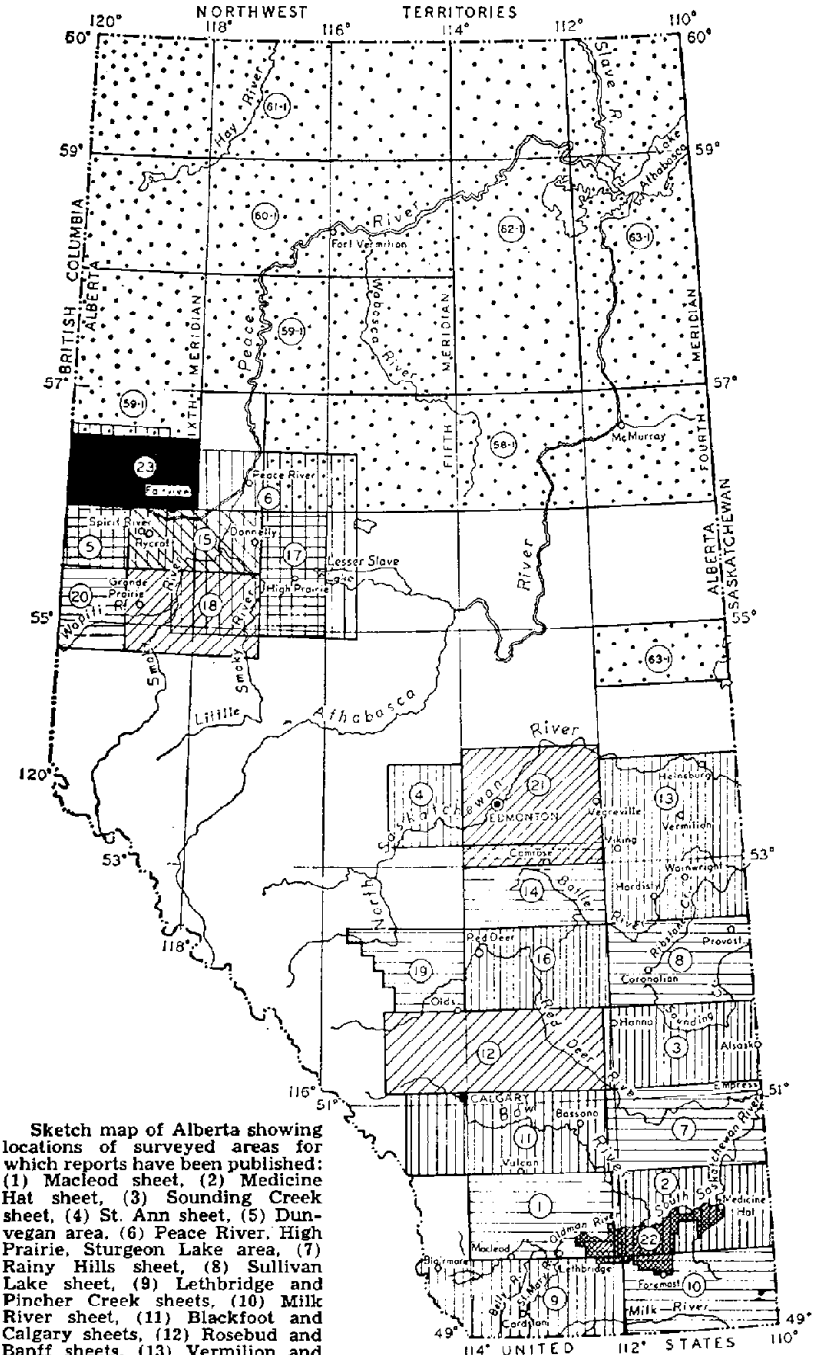
This publication deals with the soils of the Cherry Point and Hines Creek area. It is the fifth of a series of reconnaissance soil survey publications describing the soils of portions of the Peace River District. The preceding publications dealt with the soils of the Rycroft and Watino sheets (report published in 1950), the High Prairie and McLennan sheets (report published in 1952), the Grande Prairie and Sturgeon Lake sheets (report published in 1956), and the Beaverlodge and Blueberry Mountain sheets (report published in 1961).

The survey of the soils of Cherry Point and Hines Creek area was begun in the summer of 1957 with the object of obtaining essential information about the soils of this area—their kind, distribution, and chemical and physical characteristics. This publication consists of two parts: two maps (soil map, soil rating map) and a report.

The soil map, printed on a scale of three miles to one inch, shows the location and extent of the different soil areas and indicates the main topographical features. The soil rating map distinguishes the better land from the poorer land and serves as a guide to future agricultural development.

The report describes the cultural and physical features of the area, and the chemical, physical and morphological characteristics of the soil series. The sections devoted to soils and soil rating should be carefully studied by those using the accompanying maps. The appendices to the report provide information on methods used in chemical and physical analyses, definitions of terms describing significant features of the mapped area and of the field classification, physical analyses that may be helpful in engineering studies, and a classification of the soils of the Cherry Point and Hines Creek area. A glossary is included which gives the definitions of some of the more frequently used descriptive soil terms.

Figure 1—Location Map



Sketch map of Alberta showing locations of surveyed areas for which reports have been published: (1) Macleod sheet, (2) Medicine Hat sheet, (3) Sounding Creek sheet, (4) St. Ann sheet, (5) Dunvegan area, (6) Peace River, High Prairie, Sturgeon Lake area, (7) Rainy Hills sheet, (8) Sullivan Lake sheet, (9) Lethbridge and Pincher Creek sheets, (10) Milk River sheet, (11) Blackfoot and Calgary sheets, (12) Rosebud and Banff sheets, (13) Vermilion and Wainwright sheets, (14) Peace Hills sheet, (15) Rycroft and Watino sheets, (16) Red Deer sheet, (17) High Prairie and McLennan sheets, (18) Grande Prairie and Sturgeon Lake sheets, (19) Rocky Mountain House sheet, (20) Beaverlodge and Blueberry Mountain sheets, (21) Edmonton sheet, (22) St. Mary and Milk Rivers Development, (A) Preliminary 58-1, (B) Preliminary 59-1, (C) Preliminary 60-1, (D) Preliminary 61-1, (E) Preliminary 62-1, (F) Preliminary 63-1, (23) (In black) Cherry Point and Hines Creek area.

NOTE: Reports for areas 1 to 9 inclusive are out of print, but may be obtained on loan from the University Extension Library, University of Alberta, Edmonton.

Soil Survey of the Cherry Point and Hines Creek Area

GENERAL DESCRIPTION OF THE AREA

LOCATION AND EXTENT

The Cherry Point and Hines Creek area lies in the western portion of the Peace River District between 56° 00′ and 56° 36′ north latitude and between 118° 00′ and 120° 00′ west longitude. It is comprised of the Cherry Point and Hines Creek map sheets plus the addition of township 87 which roughly marks the northern limits of agricultural development in this area. It consists of all of townships 82 to 87 in ranges 1 to 12, portions of townships 81 to 87 in range 13, and portions of township 81 in ranges 1 to 12, west of the sixth meridian.

The mapped area extends from Whitelaw to the Alberta-British Columbia boundary and includes the areas adjacent to Whitelaw, Bluesky, Fairview, Gage, Highland Park, Royce, Hines Creek, Peace Grove, Eureka River, Worsley, Clear Prairie, and Cherry Point. There are approximately 1,996,600 acres in this area whose general location is shown on the sketch map in Figure 1.

The principal town, Fairview, is situated about 365 miles by rail northwest of Edmonton.

SETTLEMENT AND AGRICULTURAL DEVELOPMENT

The first settlement in this area occurred at Waterhole, as indicated by the Dunvegan Journal of August 5, 1840. Farming on a small scale was attempted between 1882 and 1887, at first by settlers, then by the Hudson's Bay Company. These early attempts were not too encouraging and the reports of Somerset[1] and Macoun[2] discouraged further attempts at agricultural development in this region. However, settlers continued to venture into the area and by 1911, according to the Canada Census, the total population was indicated as 43.

From this time settlement progressed fairly rapidly. The 1916 Census shows that there was a total population of 673 and 229 occupied farms in the area, concentrated mainly adjacent to and east of Waterhole. However, the largest influx of settlers took place with the extension of the Edmonton, Dunvegan, and British Columbia Railway (now the Northern Alberta Railway) from Peace River to Fairview by 1928, and to Hines Creek by 1930. In the period 1926 to 1931, the Census data show an increase of 1,640 in total

1. Somerset, 1895—The Land of the Muskeg. William Heinemann, London, England.
2. Report on the Peace River Region, Geological Survey of Canada. Annual Report 1903, Vol. 15, part E, 1904.

population, and an increase of 855 in the number of occupied farms in the mapped area. This settlement took place south and west of Fairview and west and north of Hines Creek. The towns of Whitelaw, Bluesky, Fairview, and Hines Creek came into existence with the advent of the railway, and the trading centre at Waterhole was moved to Fairview.

The 1961 Census shows a total population of 4,807 and 1,197 occupied farms in this area. Approximately 31 per cent of this total population were urban dwellers. The trend in population and in the number of occupied farms over the past 50 years is illustrated in Figure 3.

Figure 2—Farmstead in the Worsley area.

A summary of the occupied and the improved acreage in the mapped area for each of the Census years is shown in Table I. The data show a general increase in the occupied acreage except for 1946, the war years, whereas the improved acreage shows a marked increase each year. The percentage of land improved has increased from 20 to 54 in 45 years.

TABLE 1—Acres Occupied and Acres Improved in the Cherry Point and Hines Creek Areas, 1916-1961

Year	Acres Occupied	Acres per Farm	Acres Improved	Per Cent of Land Improved
1916	57,105	249	11,425	20
1921	116,742	241	33,394	29
1926	124,640	354	47,322	38
1931	298,784	247	100,281	34
1936	299,019	281	110,618	37
1941	381,834	338	151,067	40
1946	364,566	372	164,744	45
1951	476,295	413	227,784	48
1956	583,751	461	300,109	51
1961	647,769	541	350,409	54

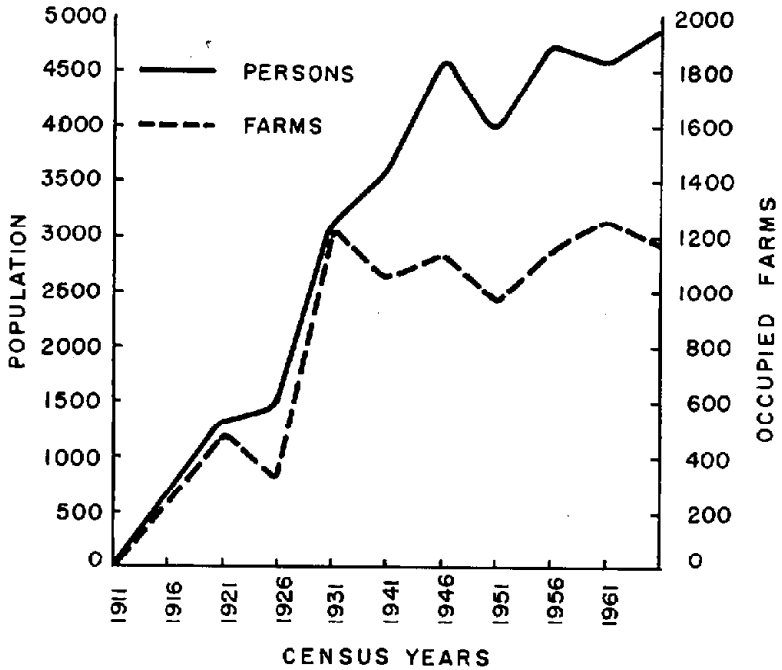
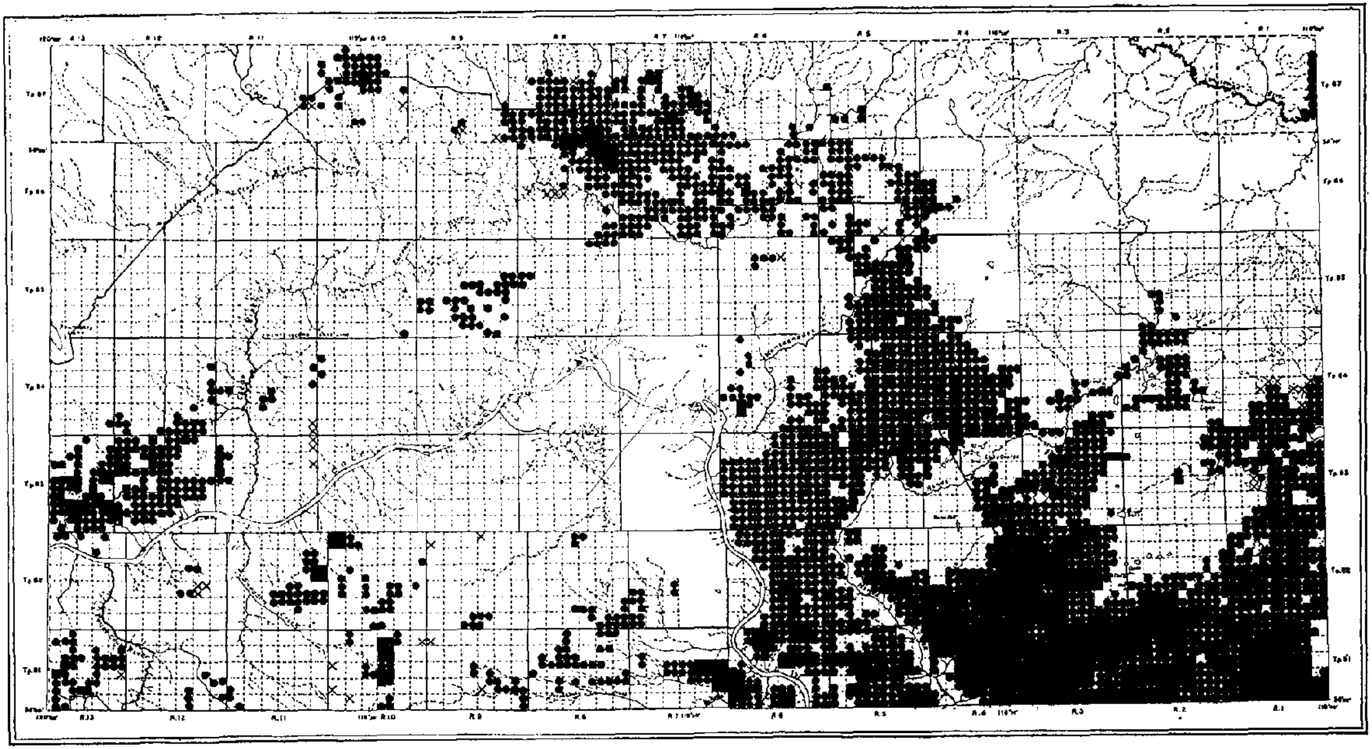


Figure 3—Population and Occupied Farm Trends in the Cherry Point and Hines Creek area.

Figure 4—Landscape in the Hines Creek area showing cleared cultivated areas and uncleared areas.



Completely cultivated (120-160 acres) ■

Partially cultivated (10-120 acres) ...... ●

Abandoned cultivation (10-160 acres) ☒

Virgin lands (Idle and Pasture) .... □

Figure 5—Map Showing the Cultivated, Abandoned, and Virgin Lands in the Mapped Area at the Time of Survey.

The cultivation map (Figure 5) shows the distribution of farms on which cultivation was recorded at the time of the survey. The largest portion of the cultivated acreage is in the southeastern portion of the area. Smaller acreages are located in the vicinity of Whitelaw, Highland Park, Hines Creek, Eureka River, Worsley, Clear Prairie, and Cherry Point.

Grain farming is presently the dominant type of farming in the mapped area. Census data (Table 2) show that wheat, oats, and barley occupy the largest portion of the cultivated acreage. The acreage sown to wheat is shown to exceed that sown to oats plus barley until 1951. The 1961 Census shows that barley has become the dominant cereal crop grown, followed by wheat, and then oats. The acreage sown to hay crops is shown to have increased markedly since 1941 (Table 2), a trend which is considered desirable for this area.

TABLE 2—Total Acreage Cropped and Acreages of Principal Crops in the Cherry Point and Hines Creek Area, 1916-1961.

Year	Total Field Crops	Wheat	Oats	Barley	Rye	Flax	Mixed Grains	Hays
1916	9,052	4,176	4,238	463	0	35	0	81
1921	25,104	9,493	11,558	1,658	310	156	34	1,790
1926	35,796	23,287	9,290	381	231	0	2	2,522
1931	77,956	52,125	20,584	1,198	596	15	14	3,254
1936	79,276	45,146	22,087	3,043	920	34	100	7,734
1941	96,894	53,225	28,404	5,096	436	1,736	52	7,693
1946	116,636	65,056	35,230	3,675	1,171	476	40	10,712
1951	166,194	61,348	60,454	17,724	5,453	2,803	292	18,037
1956	214,703	56,036	58,063	61,597	689	11,572	493	26,168
1961	254,475	61,363	40,784	68,797	1,331	5,969	1,773	51,725

Data compiled by the Sanford Evans Statistical Service, Winnipeg, (Table 3) shows the yield of wheat by towns in the mapped area.

TABLE 3—Yields of Wheat Recorded in Shipping Points of the Cherry Point and Hines Creek Area

Town	Number of years recorded	Average yield per acre
Bluesky	32	17.8
Fairview	33	17.6
Gage	30	19.4
Hines Creek	29	19.5
Whitelaw	35	18.9

Canada Experimental Farm records at Beaverlodge show that the average crop yields for the Peace River District were as follows: wheat—20 bushels per acre, barley—25 bushels per acre, oats—38 bushels per acre, rye—17 bushels per acre, flax—10 bushels per acre, sweet clover seed—400 pounds per acre, alsike clover seed—250 pounds per acre, alfalfa seed—100 pounds per acre, and brome grass seed—250 pounds per acre. These figures include yields produced on a variety of soils and under differing farming practices.

Census data for livestock (Table 4) show that the livestock population is comparatively small and varies considerably. The variations are most pronounced in the sheep, swine, and poultry population.

TABLE 4—Livestock Population in the Cherry Point and Hines Creek Area, 1916-1961

Year	Horses	Cattle	Sheep	Swine	Poultry
1916	681	1,010	.....	1,949	.....
1921	2,197	4,721	455	1,720	18,416
1926	2,859	3,154	236	2,384	20,980
1931	4,463	3,893	2,239	4,636	44,304
1936	5,301	7,966	999	5,734	46,941
1941	6,595	6,156	1,236	12,546	74,802
1946	5,149	7,388	1,766	5,348	47,506
1951	3,597	7,133	892	5,947	53,041
1956	1,893	11,426	1,531	8,797	65,122
1961	1,160	16,195	2,847	15,655	63,134

TRANSPORTATION AND MARKETS

The railway, highways, and main secondary roads that traverse the mapped area are shown on the accompanying soil map. These transportation links provide all-weather routes between local towns and to market centres outside the area. A network of market roads serve the farm communities. Some of these roads are gravelled but most are graded earthen roads. The densely settled portions of the area are well supplied with good market roads, whereas the sparsely settled areas have few roads and in some instances they are accessible only by wagon and tractor trails.

Fairview is the principal communication and market centre in the area. It is located at the junction of the highways leading out of the area, and it has good grain and livestock marketing facilities. Other grain and livestock marketing facilities are provided in the towns of Hines Creek, Bluesky, and Whitelaw.

Figure 6—This gravelled highway traversing the northern portion of the mapped area is the main transportation route linking the northern settled areas to the marketing centres at Hines Creek and Fairview, and to Dawson Creek and Fort St. John in British Columbia.

FACTORS AFFECTING SOIL FORMATION

The various soil-forming factors, as they exist in this area, are briefly discussed below.

GEOLOGY AND SURFACE DEPOSITS

The distribution of the bedrock formations common to this area is shown in Figure 7. The area is underlain entirely by shales and sandstones of Late Cretaceous age. The Kaskapau formation has the greatest areal distribution and overlies the Dunvegan formation. The Dunvegan formation, composed mainly of sandstone, has a small, patchy areal distribution occurring north of Whitelaw in township 83, range 1, along the Whitemud river in township 87, range 1, and along the erosion banks of the Peace, Clear, and Montagneuse rivers and the Hines creek. The shales of the Fort St. John formation are found only at the bottom of the erosion banks along the Peace river.

The surface deposits of the mapped area consist of till, glacio-fluvial, lacustro-till, lacustrine, alluvial and aeolian materials.

The till deposits consist of medium to fine textured unsorted materials that were deposited through ice action. The deposits are found mainly in the northern portion of the mapped area. At the higher elevations, these deposits may be found as a thin mantle covering underlying geological formations.

The glacio-fluvial deposits are composed of sorted and partially sorted fine to coarse textured materials deposited by melting ice. The deposits are usually found considerably removed from major stream valleys. In this area the most extensive deposit of this material occurs along a line extending from Whitelaw to Fairview.

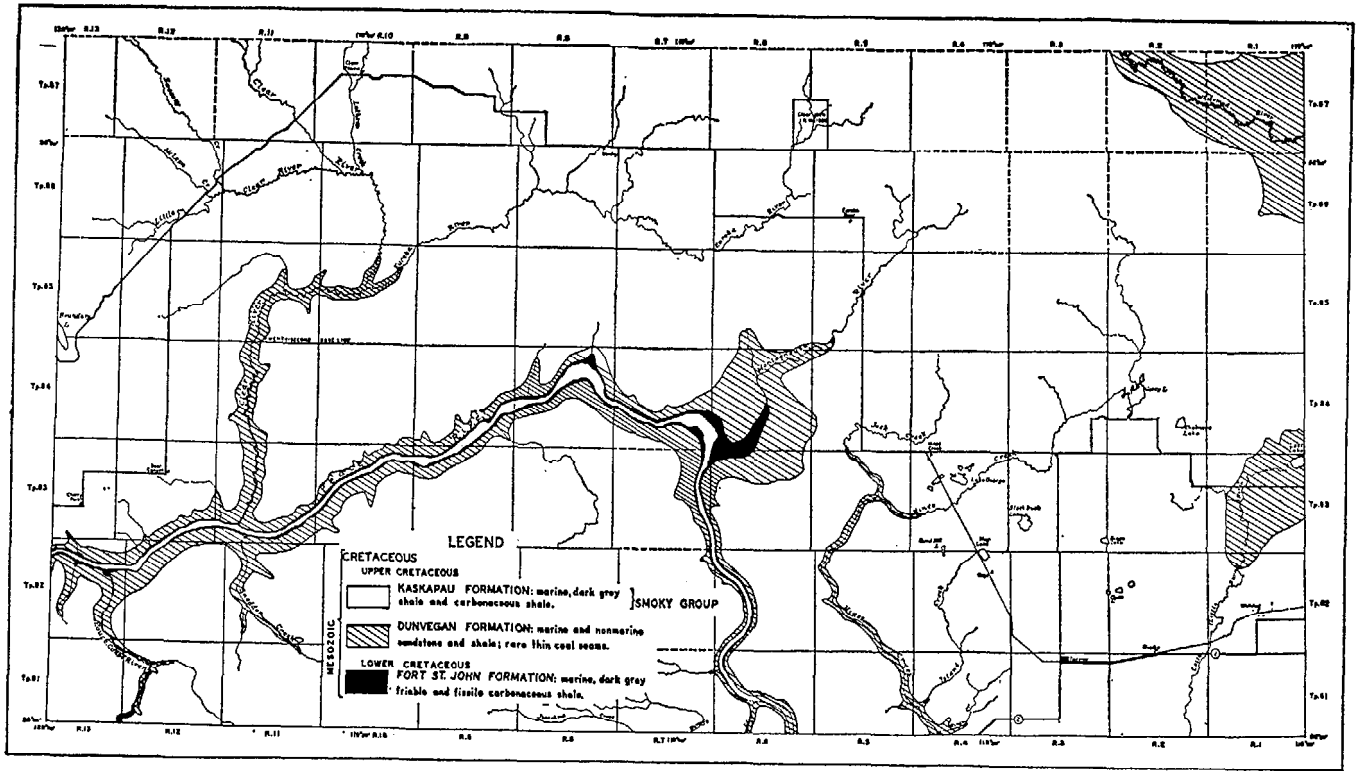
The lacustro-till deposits consist mainly of fine textured materials that show some stratification and contain some stones. This material is believed to be derived from glaciers, reworked and redeposited in temporary glacial lakes. These deposits are found, in this area, at elevations between 2,150 and 2,400 feet.

The lacustrine deposits consist of medium to fine textured materials that are stratified and are stone-free. These deposits are believed to be of post-glacial origin that were sorted by water and deposited in deep glacial lakes. They are found in this area at elevations up to 2,150 feet generally adjacent to the Peace river.

The alluvial deposits are composed of coarse to medium textured materials deposited through the action of rapidly moving water. These materials occur in this area as outwash, beach lines, thin beds overlying other deposits, and as recent deposits on river flats. They are found in association with other surface deposits in various portions of the mapped area.

The aeolian deposits are composed of coarse to medium textured materials deposited through wind action. They occur as dunes and as thin beds overlying other deposits. These deposits are found in the south-central portion of the mapped area in the vicinity of Gage.

Figure 7—Map Showing the Geology of the Cherry Point and Hines Creek Area.[1]



1. Russell, L. S. 1948. Preliminary map Sexsmith-Bison Lake, Canadian Department of Mines and Resources, Mines and Geology Branch, Bureau of Geology and Topography, Ottawa.

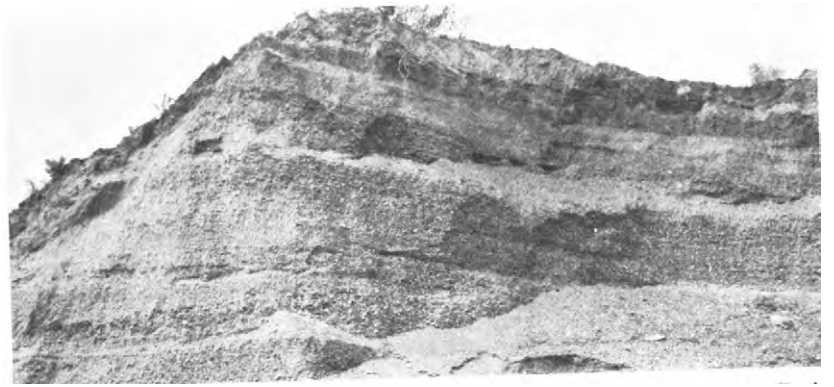


Figure 8—Stratified deposits of sands and gravels are common in the glacio-fluvial materials. This deposit is found south of Whitelaw.

PHYSIOGRAPHIC FEATURES

The land surface of the area, in general, is composed of high plain remnants, gently sloping areas, flatlands, and incised valleys of the major streams. The maximum difference in elevation between the river-beds and the high plain remnants is about 2,300 feet. In general, the difference in elevation is around 1,000 feet.

The high plain remnants are found in the northern portion and in portions of the southwestern part of this area. The highest portions of these features, forming the Clear hills, are found in township 87, ranges 4 and 9, at elevations of 3,100 and 3,400 feet respectively. Low hills are found in township 82, range 8; townships 81, 82, and 83, range 9; and township 82, range 10.

Figure 9—Gently rolling topography of the gently sloping areas with the Clear hills in the background.

The gently sloping areas form the portion of the mapped area extending from the high plain remnants to the flatlands. They occupy that portion of the area at elevations between 2,150 and 2,400 feet. Local low ridges and knolls are characteristic of these gently sloping areas.

The flatlands occupy that part of the area with elevations up to 2,150 feet and occur in the southeastern, north-central, and southwestern portions of the mapped area. Beach-line remnants are found along the 2,150-foot contour. In some portions of these flatlands the relief is characterized by numerous low, steep-sided knolls. These knolls commonly have crowns with doughnut-shaped depressions.

Figure 10—Low, steep-sided knolls of the flatlands in the Highland Park area.

Figure 11—Level topography of the flatlands in the Highland Park area.

The south-central portion of the area, in the vicinity of Gage, is characterized by longitudinal sand dunes or ridges which are generally separated by bog areas.

DRAINAGE

The Peace river and its tributaries provide the drainage for this area. The main tributaries of the Peace river usually flow throughout the summer. They are the Pouce Coupe, Clear, Montagneuse

and Leith (Little Burnt) rivers and the Josephine, Hamelin, and Hines creeks. These tributaries have deeply dissected valleys commonly approaching 1,000 feet in depth.

The area contains several lakes; the largest are named Last, Gerry, Black Duck, Hay, George, and Boundary. The majority of these lakes are surrounded by boggy areas and have no well-defined outlets.

Figure 12—Junction of the Peace and Montagneuse rivers. The Peace river and its tributaries provide the drainage system for the mapped area.

CLIMATE

There is a scarcity of meteorological information for the Cherry Point and Hines Creek area. While the records of Fairview may provide a reasonably accurate record of the climate in the southern portion of this area, preliminary investigations have indicated that there may be an appreciable variation in climate in the northern portion of the area. Variations in precipitation, moisture distribution, frost-free periods, and other climatic aspects might prove significant to crop production in this region.

Data compiled from the records of the Canada Experimental Farm at Beaverlodge and from the records obtained by the Canada Meteorological Service, as indicated in Tables 5 and 6, provide an indication of some aspects of climate common to this region.

TABLE 5—Mean Monthly and Annual Temperature and Precipitation at Selected Stations in or near the Mapped Area

	Fairview (14 yrs.) Elevation 2,160 feet		Beaverlodge (43 yrs.) Elevation 2,500 feet		Grande Prairie (14 yrs.) Elevation 2,190 feet		Fort St. John (14 yrs.) Elevation 2,275 feet	
	Temperature Degrees F.	Precipitation inches	Temperature Degrees F.	Precipitation inches	Temperature Degrees F.	Precipitation inches	Temperature Degrees F.	Precipitation inches
December	-14.3	1.42	-14.7	1.16	-15.5	1.36	-18.7	1.02
January	4.7	1.23	8.4	1.19	5.6	1.35	5.2	1.01
February	8.1	1.30	10.1	1.07	8.6	1.37	9.6	1.12
Winter	-0.5	3.95	1.3	3.42	-0.4	4.08	-1.3	3.15
March	20.2	0.98	23.2	1.03	20.4	0.74	23.5	0.88
April	36.7	1.01	36.8	0.87	37.3	0.82	37.4	0.87
May	49.9	1.40	49.2	1.50	50.3	1.52	50.6	1.07
Spring	35.6	3.39	36.4	3.40	36.0	3.08	37.2	2.82
June	56.4	2.31	55.4	2.01	56.4	2.00	56.9	2.12
July	60.2	2.26	59.3	2.31	60.7	2.48	61.1	1.94
August	58.1	1.96	57.0	1.92	58.5	1.68	58.7	1.81
Summer	58.2	6.53	57.2	6.24	58.5	6.16	58.6	5.87
September	49.6	1.49	49.0	1.87	49.8	1.28	49.8	1.14
October	38.5	1.15	38.9	1.04	39.3	0.98	39.6	1.00
November	20.2	1.41	22.0	1.35	21.8	1.22	20.3	1.06
Fall	36.1	4.05	36.6	4.26	37.0	3.48	36.6	3.20
Annual	32.4	17.92	32.9	17.32	32.8	16.80	32.9	15.04

The records given in Table 5 show that the climate of this area is characterized by relatively cold winters and moderately warm summers. The mean summer temperature, as indicated by the records for June, July, and August is 58°F. July is the warmest month with a mean temperature of about 60°F. These conditions are conducive to the satisfactory growth of crops adapted to a temperate climate. The annual precipitation, averaging about 17 inches, is generally very favorably distributed. Approximately three-quarters of this precipitation falls during the spring, summer, and fall months when it can be best utilized by vegetation. Furthermore, the majority falls during the months of June and July at a time when the plants are at their stage of maximum water requirement.

A further significant feature of the climate of this area involves consideration of the frost-free period. A minimum period of 90 days characterized by temperatures higher than 32°F is considered as suitable for the production of cool-season crops. The data in Table 6 indicate that, while the average frost-free period is satisfactory, the variations emphasize that frost damage occurs occasionally in this region. Records taken at Beaverlodge show that there have been five seasons with a frost-free period less than 90 days in the last 30 years. However, preliminary investigations indicate that in the northern portion of the mapped area the frequency of frost damage may be greater than that indicated in the available records.

TABLE 6—Frost Data for Selected Stations in or near the Mapped Area

Station	Height (feet above M.S.L.)	No. of Years	Average Frost-free Period (days)	Longest Frost-free Period (days)	Shortest Frost-free Period (days)
Fairview	2,160	13	105	133	78
Beaverlodge	2,500	43	101	140	48
Grande Prairie	2,190	19	105	139	81
Fort St. John	2,275	9	109	140	76

VEGETATION

The mapped area lies within the Boreal Forest Region of Canada as delineated by Rowe.* The present native vegetation consists of a mixed tree cover in which aspen poplar is dominant. Other tree species are balsam poplar, white spruce, jack and lodgepole pine, white and grey birch, willow and alder. Such shrubs as rose, gooseberry, raspberry, cranberry, chokecherry, saskatoon, and hazelnut occur, usually in mixtures, particularly in the more open areas and along eroded stream banks. The native vegetation of the poorly drained areas consists of black spruce, tamarack, drawf birch, labrador tea, sedges, rushes, reeds, coarse grasses, and mosses.

Much of the native vegetation has been destroyed by repeated fires and land improvement practices. Marketable stands of spruce, however, are found in widely scattered locations particularly in the northern portion of the mapped area. The relative distribution of tree cover, at the time of survey, is shown in Figure 15.

*Rowe, J. S. 1959. Forest regions of Canada. Canada Department of Northern Affairs and National Resources Bulletin 123.

Figure 13—Light to medium tree cover. Areas with this type of cover are being cleared for agricultural use. (See Figure 15).

Figure 14—Such tree cover is difficult and expensive to clear and poses a serious problem in the improvement of areas considered as suitable for agricultural puropses.

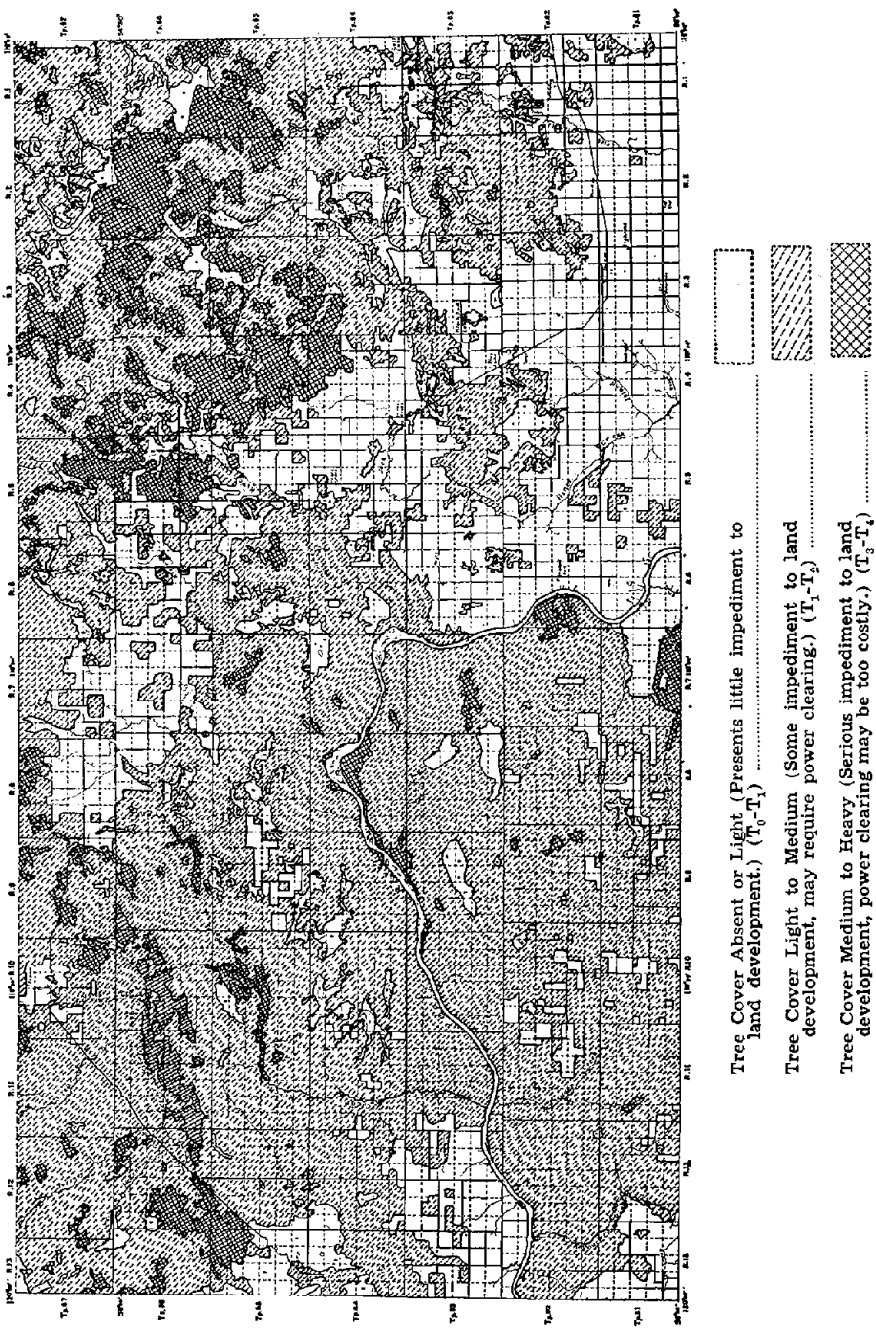


Figure 15—Map Showing the Relative Distribution of Tree Cover in the Mapped Area.

SOILS

SOIL FORMATION

Soil formation proceeds in stages, none of which are distinct. The two major steps in soil formation are accumulation of soil parent material and the formation of horizons within this accumulated material. The weathering of rocks provides the soil parent materials. The horizons are formed in this accumulated material because of gains, losses, and alterations. These are brought about by weathering of minerals; accumulation and assimilation of organic matter; removal, transfer, and transformation of materials; and the development of structure. These processes produce great changes in both chemical and physical properties, thus the various horizons being formed may have markedly different properties from one another and from the parent material.

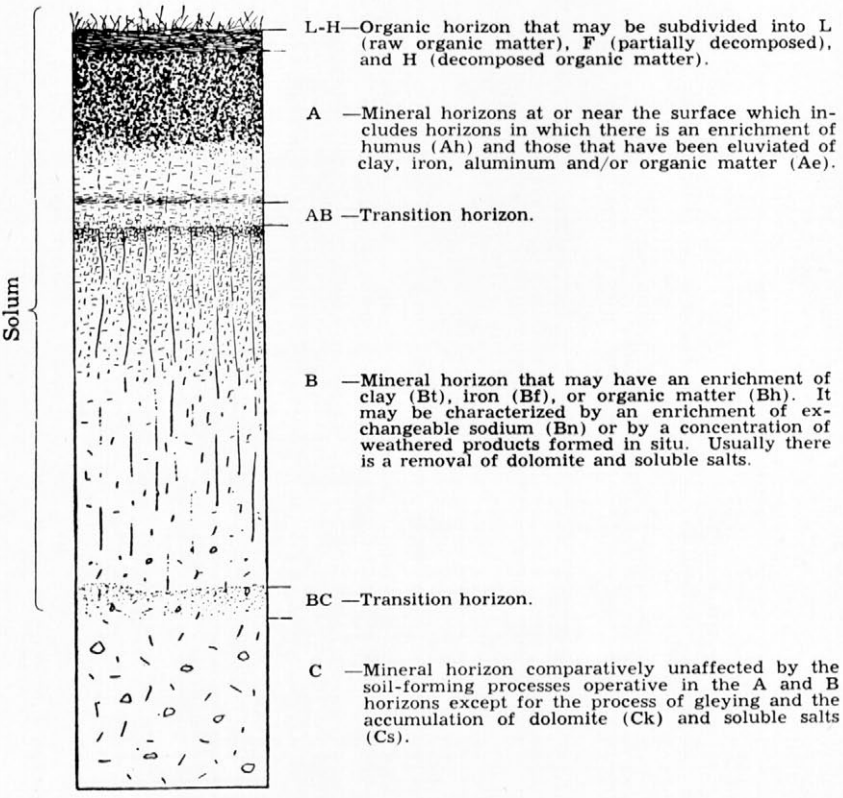


Figure 16—Diagram of a soil profile showing various horizons. Further separations of horizons may be made by the use of suffixes. (See Appendix II).

The soils of this area have formed under the influence of soil-forming factors described in the previous section. The combined effects of these soil-forming factors have fixed the character of each soil mapped. A record of their effects is exhibited by a vertical cut through the soil horizons which reveals the soil profile. The horizons which make up the soil profile differ from one another in one or more of the following features: color, texture, structure, consistency reaction, and chemical and biological composition. The main horizons which make up the soil profile are designated L, F, H, A, B, and C. Each of these major horizons may be subdivided, using the horizon suffixes as described in Appendix II. Figure 16 shows, in diagrammatical form, a normal soil profile with its various horizons.

Through observation of the characteristics of the soil profile it is possible to classify soils in accordance with the processes involved in their formation. Such a classification permits the grouping of soils into natural units, which are indicated in the fifth report of the National Soil Survey Committee of Canada.

SOIL CLASSIFICATION

The basic unit in the classification system is the *soil series.* A soil series consists of soils that have horizons similar in their differentiating characteristics and arrangement in the soil profile, and are formed from a particular type of parent material. Any significant variation in one or more of the soil-forming factors causes dissimilarities of profile characteristics permitting a separation into a different soil series.

When soils have similar profile characteristics but vary in texture of the surface horizons they may be separated into *soil types.* A soil type is a division of a soil series.

When soils have external features that are significant to their use and management, such as topography, stoniness, etc. they are classified as *soil phases.*

In addition to the basic units used in field classification—series, types, and phases—other categories are used to group soils into broader classes. Category VI (Order) provides the largest grouping and is based on the general characteristics common to the entire solum. From this level further separations are made according to horizon characteristics permitting a grouping in Category V (Great Group), and Category IV (Subgroup).

In the mapped area, the soils are grouped into the *Chernozemic, Solonetzic, Podzolic, Gleysolic,* and *Organic Orders.* Further separations are made permitting a grouping into the Great Group and Subgroup categories. The following provides an indication of the features recognized in these categories:

Chernozemic Soils

This Order of soils is confined to the well to imperfectly drained soils developed under grassland or under transition grassland-forest

vegetation. They are characterized by the occurrence of dark colored humus-mineral surface horizons. Recognition of the differences in color of the Ah horizon provides a basis of separating the soils in this Order into the *Brown, Dark Brown, Black,* and *Dark Grey* Great Groups. Further separations are made on the basis of the characteristics of the horizons which permit a grouping at the Subgroup level of categorization. Thus, the *Eluviated Black* Subgroup would be composed of those Black soils that have a lighter colored Ae horizon. Similarly, profiles characterized by the absence of a B horizon, or by saline or gleyed horizons may occur and are indicated in the classification as *Rego, Saline,* or *Gleyed* Subgroup members. Otherwise, profiles exhibiting the normal or standard characteristics of the Great Group are indicated in the Subgroup as *Orthic.*

In the mapped area all of the Chernozemic soils exhibit evidence of leaching, and are characterized by a distinct Ae horizon which permits a grouping into the *Eluviated Black* or *Eluviated Dark Grey* Subgroups.

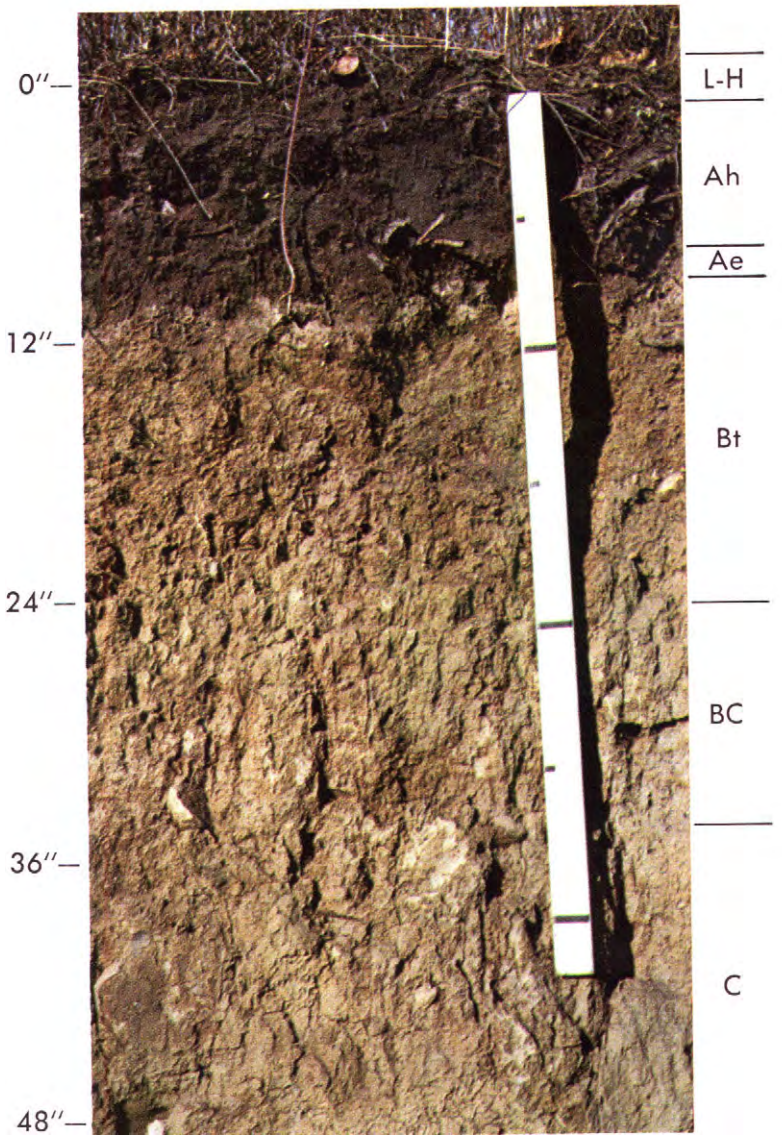
Solonetzic Soils

This Order of soils consists of well to imperfectly drained soils developed under a variable vegetative cover from saline parent materials. Chemical standards provide a guide in the characterization of these soils, but separations into the Great Group category are made mainly on morphological differences evident in the profiles. There is, commonly, a very sharp break between the A and B horizons and the characteristics of these horizons permit a separation into the Solonetz, Solodized Solonetz, and Solod Great Groups. The *Solonetz* soils have a very firm B horizon that is alkaline in reaction and an A horizon that is usually thin when compared to the B horizon. *Solodized Solonetz* profiles are characterized by a distinct, light colored Ae horizon separating the Ah and B horizons, while the *Solod* profiles are characterized by a somewhat thicker A horizon composed of both Ah and Ae subdivisions and by a structural breakdown of the upper portion of the B horizon giving rise to an AB horizon. At the Subgroup level these major profile types may be divided on the basis of significant differences in the color of the A horizons or other features similar to those referred to in the Subgroup separations of the Chernozemic Order. Thus, these Great Groups are separated into *Brown, Dark Brown, Black, Dark Grey, Grey Wooded,* and *Gleyed* Subgroups.

In this mapped area Solonetz and Solodized Solonetz soils are of rare occurrence. However, the Solod soils are of common occurrence and appreciable areas of Black Solod, Dark Grey Solod, and Grey Wooded Solod soils are indicated on the accompanying soil map.

Podzolic Soils

This Order consists of the well and imperfectly drained soils developed under a forest or heath vegetation. They have a pro-



Eluviated Dark Grey

ELUVIATED DARK GREY

Eluviated Dark Grey soils generally occur in areas that are transitional between parkland and woodland—often areas of mixed poplar and shrub growth. The mean annual precipitation is usually from 15 to 18 inches.

These soils are characterized by:

(a) A thin leaf mat (L-H).

(b) A fairly deep dark grey surface (Ah).

(c) A thin light brown layer (Ae) is usually present.

(d) A blocky structural subsoil that is more clayey than the surface soil.

These soils are usually well supplied with plant nutrients. If cultivated for any length of time they will respond to the application of nitrogen and phosphorus bearing fertilizers.

Alberta Soil Survey

S-S-Series 2 Aug. 1963

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nounced, light colored, eluvial (Ae) horizon which is underlain by an illuvial (B) horizon that has an accumulation of sesquioxides, organic matter, clay, or any combination of these. Depending on the main accumulation products in the B horizons, provision is made for a grouping of soils into the *Grey Brown Podzolic, Grey Wooded, Humic Podzol,* and *Podzol* Great Groups. In the first two groups clay is the main accumulation product. Organic matter is the main accumulation product of the Humic Podzol group, and a combination of organic matter and sesquioxides is the main accumulation product in the Podzol group. Further separations made on the recognition of various horizon characteristics permit a grouping at the Subgroup level of classification.

In the mapped area, all of the Subgroups of the Grey Wooded Great Group have been recognized. However, apart from the *Orthic Grey Wooded* and the *Dark Grey Wooded* the occurrence *of other* Subgroups was limited to small areas which were not feasible to indicate on the scale of mapping used in this survey. The *Orthic Grey Wooded* Subgroup consists of soils that have an organic surface horizon (L-H) with a light colored Ae horizon and a Bt horizon. They may have a thin Ah (less than 2 inches), a slightly mottled lower Ae horizon, and a marked AB horizon. The *Dark Grey Wooded* Subgroup consists of soils that have a thicker Ah horizon (2 to 4 inches) overlying a prominent Ae horizon and a Bt horizon. *Brunisolic Grey Wooded* soils are characterized by a brown or reddish brown upper Ae1 (Bmfl) which grades to a lighter colored Ae2 horizon overlying the Bt horizon. *Bisequa Grey Wooded* soils have a Podzol sequence of horizons developed in the Ae horizon overlying a continuous Bt horizon at depths of less than 30 inches from the surface. *Gleyed Grey Wooded* soils show evidence of gleying indicated by mottling or other discolorations due to periodic wetness in the Ae and Bt horizons. *Peaty Grey Wooded* soils show evidence of gleying and have a peaty surface accumulation of 6 to 12 inches in thickness.

Gleysolic Soils

This Order is composed of soils associated with wetness. They have developed under various climatic and vegetative conditions in the presence of a high or a highly fluctuating water table. These soils may have an organic horizon not exceeding a compacted thickness of 12 inches, an Ah horizon, or some organic material dispersed throughout the mineral soil. They are characterized by dull colors and may have prominent yellowish or reddish colored mottles. The outstanding characteristics of the A horizon provide a guide to grouping at the Great Group level. Thus the *Humic Gleysol* Great Group consists of soils that have an Ah horizon that is more than 3 inches in thickness under virgin conditions, the *Gleysol* Great Group consists of soils that have less than 3 inches of an Ah horizon under virgin conditions, whereas the *Eluviated Gleysol* Great Group is characterized by a prominent Ae horizon. Further separations are

made permitting a grouping in the Subgroup category. These involve the consideration of salts, carbonates, a peaty surface, or the absence of a B horizon permitting the designation of *Saline, Carbonated, Peaty,* or *Rego* Subgroups. In addition, the thickness of the Ah horizon characterizes the *Humic* and the *Low Humic Eluviated* Gleysol Subgroups.

In the mapped area, the most common of the Gleysolic soils are the Orthic Humic Gleysols, the Peaty Humic Gleysols, the Humic Eluviated Gleysols, and the Low Humic Eluviated Gleysols.

Organic Soils

The classification of this Order of soils is still under study and several approaches have been made in the methods of field classification beyond the Order level.

This Order of soils includes wet soils characterized by an accumulation of organic matter that in a compressed state exceeds a thickness of 12 inches. In the mapped area, two separations were made that closely approach the proposed Great Groups of *Low Nutrient bogs* and *High Nutrient bogs*. They are the fibrous peat or sedge bog soils and the sphagnum peat or moss bog soils.

SOIL SURVEY METHODS AND MAPPING

The soil survey of the Cherry Point and Hines Creek area was a reconnaissance survey carried out by making traverses at approximately one mile intervals. Along the lines of traverse test holes were dug to permit a study of the morphological features of the soils. Soil boundary lines were determined along the lines of traverse, projected between the lines of traverse, and checked with the use of aerial photographs. In addition, a record was made on the township plans of the improved land, density of tree cover, stones, topography, and other features considered pertinent to the agricultural development of this area. The field classification used in recording some of these features is defined in Appendix II of this report. Munsell Soil Color Charts were used as a guide in describing the colors of the soils and all descriptions refer to virgin soil profiles.

The detail of separation of soil series is governed by the scale of mapping. While the field information is recorded on township plans at a scale of one mile to two inches, the accompanying soil map is prepared on a scale of three miles to one inch. Thus, there is a limit imposed on the size of areas that can be shown on this soil map. As a result, in mapping an area characterized by a complex soil pattern an effort is made to indicate this pattern by recording the presence of the dominant soil series. Most of the map units, shown on the accompanying soil map, are indicated as a soil association containing several soil series shown in their order of dominance. The selection of these dominant soil series composing the map unit involves the elimination of the less prevalent associated soil series. For example, in many of the map units composed dominantly of Dark Grey Wooded profiles, there will be some Eluviated Dark Grey profiles which

are not feasible to separate on this scale of mapping. Thus, further inspections must be made if information of a more detailed nature is required.

SOIL RATING

In addition to the classification and mapping of the soils of the Cherry Point and Hines Creek area, a grouping was made to provide a comparative rating of the soils indicating their inherent productivity. This information is presented in map form and accompanies this report.

The productivity rating is essentially an interpretation of the morphological features of the soil and the physical characteristics of the area as they affect plant growth and agricultural use. Such factors as type of soil profile, texture of the soil, degree of stoniness, topography, and elevation were all taken into consideration. For the purpose of this report, soils occurring at elevations of approximately 2,700 feet to 3,000 feet have received a lower rating than comparable soils at lower elevations and soils occurring at elevations exceeding 3,000 feet are indicated as unsuitable for grain crop production. Factors such as hail incidence, local frost hazard, and distance from markets were not considered. However, the past performance of somewhat similar soils under the prevailing grain cropping systems of management were used as a guide.

This productivity rating serves only to compare the inherent productivity of the soils in this area, and is not intended to indicate potential capabilities. Changing methods of management and cultivation, and the increasing use of commercial fertilizers will greatly affect the future productivity of any of the soils in this mapped area.

On the basis of their inherent productivity, the soils of this mapped area have been grouped into seven productivity groups; three non-arable and four arable, in accordance with their suitability for grain production.

Most of the soil areas that appear on the soil map consist of more than one soil series. As each of these soil series may have a different productivity rating, it was necessary to consider averages when applying this rating system to soil areas. Thus, the soil rating map should be regarded as presenting average ratings of soil areas rather than specific ratings for individual land parcels. Further, because the density of native tree cover is quite variable in this area, no attempt was made to subdivide the pasture lands according to their carrying capacity. They are shown on the rating map as P & W (pasture and woodland). The following is the approximate acreage of each of the productivity groups as outlined on the accompanying soil rating map.

P. & W.	Pasture and woodland, non-arable land	507,800
Group 4.	Poor to fair arable land	182,800
Group 5.	Fair to fairly good arable land	300,700
Group 6.	Fairly good to good arable land	837,500
Group 7.	Good to very good arable land	151,000

It should be recognized however, that with the continuing improvement in farming practices and the introduction of new varieties of farm crops, the productivity capacity of these soils will undoubtedly rise and a shift in the present proposed limits for these productivity groups may be necessary.

DESCRIPTION OF SOILS

The soils of the Cherry Point and Hines Creek area are grouped according to their drainage characteristics and on the basis of similarity of parent material. In the classification of the well to imperfectly drained soils, parent material has a marked effect on profile characteristics. Soils formed under poorly drained conditions are characterized by profiles that show little difference over a much wider range of parent materials and are grouped according to their textural characteristics.

In the descriptions to follow, information is presented on the profile features that characterize each soil, and in the occurrence, topography, vegetation, rating, and agricultural use. In addition, information on the parent materials, and the Subgroup classification is presented. A summary of this grouping and classification is shown in the soil map legend and in appendix IV.

I. WELL TO IMPERFECTLY DRAINED SOILS

A. SOILS DEVELOPED ON TILL

1. Yellowish brown to greyish brown, slightly calcareous, loam to clay loam.

This till is somewhat stony, has occasional coal flecks and is derived mainly from both the Smoky and the Wapiti formations of Late Cretaceous age. This fairly uniform, medium to fine textured till forms the parent material of the *Braeburn* series in this area.

(a) Braeburn Series—Orthic Grey Wooded, loam to clay loam.

Extent and Occurrence: The Braeburn soils occupy a very small area of approximately 300 acres in the southwestern portion of this area. They occur in association with Codesa soils.

Topography: In this area these soils occur on hilly topography.

Native Vegetation: Predominantly aspen poplar with varying mixtures of white spruce, pine, birch, and various shrubs.

Profile Description: The Braeburn soils have a dark greyish brown L-H horizon; a moderately thick, light yellowish brown Ae horizon that is medium acid in reaction; and a moderately well developed, blocky structured, dark yellowish brown Bt horizon. The solum of these soils is from 34 to 48 inches in thickness. The following description is typical of a Braeburn soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark greyish brown (10YR 4/2, moist),* leaf mat. pH 6.8.
Ahe	1	Greyish brown (10YR 5/2, moist) loam, weak fine granular. Usually thin, often absent. pH 6.6.
Ae	4	Light yellowish brown (10YR 6/4, moist) very fine sandy loam, fine to medium platy, friable. pH 5.5.
AB	3	Yellowish brown (10YR 5/4, moist) silt loam, fine subangular blocky, firm, somewhat porous. pH 5.2.
Bt	10	Dark yellowish brown (10YR 4/4, moist) clay, medium to coarse blocky, firm. pH 5.0.
BC	16	Dark yellowish brown (10YR 4/4, moist) clay loam, fine to medium subanuglar blocky, firm. pH 5.5.
Cca	at 35 below surface	Greyish brown (10YR 5/2, moist) clay loam with occasional bands of dark grey (10YR 4/1, moist) clay. Lime occurs in pockets or in small beds. pH 7.5.
Ck		Greyish brown (10YR 5/2, moist) clay loam, with occasional pockets of sandy loam and silt loam. pH 7.0.

*Munsell designation

Agriculture: The Braeburn soils of this area occur on hilly topography, and are not cultivated.

Soil Rating: Hilly phases of these soils are considered as nonarable.

2. Brown to greyish brown, slightly calcareous and saline, clay loam to clay.

This till, derived largely from the Kaskapau and Dunvegan formations of Late Cretaceous age, is generally finer textured and somewhat darker in color than the till described above. It forms the parent material of the *Alcan* and *Murdale* soils.

(a) Alcan Series—Grey Wooded Solod, silt loam to clay loam.

Extent and Occurrence: These soils occupy approximately 217,800 acres in the northwestern, northern, and northeastern portions of the mapped areas. The Alcan soils occur in association with Murdale, Boundary, Codesa, Snipe, Goose, Prestville, Eaglesham and Kenzie soils in this area.

Topography: Undulating to hilly.

Native Vegetation: Predominantly aspen poplar and white spruce with varying mixtures of pine, birch, and various shrubs.

Profile Description: The Alcan soils have a thin leaf mat and may have a thin dark greyish brown Ah horizon, underlain by a moderately thick, greyish Ae horizon that is usually fine sandy loam in texture with a platy structure. This horizon is medium to strongly acid in reaction. The Bt horizon has a dark greyish brown color, a clay texture, and a weak columnar to blocky structure that is very firm. This horizon is relatively thick and has a strong acid reaction. The following profile description is representative of the Alcan series:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 6.8.
Ahc	1	Dark greyish brown (10YR 4/2, moist) loam, weak granular, friable. Usually thin, or may be absent. pH 6.6.
Ae	4	Light grey (10YR 7/2, moist) silt loam, platy, friable. pH 5.2.
AB	4	Brown (10YR 5/3, moist) silt loam, weak subangular blocky, firm. Aggregates generally coated with material from horizon above. pH 5.0.
Btn1	15	Dark greyish brown (10YR 4/2, moist) clay, weak columnar, very firm. Columns commonly have a very dark grey coating. pH 4.4.
Btn2	11	Very dark greyish brown (10YR 3/2, moist) clay, strong blocky, very firm. pH 4.5.
BC	12	Very dark grey (10YR 3/1, moist) clay, strong medium subangular blocky, firm. pH 5.0.
Csaca	6	Grey (10YR 5/1, moist) clay, salts occur in beds as fairly large crystals, lime occurs in small scattered pockets. pH 6.6
Csk	at 54 below surface	Very dark greyish brown (10YR 3/2, moist) clay with variable amounts of pebbles and stones. Saline and slightly calcareous. pH 6.5.

Agriculture: The Alcan soils of this area occur mainly in their virgin state and support good stands of poplar and white spruce. However, investigations elsewhere indicate that these soils can be used to advantage in crop production when recommended management practices are followed.

Soil Rating: Undulating to gently rolling phases are fair to fairly good arable soils, rolling phases are poor to fair arable soils, and hilly phases are non-arable.

(b) Murdale Series—Dark Grey Solod, silt loam to clay loam.

Extent and Occurrence: The Murdale soils occur in association with the Alcan soils in this area but were not mapped as a dominant soil series. Therefore, no estimate was made of their acreage.

Topography: Gently rolling and rolling.

Native Vegetation: Predominantly aspen poplar with varying mixtures of white spruce, pine, birch, and various shrubs.

Profile Description: The profile of the Murdale soils is like that of the Alcan soils with the exception of a thicker organic-mineral (Ah) horizon. This horizon is very dark greyish brown in color and is usually 3 to 4 inches thick. The following profile description is typical of the Murdale soil series:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH. 6.6.
Ah	3	Dark greyish brown (10YR 4/2, moist) silt loam, weak granular, friable. pH. 6.4.
Ae	3	Very pale brown (10YR 7/3, moist) silt loam, platy. pH 5.3.
AB	4	Brown (10YR 5/3, moist) silt loam, weak subangular blocky, firm. Aggregates coated with materials from horizon above. pH 5.0.
Btn	10	Dark brown (10YR 4/3, moist) clay, weak columnar, very firm. Columns have dark grey coatings. pH 6.5.
BC	6	Very dark greyish brown (10YR 3/2, moist) clay, subangular blocky, firm. pH 7.4.
Csaca	6	Grey (10YR 5/1, moist) silty clay loam, salts occur in pockets and beds as fairly large crystals. Lime occurs in small scattered pockets. pH 7.8.
Csk	at 33 below surface	Very dark greyish brown (2.5Y 3/2, moist) silty clay loam with variable amounts of pebbles and stones. Saline and calcareous. pH 7.5.

Agriculture: The Murdale soils are not being extensively cultivated in this area. They occur in small areas associated with Alcan soils in regions not extensively improved for agricultural purposes.

Soil Rating: Undulating to gently rolling phases are fairly good to good arable soils, whereas the steeper and rougher phases are fair to poor arable soils depending on the degree of slope.

TABLE 7—Analyses of Alcan and Murdale Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size: Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Alcan silt loam—Grey Wooded Solod—NE 36-86-12-W6																	
L-H	1	....	....	....	....	6.8	0.15	36.00	24	88.1	68	20	0	4	8	92	3.4
Ae	3	24	60	16	2	5.2	0.06	0.93	15	9.8	35	20	0	4	41	59	1.7
BA	5	18	57	25	5	5.0	0.05	0.76	15	12.5	27	26	0	5	42	58	1.0
Btn1	15	12	40	48	29	4.4	0.04	0.62	16	30.1	18	30	0	2	50	50	0.6
Btn2	11	4	32	64	33	4.5	0.05	0.81	16	28.9	28	43	1	2	26	74	0.6
BC	19	5	34	61	30	5.0	0.06	1.01	16	28.5	34	49	1	2	14	86	0.7
Csk	at 54	12	33	55	28	6.5	.....	.....	....	.....	....	....	....	....	....	....	....
Murdale silt loam—Dark Grey Solod—SW 30-84-2-W6																	
Ahe	3	64	21	15	9	6.4	0.42	4.54	11	27.8	63	17	6	2	12	88	2.7
Ae	4	32	52	16	4	5.3	0.05	0.55	11	12.3	41	16	4	2	37	63	2.0
BA	4	13	63	24	6	5.0	0.06	0.60	10	14.4	12	19	1	1	67	33	0.6
Btn	10	40	13	47	25	6.5	0.06	0.60	11	26.1	39	47	1	2	11	89	0.8
BC	6	19	41	41	22	7.4	.....	.....	....	28.2	59	38	2	1	0	100	1.5
Csk	at 27	13	55	32	16	7.5	.....	.....	....	.....	....	....	....	....	....	....	....

Horizon	Soluble Salt Analysis: Conductivity mmhos./cm.	Cations: Ca^{++} %	Mg^{++} %	Na^{+} %	Total m.e./l.	Anions: $SO_4^{=}$ %	Cl^{-} %	HCO_3^{-} %	$CO_3^{=}$ %	Total m.e./l.
Alcan silt loam—Grey Wooded Solod—NE 36-86-12-W6										
Csk (at 54 ins.)	4.0	7	85	8	68.7	99	1	0	0	52.4
Csk (at 10 ft.)	5.2	27	62	11	88.1	97	2	1	0	82.6

B. SOILS DEVELOPED ON GLACIO-FLUVIAL MATERIALS

1. Dark brown to greyish brown loam to clay loam.

This material is somewhat gravelly, moderately calcareous, and may have strata of varying thickness or pockets of silt, sand and gravel. Salts in small quantities are present, usually at depths greater than 5 feet.

(a) Whitelaw Series—Orthic Grey Wooded, loam to clay loam.

Extent and Occurrence: Whitelaw soils occur in the southeastern portion of the mapped area. There are approximately 10,900 acres in which these soils predominate. These soils also occur in association with other soils of the area but no estimate was made of their extent, especially if they were of secondary importance. They are found in association with Berwyn, Hazelmere, Albright, Belloy, Codesa, and Snipe soils in this area.

Topography: Undulating to gently rolling with simple slopes.

Native Vegetation: Aspen poplar with varying mixtures of birch, willow, white spruce, and various shrubs.

Profile description: The profile of the Whitelaw soils has a very dark brown, organic (L-H) horizon which rests on a light brown Ae horizon. This horizon is moderately thick and is medium to strongly acid in reaction. Underlying this horizon is a dark brown to dark yellowish brown Bt horizon that has a weak blocky structure. This horizon is not as firm as the B horizon of the Alcan series. The solum of this soil is generally coarser textured and more variable than the solum of the Braeburn series. The following description is representative of a Whitelaw soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Very dark brown (10YR 2/2, moist) leaf litter. pH 6.0.
Ahe	1	Dark grey (10YR 4/1, moist) loam, weak granular, friable. May be absent. pH. 5.7.
Ae	3	Pale brown (10YR 6/3, moist) silt loam, platy, friable. pH 5.5.
AB	3	Brown (10YR 4/3, moist) clay loam, fine subangular blocky, firm. pH 4.8.
Bt1	4	Dark brown (10YR 3/3, moist) clay, subangular blocky, firm. pH 4.8.
Bt2	6	Dark yellowish brown (10YR 3/4, moist) clay, weak blocky, firm. pH 4.5.
BC	5	Dark brown (10YR 3/3, moist) clay loam, weak subangular blocky, firm. pH 5.2.
C	at 23 below surface	Dark brown (10YR 3/3), moist) clay loam, somewhat gravelly. pH 6.5.

Agriculture: The Whitelaw soils are not extensively cultivated in the mapped area. (See Cultivation Map, Fig. 5.) They are being used in coarse grain and grass seed production with good results.

These soils are relatively low in organic matter and show a response to applications of phosphate fertilizers. Crop rotations that

include crops which will build up the organic matter content, supplemented by applications of commerical fertilizer, should be considered in the use of these soils for a continuing and profitable agriculture.

Soil Rating: Fairly good arable soils.

(b) Berwyn Series—Dark Grey Wooded, loam to clay loam.

Extent and Occurrence: Berwyn soils occur in the southeastern portion of the mapped area in the vicinity of Whitelaw and Bluesky. There are approximately 20,000 acres in which these soils predominate. In this area they are found in association with Whitelaw, Belloy, Albright, Peoria, and Snipe soils.

Topography: Undulating to gently rolling.

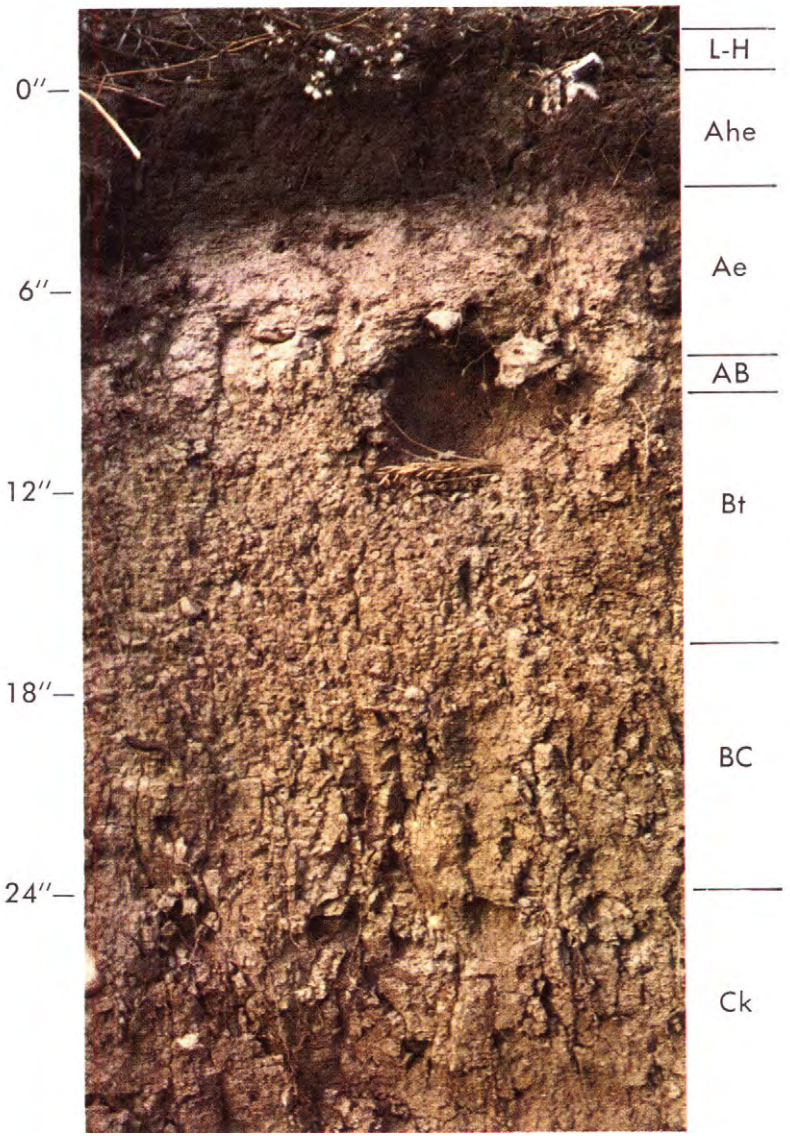
Native Vegetation: Aspen poplar with varying mixtures of birch, willow, white spruce, and various shrubs.

Profile Description: The soil profile is like that of the Whitelaw soil except for a thicker organic-mineral (Ahe) horizon. This Ahe horizon is dark grey in color and is usually 3 to 4 inches thick. The following description is representative of a Berwyn soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Very dark brown (10YR 2/2, moist) leaf litter. pH 6.0.
Ahe	3	Dark grey (10YR 4/1, moist) silt loam, weak granular, friable. pH 5.7.
Ae	2	Pale brown (10YR 6/3, moist) silt loam, platy, friable. pH 5.5.
AB	2	Brown (10YR 5/3, moist) clay loam, fine to medium subangular blocky, firm. pH 5.2.
Bt1	4	Dark greyish brown (10YR 4/2, moist) clay, subangular blocky, very firm. pH 5.0.
Bt2	8	Dark brown (10YR 4/3, moist) clay loam, weak blocky, firm. pH 4.8.
BC	5	Dark brown (10YR 3/3, moist) clay loam, weak subangular blocky, firm. pH 5.5.
Ck	at 25 below surface	Dark brown (10YR 4/3, moist) clay loam, somewhat gravelly. pH 7.0.

Agriculture: Berwyn soils are fairly extensively cultivated in this area. Considerable success has been experienced in the pro-

Figure 17—Barley crop in a Berwyn soil area near Bluesky.



Dark Grey Wooded

DARK GREY WOODED

Dark Grey Wooded soils occur in the fringes of the main forested part of Alberta and in areas of lighter tree cover. They are intermediate between Orthic Black soils and Orthic Grey Wooded soils. They are usually fairly well supplied with the mineral plant foods and have a moderate amount of organic matter. They will, however, respond to the application of green manures, nitrogen, and at times sulphur and phosphorus.

Dark Grey Wooded soils are characterized by:

(a) A leaf mat (L-H).

(b) A dark colored surface horizon 2 to 4 inches thick (Ah).

(c) A light brown, usually platy structured layer 2 to 4 inches thick (Ae). (The above three layers are usually mixed on cultivation, giving a grey to dark grey color.)

(d) A blocky structured subsoil (Bt).

This Dark Grey Wooded is a Saddle loam. It is, in general, fairly good arable land. It is somewhat susceptible to water erosion.

Alberta Soil Survey

S-S-Series 2 Aug. 1963

Available from:
Department of Extension
University of Alberta
Edmonton, Alberta, Canada

TABLE 8.—Analyses of Whitelaw and Berwyn Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size: Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Whitelaw silt loam—Orthic Grey Wooded—NW 15-83-1-W6																	
L-H	1	....	....	....	....	6.2	0.58	6.89	12	.....	....	....	....	....	....	....	....
Ae	3	37	50	13	0	5.5	0.06	0.61	10	9.2	68	11	2	3	16	84	5.1
AB	3	21	47	32	12	4.9	0.07	0.57	8	14.4	53	17	2	2	26	74	2.8
Bt1	4	19	11	70	21	4.5	0.07	0.59	9	21.2	48	17	1	1	33	68	2.6
Bt2	6	18	33	49	21	4.5	0.06	0.53	9	22.1	47	17	1	1	34	66	2.7
BC	5	16	33	51	21	4.6	0.06	0.63	10	21.2	48	17	1	1	33	68	2.6
CG	at 22	15	23	62	20	4.9	.....	.....	....	.....	....	....	....	....	....	....	....
Berwyn silt loam—Dark Grey Wooded—NW 9-82-1-W6																	
L-H	1	....	....	....	....	....	.....	.....	....	.....	....	....	....	....	....	....	....
Ahe	3	27	58	15	10	6.6	0.68	7.00	10	39.7	85	3	1	5	6	94	28.3
Ae	3	25	67	8	6	6.4	0.07	0.72	10	9.2	76	3	4	4	13	87	10.8
AB	3	21	40	39	22	5.9	0.07	0.62	9	20.2	74	15	1	1	9	91	4.6
Bt1	4	17	39	44	27	5.0	0.06	0.75	12	22.4	65	19	1	2	13	87	3.2
Bt2	8	21	40	39	27	4.8	0.06	0.63	10	23.1	59	15	1	2	23	77	3.7
BC	6	29	37	34	23	4.5	0.07	0.49	7	22.4	59	14	2	2	23	77	3.7
Ck	at 28	22	42	36	22	6.5	.....	.....	....	25.1	74	20	2	2	2	98	3.4

Horizon	Conductivity mmhos/cm	Soluble Salt Analysis: Cations: Ca^{++} %	Mg^{++} %	Na^{+} %	Total me/1	Anions: $SO_4^{=}$ %	Cl^{-} %	HCO_3^{-} %	$CO_3^{=}$ %	Total me/1
Whitelaw silt loam—Orthic Grey Wooded—NW15-83-1-W6										
Csk (at 5 ft.)	0.2	....	....	....	.....	....	....	....	....	.....
Csk (at 10 ft.)	4.2	40	44	16	68.5	84	14	2	0	70.8
Berwyn silt Loam—Dark Grey Wooded—NW 9-82-1-W6										
Csk (at 5 ft.)	1.6	38	46	16	19.8	77	13	10	0	18.7
Csk (at 10 ft.)	4.5	42	39	19	68.4	96	1	3	0	62.4

duction of grasses and grain crops on these soils. The maintenance of organic matter and the use of commercial fertilizers are essential considerations to their continued successful cropping.

Soil Rating: Fairly good to good arable soils.

C. SOILS DEVELOPED ON LACUSTRO-TILL MATERIALS

1. Variable grey to dark greyish brown clay loam to clay.

This fine textured material has alternating strata of sandy loam or loam that may be gravelly or stony. It is moderately calcareous and saline.

(a) Hazelmere Series—Grey Wooded Solod, loam to clay loam.

Extent and Occurrence: The Hazelmere soils occur in the northern portion of the mapped area at elevations of about 2,250 to 2,400 feet. There are approximately 196,700 acres in which these soils are predominant. They are found in association with Albright, Codesa, Doig, Whitelaw, Snipe, Goose, Eaglesham, and Kenzie soils in this area.

Topography: Undulating to gently rolling with long, uniform slopes.

Native vegetation: Aspen poplar associated with varying mixtures of black poplar, white spruce, birch, willow, and various shrubs.

Profile Description: Hazelmere soils have a thin dark brown organic (L-H) horizon underlain by a greyish Ae horizon that is medium acid in reaction. This horizon rests on a brownish Bt horizon that has a clay texture, weak columnar structure, and is strongly acid in reaction. The following description is representative of a Hazelmere soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH. 6.4.
Ahe	1	Dark greyish brown (10YR 4/2, moist) silt loam, weak granular, friable. May be absent. pH 6.2.
Ae	3	Light brownish grey (10YR 6/2, moist) silt loam, platy, friable. pH 6.0.
AB	3	Greyish brown (10YR 5/2, moist) silt loam, subangular blocky, firm. pH. 5.5.
Btn1	5	Dark greyish brown (10YR 4/2, moist) clay, weak columnar, very firm. pH 5.3.
Btn2	7	Dark brown (10YR 3/3, moist) clay, strong blocky, very firm. pH 5.7.
BC	8	Very dark greyish brown (10YR 3/2, moist) clay loam, subangular blocky, firm. pH 6.8.
Ccasa	at 28 below surface	Very dark greyish brown (2.5Y 3/2, moist) clay loam with strata of yellowish brown (10YR 5/4, moist) gravelly sandy clay loam. Strata are of varying thickness, and salt and lime accumulation is common. pH 7.8.

Agriculture: A relatively small proportion of the Hazelmere soil areas is presently under cultivation in the mapped area. (See Cultivation Map. Fig. 5.) These soils are generally low in fertility

and should respond to applications of commercial fertilizers. Crop rotations that include grasses to build up the organic matter content of the surface soil, and deep-rooted legumes to open up and thereby improve the structure of the subsoil should be considered in the use of these soils for a profitable agriculture.

Soil Rating: Fairly good arable soils.

(b) Albright Series—Dark Grey Solod, loam to clay loam.

Extent and Occurrence: The Albright soils occur in the northern portion of the mapped area at the same elevations as the Hazelmere soils. There are approximately 124,000 acres in which these soils predominate. They are found mainly in association with Hazelmere, Fairview, Doig, Berwyn, Belloy, and Snipe soils in this area.

Topography: Undulating to gently rolling topography consisting of long uniform slopes.

Native Vegetation: Aspen poplar associated with varying mixtures of shrubs and native grasses.

Profile Description: Albright soils have the same sequence of horizons within the soil profile as the Hazelmere soils. They differ only in the thickness of their Ahe horizon. Albright soils possess a dark greyish brown Ahe horizon that is usually 3 or 4 inches thick. The following is a description of an Albright soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 6.5.
Ahe	3	Dark greyish brown (10YR 4/2, moist) silt loam, weak granular, friable. pH 6.0.
Ae	2	Pale brown (10YR 6/3, moist) silt loam, platy, friable. pH 5.6.
AB	2	Brown (10YR 5/3, moist) clay loam, subangular blocky, firm. pH 5.5.
Bt	3	Dark greyish brown (10YR 4/2, moist) silty clay, weak columnar, very firm. pH 5.3.
Btn	4	Dark brown (10YR 3/3, moist) silty clay, strong blocky, very firm. pH 5.6.
BC	8	Dark brown (10YR 3/3, moist) clay loam, subangular blocky, firm. pH. 7.0.
Ccasa	at 23 below surface	Very dark greyish brown (2.5Y 3/2, moist) clay loam with strata of yellowish brown (10YR 5/4, moist) gravelly sandy clay loam. Lime accumulation usually occurs in the upper portion of this horizon. Salt accumulation generally occurs just below the lime accumulation. pH 7.6.

Agriculture: The Albright soils of this area are largely under cultivation. (See Cultivation Map, Fig. 5.) Grasses, legumes and coarse grains have been grown on these soils with considerable success. The maintenance of organic matter in the surface soil and the improvement of permeability and structure of the subsoil is essential to continued successful cropping.

Soil Rating: Fairly good to good arable soils.

(c) Fairview Series—Black Solod, loam to clay loam.

Extent and Occurrence: The Fairview soils occur in the central portion of the mapped area at the same elevation as the Albright soils. These soils predominate in approximately 7,800 acres of the mapped area. They are found in association with Albright, Tangent, Peoria, Belloy, and Snipe soils.

Topography: Undulating to gently rolling consisting of long uniform slopes.

Native Vegetation: Aspen poplar associated with varying mixtures of shrubs and native grasses.

Profile Description: Fairview soils have the same sequence of horizons within the soil profile as the Albright soils. They differ only in the thickness and color of their Ah horizon. The Fairview soils have a very dark greyish brown Ah horizon that is usually 4 to 6 inches thick. The following is a description of a profile typical of the Fairview soil series:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) litter. pH 6.0.
Ah	5	Very dark greyish brown (10YR 3/2, moist) silt loam, weak granular, friable. pH 5.8.
Ae	2	Pale brown (10YR 6/3, moist) silt loam, platy, friable. pH. 5.7.
AB	2	Brown (10YR 5/3, moist) clay loam, subangular blocky, firm. pH 5.5.
Btn	7	Dark greyish brown (10YR 4/2, moist) clay, weak columnar, very firm. pH 6.9.
BC	7	Dark brown (10YR 3/3, moist) clay loam, subangular blocky, firm. pH 7.6.
Ccasa	at 24 below surface	Very dark greyish brown (2.5Y 3/2, moist) clay loam with strata of yellowish brown (10YR 5/4, moist) gravelly sandy clay loam. Lime accumulation generally occurs in the upper portion of this horizon. Salt accumulation generally occurs just below the lime accumulation. pH 7.8.

Agriculture: Fairview soils are considered to be among the best productive soils in this area. Grain is the principal crop produced. The maintenance of organic matter in the surface horizon by a good rotation program and the periodic use of commercial fertilizers should be considered in the management of these soils. Fairview soils are susceptible to wind and water erosion and unless precautionary measures are taken crop production could be seriously curtailed. The maintenance of cover crops would be advantageous in the development of a successful cropping plan for these soils.

Soil Rating: Good to very good arable soils.

TABLE 9—Analyses of Hazelmere, Albright, and Fairview Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size — Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Hazelmere silt loam—Grey Wooded Solod—NW 10-83-3-W6																	
L-H	1	....	....	....	....	6.0	0.34	3.07	9	31.4	79	4	1	4	12	88	16.5
Ae	3	26	61	13	3	5.8	0.06	0.69	11	9.7	62	15	3	3	17	83	4.0
AB	3	19	58	23	9	5.2	0.06	0.46	8	11.0	45	27	3	2	23	77	1.5
Btn1	6	15	42	43	26	4.9	0.06	0.67	11	21.0	38	38	3	1	20	80	0.9
Btn2	8	17	41	42	25	5.2	0.06	0.77	13	24.5	45	39	3	1	12	88	1.1
BC	11	20	41	39	22	6.7	0.06	0.81	13	21.3	48	47	3	1	1	99	1.0
Ccasa	at 32	22	39	39	22	7.4	.....	.....	....	.....	....	....	....	....	....	....	....
Albright silt loam—Dark Grey Solod—NE 12-82-2-W6																	
L-H	1	....	....	....	....	5.6	0.52	5.52	11	26.3	62	6	2	3	27	73	7.7
Ahe	3	16	64	20	8	5.3	0.30	2.66	9	20.1	60	2	2	2	34	66	15.0
Ae	2	14	70	16	3	5.5	0.11	1.06	10	11.0	57	7	3	1	32	68	5.7
AB	2	16	47	37	23	5.3	0.08	0.75	9	17.5	46	26	7	1	20	80	1.4
Btn	7	14	48	38	25	5.0	0.07	0.79	11	25.8	36	39	8	1	16	84	0.8
BC	8	16	41	33	21	5.6	0.07	0.74	11	24.8	39	37	16	0	8	92	0.7
Ccasa	at 23	16	45	39	18	7.3	.....	.....	....	.....	....	....	....	....	....	....	....
Fairview silt loam—Black Solod—NE 17-82-3-W6																	
Ah	5	24	52	24	9	5.8	0.55	6.66	12	31.3	63	19	1	1	16	84	3.2
Ae	2	21	63	16	9	6.0	0.11	1.00	9	10.3	51	22	2	1	24	76	2.1
AB	2	25	44	31	15	5.5	0.09	0.79	9	15.9	38	44	2	2	14	86	0.8
Btn	7	22	41	37	22	6.9	0.08	0.81	11	27.3	34	59	3	1	3	97	0.6
BC	8	25	45	30	19	7.6	0.05	0.61	13	21.2	33	61	5	1	0	100	0.5
Ccasa	at 24	25	42	33	17	7.6	0.05	0.51	11	27.9	34	62	3	1	0	100	0.5

Horizon	Soluble Salt Analysis: Conductivity mmhos./cm.	Cations: Ca^{++} %	Mg^{++} %	Na^{+} %	Total me/1	Anions: $SO_4^{=}$ %	Cl^{-} %	HCO_3^{-} %	$CO_3^{=}$ %	Total me/1
Hazelmere silt loam—Grey Wooded Solod—NW 10-83-3-W6										
Csk (at 5 ft.)	4.5	33	52	15	74.6	90	8	2	0	75.9
Csk (at 10 ft.)	4.2	36	50	14	69.6	96	2	2	0	65.0
Albright silt loam—Dark Grey Solod—NE 12-82-2-W6										
Ck (at 5 ft.)	1.9	29	53	18	25.1	84	8	8	0	28.1
Csk (at 10 ft.)	3.8	36	52	12	61.1	94	3	3	0	59.2
Fairview silt loam—Black Solod—NE 17-82-3-W6										
BC	1.3	21	35	44	16.4	94	1	5	0	10.9
Ccasa (at 2 ft.)	4.0	38	45	17	66.2	98	1	1	0	68.2

2. Uniform grey to dark greyish brown clay loam to clay.

This fine textured material may have occasional, lighter colored, thin strata of sandy to silty materials that may be gravelly. Moderately calcareous and saline. Pebbles are of common occurrence. The soils formed on this material are characterized by a darker colored solum with fewer stones than the soils formed on the more variable material of similar orgin.

(a) Grimshaw Series—Dark Grey Solodized Solonetz, silt loam to clay.

Extent and Occurrence: Grimshaw soils occur in the southeastern portion of the mapped area. There are only approximately 200 acres in which they predominate, but they become more dominant in the area to the east. They are found in association with Albright, Esher, and Snipe soils.

Topography: Level to undulating.

Native Vegetation: Sparse woodland vegetation consisting of Aspen poplar, various shrubs, and native grasses.

Profile Description: The Grimshaw soils have a thin organic (L-H) horizon underlain by a relatively thick dark colored organic-mineral (Ahe) horizon. These horizons overlay a greyish brown Ae horizon that is medium acid in reaction. Underlying this horizon is a very dark grey, hard, B horizon with a fine columnar structure that has a waxy appearance. The reaction of this horizon is alkaline. The following is a description of a Grimshaw soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) litter. pH 6.0.
Ahe	3	Dark grey (10YR 4/1, moist) clay, weak granular, friable. pH 5.6.
Ae	2	Greyish brown (10YR 5/2, moist) clay loam, weak platy, friable. pH 5.7.
Btn	5	Very dark grey (10YR 3/1, moist) clay, white capped strong fine columnar, very firm. pH 7.3.
BC	6	Very dark greyish brown (10YR 3/2, moist) clay, strong blocky, very firm. pH 7.8.
Csaca	at 17 below surface	Very dark grey (10YR 3/1, moist) clay. Lime and salt accumulation. pH 8.1.
Csk		Dark grey (10YR 4/1, moist) clay with occasional thin strata of yellowish brown (10YR 5/4, moist) silt to sandy clay loam. Pebbles are of common occurrence. Saline and calcareous. pH 7.9.

Agriculture: The Grimshaw soils area is under cultivation. Although a variety of crops are being grown on these soils, consideration should be given to the improvement of the tilth of the B horizon by including deep-rooted legumes in crop rotations.

Soil Rating: Generally fairly good arable soils.

(b) Donnelly Series—Grey Wooded Solod, silt loam to clay loam.

Extent and Occurrence: Donnelly soils are found at elevations of 2,150 to 2,300 feet. They have a wide distribution and are found

in the south-central, western, northern, and east-central portions of the mapped area. There are approximately 108,600 acres in which Donnelly soils are predominant. No estimate was made of the extent of their occurrence in areas in which they were not predominant. They are found in association with Esher, Codesa, Snipe, and Goose soils.

Topography: Undulating to gently rolling with long, uniform slopes.

Native Vegetation: Aspen poplar with varying mixtures of black poplar, white spruce, pine, birch, willow, and various shrubs.

Profile Description: The profile of the Donnelly soils is composed of a thin L-H horizon which lies on a relatively thick, greyish Ae horizon that is slightly acid in reaction. These horizons are underlain by a very firm, brownish colored B horizon that has a weak columnar structure. The solum of this series is generally darker in color than the solum of the Hazelmere series. The following is a description of a typical Donnelly soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 6.5.
Ahe	1	Dark greyish brown (10YR 4/2, moist) silt loam, weak granular, friable. pH 6.4.
Ae	3	Greyish brown (10YR 5/2, moist) silt loam, platy, friable. pH 6.0.
AB	3	Greyish brown (10YR 5/2, moist) silty clay, subangular blocky, firm. pH 4.8.
Bt1	6	Dark yellowish brown (10YR 4/4, moist) clay, weak columnar, very firm. pH 4.5.
Bt2	8	Dark brown (10YR 4/3, moist) grading with depth to very dark brown (10YR 3/3, moist) clay, strong blocky, firm. pH 4.4.
BC	8	Dark greyish brown (10YR 4/2, moist) clay, fine blocky, firm. pH 6.2.
Csaca	at 30 below surface	Grey (10YR 5/1, moist) clay with lime and salt accumulation. pH 7.5.
Csk		Dark grey (10YR 4/1, moist) clay that may have thin brownish strata of sandy or silty clay loam in which pebbles are common. Moderately calcareous and saline. pH 7.7.

Agriculture: A fairly large proportion of the Donnelly soil areas is under cultivation. (See Cultivation Map, Fig. 5). They are presently being used in coarse grains and grass seed production with good results. Donnelly soils are relatively low in organic matter and natural fertility, and their subsoils tend to have a restrictive influence on the penetration of water and of plant roots. Management practices should include the build-up of organic matter in the surface soil, the growing of deep-rooted legumes to open up and improve the structure of the subsoil, and applications of commercial fertilizers when required.

Soil Rating: Fairly good to good arable soils.

Figure 18—Flax crop in a Donnelly soil area near Black Duck lake.

(c) Esher Series—Dark Grey Solod, silt loam to clay loam.

Extent and Occurrence: Esher soils are found in locations similar to those of the Donnelly soils. There are approximately 150,200 acres in which these soils are predominant in this area. They are found mainly in association with Donnelly, Doig, Landry, Snipe, and Goose soils.

Topography: Undulating to gently rolling with long, uniform slopes.

Native Vegetation: Similar to that on Donnelly soils, but not as dense.

Profile Description: Esher soils are distinguished by their relatively thick, dark colored Ahe horizons. While the underlying, firm B horizon is similar, it is usually somewhat darker colored than that of the Donnelly profile. The following is a description of a typical Esher soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 6.0.
Ahe	3	Dark greyish brown (10YR 4/2, moist) silt loam, weak granular, friable. pH 5.8.
Ae	2	Pale brown (10YR 6/3, moist) silt loam, platy, friable. pH 5.3.
AB	2	Pale brown (10YR 6/3, moist) silty clay, subangular blocky, firm. pH 4.8.
Btn1	6	Dark brown (10YR 4/3, moist) clay, weak columnar, very firm. pH 4.5.

Horizon	*Thickness in inches*	*Description*
Btn 2	6	Dark brown (10YR 4/3, moist) clay, strong blocky, firm. pH 4.3.
BC	8	Very dark greyish brown (10YR 3/2, moist) clay, weak blocky, firm. pH 6.5.
Csaca	at 28 below surface	Grey (10 YR 5/1, moist) clay, with lime and salt accumulation. pH 7.6.
Csk		Very dark grey (10YR 3/1, moist) clay with occasional strata of brownish clay loam in which pebbles and salt pockets are common. Moderately calcareous and saline. pH 7.2.

Agriculture: Esher soils in this area are largely under cultivation. The maintenance of organic matter in the surface soil and the improvement of permeability in the subsoil are essential considerations in the management of these soils. Crop response can be expected with the application of commercial fertilizers. Esher soils are used in grain and grass seed production with good results.

Soil Rating: Good arable soils.

(d) Landry Series—Black Solod, loam to clay loam.

Extent and Occurrence: Landry soils occur in the southeastern portion of the mapped area, principally in the vicinity of Fairview. There are approximately 29,600 acres in which these soils are of predominant occurrence. They are found in association with Esher, Donnelly, Doig, Gage, and Peoria soils in this area.

Topography: Undulating to gently rolling with long, uniform slopes.

Native Vegetation: Parkland type of vegetation consisting of native grasses, various shrubs, and bluffs of aspen poplar.

Profile Description: The profile of the Landry soils is very similar to that of the Esher soils except for a darker and thicker Ah horizon. This horizon is very dark brown in color and its thickness varies from 4 to 6 inches. The illustration (Fig. 19) and the following description is typical of a Landry soil profile:

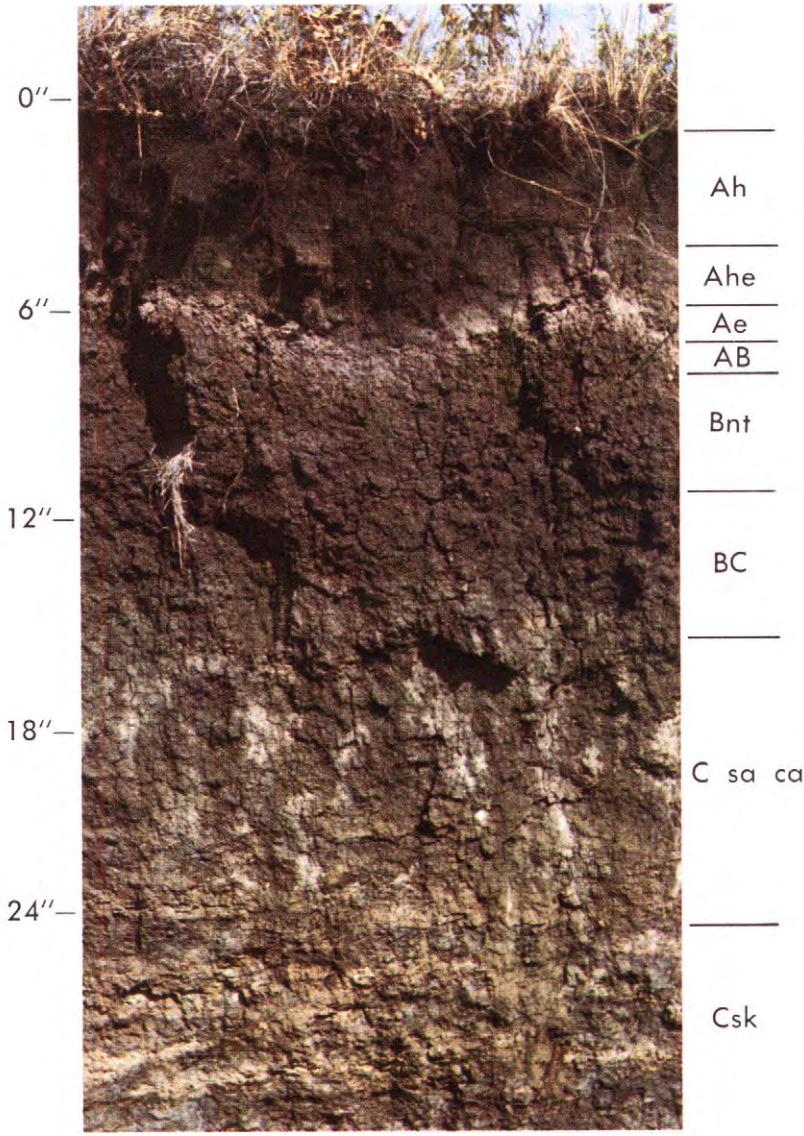
Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH. 6.0.
Ah	6	Very dark brown (10YR 2/2, moist) silt loam, weak fine subangular blocky, friable. pH 6.2.
Ae	2	Greyish brown (10YR 5/2, moist) silt loam, platy, friable. pH 6.0
AB	3	Brown (10YR 5/3, moist) silt loam, subangular blocky, firm. pH. 5.7.
Bt	8	Dark brown (10YR 3/3, moist) clay, weak columnar, very firm. Aggregates have a waxy appearance. pH 5.6.
BC	6	Very dark greyish brown (10YR 3/2, moist) clay, subangular blocky, firm. pH 7.0.

Horizon	*Thickness in inches*	*Description*
Csaca	at 26 below surface	Dark grey (10YR 4/1, moist) clay with lime and salt accumulation. pH 7.8.
Csk		Dark grey (10YR 4/1, moist) clay with occasional strata of yellowish brown (10YR 5/4, moist) silty clay loam. Pebbles are common. Moderately calcareous and saline. pH 7.4.

Agriculture: Landry soils are considered to be among the best productive soils in this area and have been farmed since the beginning of settlement. (See Cultivation Map, Fig. 5.) Grain is the principal crop produced on these soils, but increasing attention is being given to grass seed production. The maintenance of organic matter in the surface soil, the improvement of tilth in the subsoil, and the use of commercial fertilizers should be considered in the management of these soils. Landry soils are susceptible to water erosion during the spring run-off period and unless precautionary measures are taken crop production could be seriously curtailed. The maintenance of cover crops and cultivation across the slopes would be advantageous in the development of a successful cropping plan for these soils.

Soil Rating: Good to very good arable soils.

Figure 19—Landry soil profile in the area south of Fairview.



Black Solod

BLACK SOLOD

Black Solod soils occur throughout the park-land portions of Alberta. They are generally on level to gently rolling topography and are often associated with other Solonetzic soils (soils with saline subsoils). They are in areas that receive a mean annual precipitation of from 15 to 18 inches.

These soils are characterized by:

(a) A black surface horizon (Ah).

(b) A light brown horizon that may be platy structured (Ahe and Ae).

(c) A weakly columnar structured subsurface horizon that crumbles fairly readily into blocks (Bnt).

(d) A subsoil that contains lime and salt (C sa ca).

This soil is a Landry clay loam. It is generally good arable land. However, water erosion can be a serious problem in these soils.

Alberta Soil Survey

S-S-Series 2 Aug. 1963

Available from:

Department of Extension
University of Alberta
Edmonton, Alberta, Canada

TABLE 10 (a)—Analyses of Grimshaw, Donnelly, Esher, and Landry Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size — Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Grimshaw clay—Dark Grey Solodized Solonetz—NW 25-82-26-W5																	
L-H	1	....	....	....	....	6.0	0.34	3.07	9	.....	....	....	....	....	....	....	....
Ahe	3	15	36	49	29	5.6	0.80	8.76	11	40.3	48	21	3	2	26	74	2.0
Ae	2	18	40	42	21	5.7	0.30	3.32	11	23.8	31	34	13	1	21	79	0.6
Btn	5	12	34	54	36	7.3	0.24	1.67	7	35.7	23	51	25	1	0	100	0.3
BC	6	8	28	64	41	7.9	0.08	1.16	14	42.7	20	50	29	1	0	100	0.2
CsaCa	at 18	9	19	72	40	8.1	0.08	1.04	13	.....	....	....	....	....	....	....	....
Csk	at 36	14	26	60	31	7.9	0.06	0.79	13	.....	....	....	....	....	....	....	....
Donnelly silty clay loam—Grey Wooded Solod—NE 26-85-8-W6																	
L-H	1	....	....	....	....	6.5	0.17	2.05	12	23.8	67	19	0	5	9	91	3.5
Ae	3	14	70	16	4	6.3	0.07	0.69	10	7.9	61	25	0	3	11	89	2.4
AB	4	10	49	41	19	4.8	0.06	0.65	12	17.0	40	27	0	3	30	70	1.5
Bt1	10	2	24	74	40	4.2	0.06	0.75	12	32.7	38	24	2	2	34	66	1.4
Bt2	10	7	22	69	35	4.4	0.05	0.43	8	29.3	43	27	3	3	24	76	1.4
BC	9	5	18	77	31	6.0	0.06	0.85	11	31.7	61	29	3	3	4	96	1.9
Csk	at 40	2	15	83	31	7.0	0.06	1.10	17	36.3	66	28	2	4	0	100	2.2
Esher silty clay loam—Dark Grey Solod—NE 20-87-10-W6																	
L-H	1	....	....	....	....	6.0	0.52	5.52	11	.....	....	....	....	....	....	....	....
Ahe	3	15	36	49	18	5.8	0.64	5.50	9	36.2	54	26	0	3	17	83	2.1
Ae	1	14	68	18	4	5.3	0.15	1.40	10	19.3	42	26	1	3	28	72	1.6
AB	2	15	36	49	22	4.8	0.08	0.94	12	21.9	33	35	2	6	24	76	0.9
Btn1	6	13	25	62	37	4.3	0.07	0.90	14	29.0	35	40	1	3	21	79	0.8
Btn2	6	16	28	56	33	4.3	0.05	0.73	14	26.8	35	44	1	2	18	82	0.8
BC	8	21	36	43	24	6.5	0.05	0.79	15	31.1	55	41	2	2	0	100	1.3
Csk	at 30	22	35	43	23	7.0	0.05	0.78	15	52.8	79	20	0	1	0	100	3.9
Landry silt loam—Black Solod—NW 8-81-3-W6																	
L-H	1	....	....	....	....	6.0	.....	.....	....	.....	....	....	....	....	....	....	....
Ah	5	....	....	....	....	6.0	0.44	4.88	11	35.2	64	23	1	2	10	90	2.7
Ae	2	23	63	14	1	6.0	0.09	0.51	6	11.6	56	22	4	2	16	84	2.2
AB	3	16	60	24	6	5.9	0.08	1.06	14	14.5	52	28	5	1	14	86	1.6
Bt	7	4	44	52	23	5.7	0.11	1.55	15	40.3	50	37	5	2	6	94	1.2
BC	8	6	37	57	30	7.3	0.07	1.52	21	37.8	58	33	7	2	0	100	1.4
Csk	at 28	3	34	53	28	7.8	0.06	0.87	14	.....	....	....	....	....	....	....	....

TABLE 10 (b)—Analyses of Grimshaw, Donnelly, Esher, and Landry Soils

Horizon	Conductivity mmhos./cm.	Soluble Salt Analysis								
		Cations				Anions				
		Ca^{++} %	Mg^{++} %	Na^{+} %	Total m.e./l.	$SO_4^{=}$ %	Cl^{-} %	HCO_3^{-} %	$CO_3^{=}$ %	Total m.e./l.
Grimshaw clay—Dark Grey Solodized Solonetz—NW 25-82-26-W5										
Btn	6.1	6	23	71	78.7	76	20	4	0	83.6
BC	11.0	6	28	66	141.7	90	7	3	0	133.5
CsaCa	12.5	11	33	56	199.3	83	16	1	0	195.0
Csk (at 3 ft.)	11.8	12	33	55	178.6	83	16	1	0	175.9
Donnelly silty clay loam—Grey Wooded Solod—NE 26-85-8-W6										
Csk (at 3 ft.)	3.0	40	44	16	57.5	94	1	5	0	63.6
Csk (at 5 ft.)	4.0	48	39	13	58.1	93	4	3	0	50.0
Csk (at 10 ft.)	4.0	49	38	13	58.1	88	8	4	0	59.1
Esher silty clay loam—Dark Grey Solod—NE 20-87-10-W6										
Csk (at 3 ft.)	5.0	28	49	23	87.1	95	1	4	0	84.0
Csk (at 5 ft.)	2.8	51	25	24	40.4	90	4	6	0	38.9
Csk (at 10 ft.)	3.0	41	25	34	57.1	94	4	2	0	60.4
Landry silt loam—Black Solod—NW 8-81-3-W6										
BC	2.1	29	33	38	27.2	61	0	39	0	26.9
Csk (at 2 ft.)	4.6	37	44	19	70.8	94	1	5	0	67.8
Csk (at 5 ft.)	4.1	41	40	19	64.8	93	4	3	0	60.3
Csk (at 10 ft.)	5.0	36	45	19	80.8	94	4	2	0	71.6

D. SOILS DEVELOPED ON LACUSTRINE MATERIALS

1. Uniform, stone-free, grey to dark grey clay, moderately calcareous and saline.

This material is characterized by the presence of varves of fine sandy loam and silt loam, and occurs at elevations generally between 2,000 and 2,150 feet.

(a) Nampa Series—Grey Wooded Solod, clay loam to clay.

Extent and Occurrence: Nampa soils are found mainly in the central and south-central portions of the mapped area. There are approximately 112,100 acres in which these soils are predominant. No estimate was made of their occurrence in association with other soils of the area. They are found in association with Falher, Doig, Beatton, Snipe, and Goose soils.

Topography: Level and depressional.

Native Vegetation: Woodland consisting of aspen poplar, black poplar, willow, and native coarse grasses.

Profile Description: Nampa soil profiles have a thin organic (L-H) horizon and may have a thin organic-mineral (Ahe) horizon which rests on a light grey Ae horizon. Underlying this horizon is a brown B horizon which is fine textured, has weak columnar structure, and is medium to strongly acid in reaction. Nampa profiles differ from the Donnelly profiles in having a thinner Ae horizon and a generally darker colored solum. The following is a description of a representative Nampa soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf mat. pH 6.3.
Ahe	1	Dark greyish brown (10YR 4/2, moist) clay loam, weak granular, friable. May be absent. pH 6.3.
Ae	2	Light brownish grey (10YR 6/2, moist) silty clay loam, platy, friable. Iron staining is common in the lower portion of this horizon. pH 6.0.
AB	3	Light brownish grey (10YR 6/2, moist) clay loam, subangular blocky, firm. pH 5.7.
Bt1	8	Dark greyish brown (10YR 4/2, moist) clay, weak columnar, very firm. pH 5.4.
Bt2	8	Dark brown (10YR 3/3, moist) clay, blocky, very firm. pH 5.3.
BC	10	Dark grey (10YR 4/1, moist) clay, subangular blocky, firm. pH 7.2.
Csaca	at 33 below surface	Grey (10YR 5/1, moist) clay with lime and salt accumulation. pH 7.8.
Csk		Dark grey (10YR 4/1, moist) clay. Moderately calcareous and saline. pH 7.6.

Agriculture: Nampa soil areas are not as yet extensively cultivated in the mapped area. (See Cultivation Map, Fig. 5.) These soils are low in organic matter and they have a relatively impermeable subsoil. Water penetration is slow and during heavy rains Nampa soil areas may be submerged for varying periods. The growing of

deep-rooted legumes tends to improve the structure and the permeability of these soils. Experimental field trials have shown that substantial increase in yields can be obtained by applications of nitrogen-phosphorus commercial fertilizers.

Soil Rating: Fairly good arable soils.

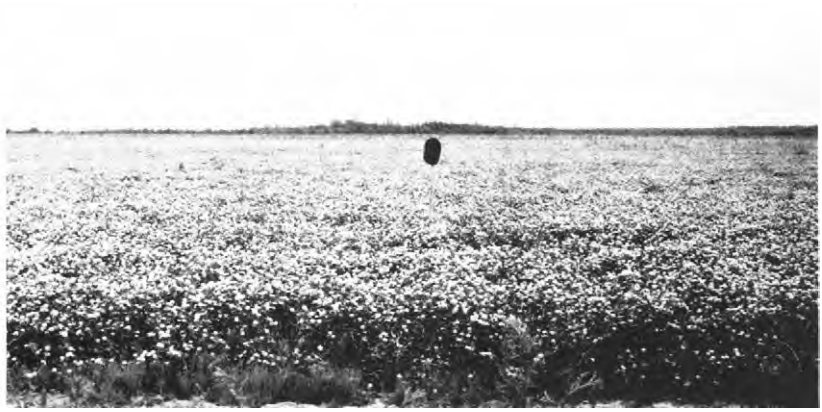


Figure 20—Clover crop in a Nampa soil area south of the Peace river.

(b) Falher Series—Dark Grey Solod, clay loam to clay.

Extent and Occurrence: Falher soils occur mainly in the south-western, central, and south-central portions of the mapped area. There are approximately 256,800 acres in which these soils are predominant. They are found in association with Nampa, Doig, Snipe, and Goose soils in this area.

Topography: Level to undulating.

Native Vegetation: Woodland consisting of aspen poplar, willow, and native grasses.

Profile Description: Falher soils are distinguished by a dark grey Ahe horizon that is usually 3 to 4 inches thick. The remainder of the solum is similar but may be somewhat darker in color than that of the Nampa soils. The following profile description is typical of a Falher soil:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf mat. pH 6.6
Ahe	3	Dark greyish brown (10YR 4/2, moist) clay loam, weak granular, friable. pH 6.4.
Ae	2	Pale brown (10YR 6/3, moist) silty clay loam, platy, friable. pH 6.2.
AB	3	Greyish brown (10YR 5/2, moist) silty clay, subangular blocky, firm. pH 6.1.
Bt1	5	Dark greyish brown (10YR 4/2, moist) clay, weak columnar, very firm. pH 5.8.

Horizon	*Thickness in inches*	*Description*
Bt2	5	Very dark greyish brown (10YR 3/2, moist) clay, strong blocky, very firm. pH 5.1.
BC	6	Dark grey (10YR 4/1, moist) clay, blocky, very firm. pH 6.8.
Csaca	at 25 below surface	Dark grey (10YR 4/1, moist) clay with lime and salt accumulation. pH 7.7.
Csk		Dark grey (10YR 4/1, moist) clay. Saline and calcareous. pH. 7.6.

Agriculture: Falher soils are largely under cultivation in this area. They are being used for grain, grass, and legume crop production. Attention should be given to the maintenance of organic matter in the surface soil and to the improvement in permeability of the subsoil. These soils have been shown to respond to applications of commercial fertilizers.

Soil Rating: Good arable soils.

(c) Rycroft Series—Black Solod, clay loam to clay.

Extent and Occurrence: Rycroft soils occur in the north-central and south-central portions of the mapped area. There are approximately 31,200 acres in which the Rycroft soils are predominant. These are found in association with Doig soils in this area.

Topography: Undulating to gently rolling.

Native Vegetation: Parkland vegetation consisting of native grasses, various shrubs, with bluffs of aspen poplar and willow.

Profile Description: The Rycroft soil profile is similar to that of the Falher soil profile except for the Ah horizon which is darker in color and thicker. In addition, the Ae horizon of the Rycroft soils is thin and may be discontinuous. The following is a description of a typical Rycroft soil profile:

Horizon	*Thickness in inches*	*Description*
Ah	6	Very dark brown (10YR 2/2, moist) silty clay, weak fine granular, friable. pH 6.2.
Ae	1	Pale brown (10YR 6/3, moist) silty clay loam, platy. Discontinuous and may be absent. pH 5.6.
AB	3	Brown (10YR 5/3, moist) clay, subangular blocky, firm. pH 5.6.
Bt1	6	Very dark brown (10YR 2/2, moist) clay, weak columnar, very firm. pH 4.7.
Bt2	6	Very dark grey (10YR 3/1, moist) clay, strong blocky, very firm. pH 5.1.
BC	8	Dark grey (10YR 4/1, moist) clay, blocky, firm. pH 7.1.
Csaca	at 31 below surface	Grey (10YR 5/1, moist) clay with lime and salt accumulation. pH 8.0.
Csk		Dark grey (10YR 4/1, moist) clay. Saline and calcareous. pH 7.6.

TABLE 11—Analyses of Nampa, Falher, and Rycroft Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size — Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Nampa clay loam—Grey Wooded Solod—NW 32-84-10-W6																	
L-H	1	....	....	....	....	6.3	0.55	9.83	18	36.1	62	16	0	7	15	85	3.9
Ae	2	20	52	28	5	6.1	0.11	1.13	11	12.6	59	19	0	6	16	84	3.1
AB	3	23	41	36	13	6.0	0.09	1.10	12	12.9	57	20	0	5	18	82	2.8
Bt1	8	7	27	66	37	5.4	0.09	0.92	12	25.5	55	28	0	3	14	86	2.0
Bt2	8	3	20	77	42	5.3	0.09	1.42	16	33.8	57	31	1	2	9	91	1.8
BC	10	1	24	75	34	7.5	0.09	1.44	16	.....	....	....	....	....	....	....	....
Csk	at 34	0	18	82	33	7.8	0.10	1.56	16	.....	....	....	....	....	....	....	....
Falher clay loam—Dark Grey Solod—SW 29-83-12-W6																	
L-H	1	....	....	....	....	.....	.....	.....	...	.....	....	....	....	....	....	....	....
Ahe	3	27	31	42	13	6.5	0.31	4.48	15	41.9	71	12	0	5	12	88	5.9
Ae	2	20	51	29	9	6.2	0.07	0.75	11	21.7	64	17	0	4	15	85	3.7
AB	3	14	46	40	17	6.1	0.10	1.29	13	23.4	63	19	0	3	15	85	3.3
Bt	10	2	8	90	49	5.1	0.08	1.20	15	37.6	54	26	2	2	16	84	1.9
BC	6	1	13	86	39	6.8	0.09	1.41	16	.....	....	....	....	....	....	....	....
Csk	at 27	8	15	77	26	7.4	0.09	1.42	16	.....	....	....	....	....	....	....	....
Rycroft clay—Black Solod—SW 30-86-7-W6																	
Ah	6	6	35	59	27	5.4	0.19	5.75	31	41.5	57	19	1	5	18	82	3.0
AB	3	5	25	70	35	4.7	0.25	2.72	11	34.0	52	22	1	2	23	77	2.3
Bt1	7	8	28	63	33	4.7	0.25	3.04	12	36.6	51	23	2	2	22	78	2.0
Bt2	7	3	28	69	41	5.4	0.14	2.20	16	41.7	59	26	3	2	10	90	2.0
BC	8	2	28	70	34	7.2	0.07	1.64	24	38.3	66	29	3	2	0	100	2.1
Csk	at 33	3	27	70	29	7.3	0.06	1.25	20	.....	....	....	....	....	....	....	....

Horizon	Soluble Salt Analysis: Conductivity mmhos./cm.	Cations: Ca^{++} %	Mg^{++} %	Na^{+} %	Total m.e./l.	Anions: $SO_4^{=}$ %	Cl^{-} %	HCO_3^{-} %	$CO_3^{=}$ %	Total m.e./l.
Nampa clay loam—Grey Wooded Solod—NW 32-84-10-W6										
Ck (at 5 ft.)	0.9	43	38	19	10.9	81	2	17	0	9.9
Ck (at 10 ft.)	3.2	55	38	7	45.8	82	14	4	0	51.0
Falher clay loam—Dark Grey Solod—SW 29-83-12-W6										
Csk (at 5 ft.)	4.8	29	59	12	84.9	96	2	2	0	81.3
Csk (at 10 ft.)	5.0	35	53	12	76.5	91	7	2	0	80.6
Rycroft clay—Black Solod—SW 30-86-7-W6										
Csk (at 3 ft.)	3.8	60	34	10	56.3	96	0	4	0	53.3

Agriculture: The Rycroft soils are extensively cultivated in this mapped area. These soils are being used mainly for grain crop production, but increasing attention is being given to the inclusion of grasses and legumes in the crop rotation. The improvement of the tilth of the subsoil is of prime importance in the management of these soils.

Soil Rating: Very good arable soils.

2. Brown to greyish brown, silty clay loam and silty clay, moderately calcareous and saline.

This material may have strata of dark grey silty clay and clay, and yellowish brown silt loam. Pebbles may occur in the clay strata. The dark grey lacustrine and lacustro-till materials usually underly this deposit at depth.

(a) Beatton Series—Grey Wooded Solod, silt loam to silty clay loam.

Extent and Occurrence: Beatton soils occur in the north-central and south-central portions of the mapped area. There are approximately 1,000 acres in which these soils are predominant. They are found in association with Doig, Judah, Hazelmere, and Nampa soils.

Topography: Generally quite variable, complex slopes.

Native Vegetation: Mixed woodland in which aspen poplar is predominant.

Profile Description: Beatton soil profiles have a thin organic (L-H) horizon and may have a thin organic-mineral (Ahe) horizon that lies on a pale brown Ae horizon. Underlying this horizon is a dark greyish brown B horizon that has a fine texture, moderately strong columnar structure, and medium to strong acid reaction. The dominantly brownish colored solum distinguishes this series from the Nampa series. The following is a description of a Beatton soil profile.

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark greyish brown (10YR 4/2, moist) leaf litter. pH 6.7.
Ahe	1	Dark greyish brown (10YR 4/2, moist) silt loam, weak granular, friable. May be absent. pH 6.0.
Ae	3	Very pale brown (10YR 7/3, moist) silt loam, strong platy, friable. pH 5.3.
AB	3	Greyish brown (10YR 5/2, moist) silty clay, subangular blocky, firm. pH 5.1.
Btn	10	Dark brown (10YR 3/3, moist) clay, columnar, blocky with organic staining, firm. pH 5.1.
BC	8	Dark brown (10YR 3/3, moist) silty clay, blocky, firm. pH 7.3.
Csaca	at 26 below surface	Dark greyish brown (10YR 4/2, moist) silty clay, with frequent very dark greyish brown (2.5Y 3/2, moist) clay strata. Lime and salt accumulation. pH 8.0.
Csk		Dark greyish brown (10YR 4/2, moist) silty clay with dark greyish brown (2.5Y 3/2, moist) clay strata that may have stones. Moderately calcareous and saline. pH 8.0.

Agriculture: A very small acreage of these soils is being cultivated in the mapped area. They are used mainly for grasses and legumes. These soils have low natural fertility, therefore require good farming practices and the use of commercial fertilizers to enable them to produce satisfactorily.

Soil Rating: Fairly good arable soils.

(b) Doig Series—Dark Grey Solod, silt loam to silty clay loam.

Extent and Occurrence: Doig soils occur in the central, northern, and western portions of the mapped area. There are approximately 69,300 acres in which these soils are predominant. These soils are found in association with Beatton, Nampa, Falher, Rycroft, Judah, and Snipe soils.

Topography: Variable, but a complex undulating to gently rolling topography is typical of the larger areas of Doig soils.

Native Vegetation: Mixed woodland in which aspen poplar and small shrubs are predominant.

Profile Description: The Doig soil profile is similar to that of the Beatton soil profile except for a thicker Ahe horizon. The following is a description of a typical Doig soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 6.0.
Ahe	3	Dark brown to brown (10YR 4/3, moist) silt loam, weak granular, friable. pH 5.9.
Ae	2	Light brownish grey (10YR 6/2, moist) silt loam, platy, friable. pH 4.4.
AB	3	Greyish brown (10YR 5/2, moist) silty clay loam, subangular blocky, firm. pH 4.2.
Btn	8	Dark brown (10YR 3/3, moist) clay, columnar, very firm. pH 5.2.
BC	11	Dark yellowish brown (10YR 3/4, moist) silty clay, subangular blocky, firm. pH. 6.0.
Csaca	at 28 below surface	Dark greyish brown (10YR 4/2, moist) silty clay, with lime and salt accumulation. pH 7.4.
Csk		Dark greyish brown (10YR 4/2, moist) silty clay with frequent very dark greyish brown (2.5Y 3/2, moist) clay strata that may have stones. Moderately calcareous and saline. pH 7.4.

Agriculture: The Doig soils in the mapped area are largely under cultivation and are cropped mainly to grain. (See Cultivation Map, Fig. 5.) Replenishment of organic matter, the introduction of grasses and legumes into the crop rotation, and the use of commercial fertilizers appear to be the basic requirements for the successful management of these soils.

Soil Rating: Fairly good to good arable soils.

TABLE 12—Analyses of Beatton and Doig Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size — Sand %	Silt %	Clay % <2μ	Clay % <.2μ	pH	N %	Org. C %	C/N Ratio	Chemical Analysis: Exchangeable Cations — Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Beatton silty clay loam—Grey Wooded Solod—SE 1-82-6-W6																	
L-H	1	....	....	....	....	6.7	0.24	3.38	14	.....	....	....	....	....	....	....	....
Ae	3	20	63	17	3	5.3	0.05	0.48	9	6.7	27	31	3	3	36	64	0.8
AB	3	9	51	40	21	5.1	0.08	1.08	13	19.2	26	48	2	3	21	79	0.5
Btn	10	1	32	67	43	5.1	0.07	1.06	13	32.9	27	55	3	2	13	87	0.5
BC	8	1	42	58	33	7.3	0.07	0.90	13	30.2	28	66	4	2	0	100	0.4
Csaca ..	at 25	1	43	56	27	8.0	0.07	0.75	11	.....	....	....	....	....	....	....	....
Doig silt loam—Dark Grey Solod—NE 21-82-1-W6																	
Ahe	3	6	68	26	8	5.9	0.33	4.66	14	29.8	54	28	1	5	12	88	1.9
Ae	2	13	67	20	5	4.4	0.09	0.84	10	10.2	27	24	2	3	44	56	1.0
AB	3	12	63	25	8	4.2	0.07	0.61	8	11.9	25	29	2	3	41	59	0.8
Btn	8	4	40	56	35	5.2	0.06	0.89	14	25.5	20	47	2	2	29	71	0.4
BC	11	0	55	45	25	6.0	0.08	0.87	12	27.9	31	53	3	2	11	89	0.6
Csaca ..	at 27	....	....	....	....	7.4	.....	.....	....	.....	....	....	....	....	....	....	....

Horizon	Conductivity mmhos./cm.	Soluble Salt Analysis: Cations — Ca^{++} %	Mg^{++} %	Na^{+} %	Total m.e./l.	Anions — $SO_4^{=}$ %	Cl^{-} %	HCO_3^{-} %	$CO_3^{=}$ %	Total m.e./l.
Beatton silty clay loam—Grey Wooded Solod—SE 1-82-6-W6										
BC	2.3	16	61	23	31.4	89	0	11	0	29.2
Csaca	6.2	23	66	11	109.3	98	0	2	0	103.2
Doig silt loam—Dark Grey Solod—NE 21-82-1-W6										
BC	1.6	17	64	19	18.5	47	0	3	0	18.5
Csaca	5.5	27	64	9	87.0	99	0	1	0	84.6

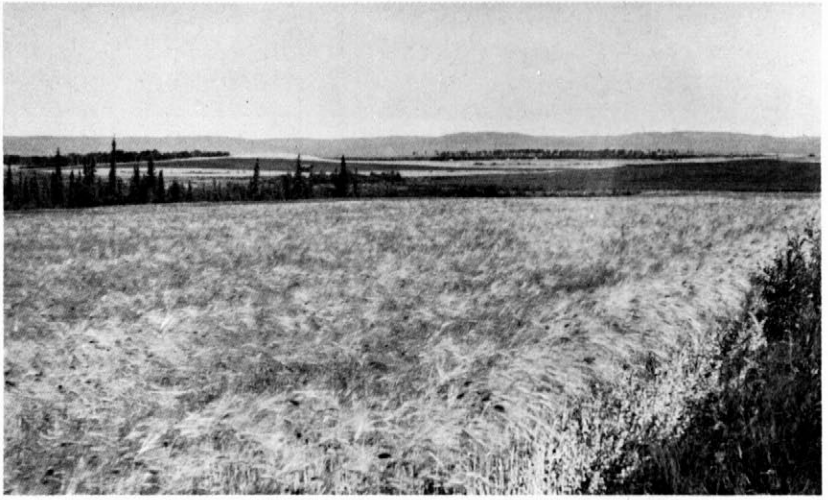


Figure 21—Barley crop in a Falher-Doig soil area near Worsley.

3. Brown silty clay loam to silty clay that is moderately calcareous.

This material is usually stratified with the strata consisting of brown to greyish brown silty clay loam and clay, and yellowish brown silt loam to very fine sandy loam. It is stone-free and lacks the salt content common to the preceding lacustrine deposits. The soils formed on this material usually have a brown colored solum that has a granular to subangular blocky structure.

(a) Kathleen Series—Orthic Grey Wooded, silt loam to silty clay loam.

Extent and Occurrence: Kathleen soils occur in the north-central portion of the mapped area. There are approximately 6,000 acres in which these soils predominate. They are found in association with Judah, Albright, Hazlemere and Wanham soils.

Topography: Undulating to gently rolling.

Native Vegetation: Mixed woodland in which aspen poplar is the predominant species.

Profile Description: Kathleen soil profiles possess a thin organic (L-H) horizon and may have a thin organic-mineral (Ahe) horizon. These horizons lie on a pale brown Ae horizon that is relatively thick and is acid in reaction. Underlying this horizon is a dark greyish brown Bt horizon that is usually the most acidic horizon of the solum. The absence of columnar structure in the B horizon distinguishes this series from the Beatton series. The following is a description of a typical Kathleen soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 6.6.
Ahe	1	Dark greyish brown (10YR 4/2, moist) silty clay loam, weak granular, friable. pH 6.4.
Ae	3	Pale brown (10YR 6/3, moist) silt loam, fine platy, friable. pH 6.2.
AB	4	Brown (10YR 5/3, moist) silty clay loam, subangular blocky, firm. Aggregates usually have light brownish grey coatings. pH 5.2.
Bt	10	Brown (10YR 4/3, moist) clay, blocky, firm. pH 4.9.
BC	6	Brown (10YR 4/3, moist) silty clay, subangular blocky, firm. pH 6.1.
Cca	at 25 below-surface	Dark yellowish brown (10YR 4/4, moist) silty clay with lime accumulation. pH 7.8.
Ck		Dark brown (10YR 3/3, moist) silty clay with yellowish brown 10YR 5/6, moist) silt laminae. Calcareous. pH 7.8.

Agriculture: The Kathleen soils of this area are not extensively cultivated. (See Cultivation Map, Fig. 5.) They are producing mainly coarse grains and grasses.

These soils are relatively low in native fertility and should respond very favorably to good management practices and to the use of commercial fertilizers.

Soil Rating: Fairly good arable soil.

(b) Judah Complex—Eluviated Dark Grey and Dark Grey Wooded, silt loam to silty clay loam.

Extent and Occurrence: There are approximately 17,900 acres in which Judah soils predominate. They occur in the extreme southwestern and east-central portions of the mapped area in association with Doig, Beatton, Falher, Nampa, Codner, and Prestville soils.

Topography: Quite variable. Complex undulating to rolling topography is typical of the larger areas of Judah soils.

Native Vegetation: Mixed woodland with a preponderance of aspen poplar.

Profile Description: The Judah soil profile is unlike other Dark Grey Wooded soil profiles of this area in that there is usually a gradual greying of the lower part of the prominent A horizon resulting frequently in the absence of a distinct Ae horizon. The remainder of the soil profile is comparable to the Kathleen soil profile.

TABLE 13—Analyses of Kathleen and Judah Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size — Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Kathleen silty clay loam—Orthic Grey Wooded—SE 27-81-13-W6																	
L-H	2	....	....	....	....	7.5	0.48	6.76	14	.....	....	....	....	....	....	....	....
Ae	3	5	44	51	18	6.4	0.06	0.61	11	11.0	67	15	1	2	15	85	4.2
AB	4	4	35	61	29	5.2	0.07	0.74	9	17.2	60	17	1	2	20	80	3.3
Bt	10	3	23	74	40	4.9	0.09	0.80	9	31.1	57	22	1	1	19	81	2.5
BC	6	3	23	74	31	6.1	0.11	1.02	9	34.1	70	22	1	1	6	94	3.0
Cca	at 25	7	43	50	19	7.8	0.09	1.18	13	.....	....	....	....	....	....	....	....
Judah silty clay loam—Dark Grey Wooded—NE 23-83-6-W6																	
Ahe	4	15	45	40	20	6.8	0.58	6.13	11	40.3	73	16	1	6	4	96	4.3
AB	4	14	47	39	24	5.5	0.11	1.16	11	22.6	66	20	1	3	10	90	3.1
Bt	10	14	43	43	29	6.1	0.09	0.08	10	21.8	80	17	1	2	0	100	4.4
BC	9	13	55	32	16	7.5	.....	.....	....	.....	....	....	....	....	....	....	....
Cca	at 27	10	39	51	22	7.6	.....	.....	....	.....	....	....	....	....	....	....	....

The following is a description of a profile typical of the Judah series:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 7.2.
Ahe	3	Brown (10YR 4/3, moist) silty clay loam, weak granular, friable. pH 6.8.
AB	4	Brown (10YR 4/3, moist) silty clay loam, fine subangular blocky, firm. Aggregates have greyish brown (10YR 5/2, moist) coatings. pII 5.5.
Bt	10	Dark yellowish brown (10YR 3/4, moist) silty clay, blocky, firm. pH 6.1.
Bc	9	Brown (10 YR 4/3, moist) silty clay loam, subangular blocky, firm. pH. 7.5.
Cca	at 27 below surface	Dark yellowish brown (10YR 4/4, moist) silty clay with lime accumulation. pH 7.8.
Ck		Dark brown (10YR 3/3, moist) silty clay with yellowish brown (10YR 5/6, moist) silt laminae. Calcareous. pH 7.8.

Agriculture: The Judah soils of the mapped area are largely under cultivation and cropped mainly to grains. (See Cultivation Map, Fig. 5.) Cultivation on the contour where practical, introduction of grasses and legumes into the crop rotation, and applications of commercial fertilizers appear to be the basic requirements for the successful management of these soils.

Soil Rating: Depending on topography, these soils are fairly good to good arable soils.

E. SOILS DEVELOPED ON ALLUVIAL AND AEOLIAN MATERIALS

These deposits are usually found adjacent to the water courses. They are commonly stratified, with the strata consisting of parallel alternating beds of sand, silt, and clay. Cross-bedding is evident in a number of these deposits, indicating that wind may have played a role in their deposition. These deposits frequently overlie till or lacustrine materials.

The soils developed on these deposits are grouped according to their dominant textural characteristics. These groups are as follows:

1. Brown to yellowish brown, very calcareous, variable, silty materials.

(a) Davis Series—Orthic Grey Wooded, loam to silt loam.

Extent and Occurrence: The Davis soils occur in the southeastern portion of the mapped area adjacent to stream channels. There are approximately 2,600 acres in which these soils predominate. They are found in association with Tangent and Codner soils in this area.

Topography: Complex undulating to rolling topography. The rolling topography consists of low, steep-sided knolls.

Native Vegetation: Mixed woodland consisting of aspen poplar, white spruce, pine, and various shrubs.

Profile Description: Davis soil profiles have a thin organic (L-H) horizon and may have a thin organic-mineral (Ahe) horizon. These

horizons rest on a light brown Ae horizon that is relatively thick. Underlying this horizon is a brown Bt horizon. The lower portion of this horizon is usually stronger in color than the upper portion. The strongest colored portion occurs immediately above the lime accumulation horizon. The following is a description of a typical Davis soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 7.2.
Ahe	1	Brown (10YR 4/3, moist) silt loam, weak granular, friable. pH 7.0.
Ae	3	Very pale brown (10YR 7/4, moist) very fine sandy loam, weak fine platy, friable. pH 6.8.
AB	4	Light yellowish brown (10YR 6/4, moist) silty clay loam, weak subangular blocky, firm. pH 6.4.
Bt1	4	Yellowish brown (10YR 5/4, moist) silty clay, strong subangular blocky, firm. pH 6.6.
Bt2	4	Dark yellowish brown (10YR 4/4, moist) in the upper portion to strong brown (7.5YR 5/6, moist) in the lower portion, silty clay, subangular blocky, firm. pH 7.6.
Cca	at 17 below surface	Light yellowish brown (10YR 6/4, moist) silty clay loam with lime accumulation. pH 7.8.
Ck		Light yellowish brown (10YR 6/4, moist) silty clay loam with pale brown (10YR 6/3, moist) very fine sandy loam to silt strata. Calcareous. pH 8.2.

Agriculture: Davis soils are being used for grain and forage crop production. Significant crop responses have been obtained from the application of nitrogen-phosphorus fertilizers.

Soil Rating: Davis soils are fair to fairly good arable soils.

(b) Tangent Series—Dark Grey Wooded, loam to silt loam.

Extent and Occurrence: Tangent soils occur in the southeastern portion of the mapped area. In this area there are approximately 16,800 acres in which these soils are predominant.

Topography: Undulating to gently rolling, usually with complex slopes.

Native Vegetation: Woodland with a predominance of aspen poplar and shrubs.

Profile Description: The Tangent soil profile is similar to the Davis soil profile except for a thicker organic-mineral (Ahe) horizon.

TABLE 14—Analyses of a Tangent Soil

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size: Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Tangent silt loam—Dark Grey Wooded—NE 1-83-4-W6																	
Ahe	4	39	52	9	0	5.6	0.40	6.35	16	36.1	69	12	1	2	16	84	5.3
Ae	2	35	53	12	3	6.0	0.05	0.65	12	10.9	62	23	2	1	12	88	2.5
AB	4	23	57	20	14	6.4	0.05	0.58	11	21.1	61	32	1	1	5	95	1.8
Bt	5	28	49	23	14	6.7	0.05	0.56	11	20.9	66	30	1	1	2	98	2.2
BC	3	33	48	19	10	7.5	0.05	0.56	12	20.1	81	17	1	1	0	100	4.8
Cca	at 17	32	49	19	8	8.0	0.07	0.67	10	.....	....	....	....	....	....	....	....

Horizon	Conductivity mmhos./cm.	Soluble Salt Analysis: Cations: Ca^{++} %	Mg^{++} %	Na^{+} %	Total m.e./l.	Anions: $SO_4^{=}$ %	Cl^{-} %	HCO_3^{-} %	$CO_3^{=}$ %	Total m.e./l.
Tangent silt loam—Dark Grey Wooded—NE 1-83-4-W6										
Cca	2.6	43	38	19	35.9	90	1	9	0	33.8

The following is a description of a typical Tangent soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf and grass litter. pH 6.0.
Ahe	4	Dark greyish brown (10YR 4/2, moist) silt loam, weak fine granular, friable. pH 5.8.
Ae	2	Very pale brown (10YR 7/4, moist) very fine sandy loam, weak fine platy, friable. pH 6.0.
AB	3	Light yellowish brown (10YR 6/4, moist) silt loam, weak subangular blocky, firm. pH 6.4.
Bt	6	Light olive brown (2.5Y 5/4, moist) silty clay loam, strong subangular blocky, firm. pH 6.7.
BC	4	Olive brown (2.5Y 4/4, moist) silt loam, weak fine subangular blocky, firm. pH 7.5.
Cca	at 20 below surface	Yellowish brown (10YR 5/4, moist) silt loam, weak fine subangular blocky, friable. Lime accumulation. pH 8.0.
Ck		Brown (10YR 5/3, moist) silt loam with pale brown (10YR 6/3, moist) very fine sandy loam to silt loam strata. Calcareous. pH 8.0.

Agriculture: Tangent soils are extensively cultivated. However, they are vulnerable to both wind and water erosion. The addition of fibre and organic matter to these soils would increase aggregation and water-holding capacity, thus reducing the hazards of erosion.

Soil Rating: Fairly good to good arable soils.

2. Brown to yellowish brown, moderately calcareous, variable, sandy materials.

(a) Culp Series—Orthic Grey Wooded, loamy sand to sandy loam.

Extent and Occurrence: Culp soils occur in the southeastern portion of the mapped area adjacent to Hines creek. There are 1,600 acres in which Culp soils are predominant. They are found in association with Leith, Tangent, Codner, and Eaglesham soils.

Topography: Generally variable—gently rolling to rolling.

Native Vegetation: Woodland consisting of aspen poplar, pine, shrubs, and coarse grasses.

Profile Description: The Culp soil profile possesses a thin organic (L-H) horizon and may have a thin organic-mineral (Ahe) horizon. These horizons rest on a leached (Ae) horizon. Underlying the Ae horizon there is a fairly well developed, finer textured Bt horizon which differentiates this soil from other coarse textured soils. The following is a description of a typical Culp soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 7.2.
Ahe	1	Dark greyish brown (10YR 4/2, moist) sandy loam, weak granular, friable. May be absent. pH 7.0.
Ae	5	Light yellowish brown (10YR 6/4, moist) loamy sand, very weak platy, very friable. pH 7.0.

Horizon	*Thickness in inches*	*Description*
AB	3	Yellowish brown (10YR 5/4, moist) sandy loam, very weak fine subangular blocky, friable. pH 7.2.
Bt	8	Yellowish brown (10YR 5/4, moist) sandy clay loam, subangular blocky, firm. pH 6.6.
BC	8	Light yellowish brown (10YR 6/4, moist) sandy loam with occasional laminae of sandy clay loam, weak granular, friable. pH 6.5.
Cca	at 26 below surface	Similar to preceding horizon but with moderate accumulation of lime. pH 7.8.
Ck		Greyish brown (10YR 5/2, moist) to brown (10YR 5/3, moist) sandy loam with beds of loamy sand and occasionaly laminae of sandy clay loam. Moderately calcareous. pH 7.6.

Agriculture: Culp soils are not being cultivated in the mapped area. In other areas it has been shown that these soils will respond favorably to mixed farming practices that include the use of commercial fertilizers. These soils are very vulnerable to wind and water erosion, and should be managed very carefully.

Soil Rating: Culp soils on undulating topography are rated as fair arable soils. Those with variable steeply sloping topography should be left to permanent pasture.

(b) Leith Series—Dark Grey Wooded, loamy sand to sandy loam.

Extent and Occurrence: Leith soils are found in the southeastern portion of the mapped area adjacent to Hines creek. There are about 7,800 acres in which these soils are predominant. They occur in association with Culp, Tangent, Codner, and Eaglesham soils in this area.

Topography: Variable—undulating to rolling.

Native Vegetation: Woodland consisting of aspen poplar, pine, various shrubs and coarse grasses.

Profile Description: Leith soil profiles are similar to Culp soil profiles except for a thicker Ahe horizon. The following is a description of a typical Leith soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf and grass litter. pH 6.0.
Ahe	4	Dark greyish brown (10YR 4/2, moist) sandy loam, weak granular, friable. pH 5.7.
Ae	3	Pale brown (10YR 6/3, moist) loamy sand, very weak platy, friable. pH 5.6.
AB	3	Brown (10YR 5/3, moist) sandy loam, weak fine subangular blocky, friable. pH 5.9.
Bt	8	Yellowish brown (10YR 5/4, moist) sandy clay loam, weak subangular blocky, firm. pH 5.6.
BC	6	Light yellowish brown (10YR 6/4, moist) bedded sandy loam and loamy sand with occasional laminae of sandy clay loam, weak granular, friable. pH 6.4.

Horizon	Thickness in inches	Description
Cca	at 25 below surface	Similar to preceding horizon but with moderate accumulation of lime. pH 7.8.
Ck		Greyish brown (10YR 5/2, moist) sandy loam with beds of loamy sand and occasional laminae of sandy clay loam. Moderately calcareous. pH 7.6.

Agriculture: Leith soils of this area are being cultivated to some extent and they are producing fairly satisfactory crops of coarse grains, grasses and legumes. These soils are vulnerable to wind erosion and soil drifting is very apparent in most of the cultivated areas. Good management practices that keep these soils covered throughout the year will greatly reduce this hazard. These sandy soils respond readily to applications of commercial fertilizers.

Soil Rating: Leith soils on undulating to gently rolling topography are fairly good arable soils.

(c) Gage Series—Eluviated Black, loamy sand to sandy loam.

Extent and Occurrence: Gage soils are found near Gage in township 82, range 4. There are 1,000 acres mapped in this area. They are found in association with Peoria and Landry soils.

Topography: Undulating to gently rolling.

Native Vegetation: Sparse woodland consisting of aspen polar, shrubs and grasses.

Profile Description: The Gage soil profile possesses a dark-colored, organic-mineral (Ah) horizon underlain by a very dark grey, organic-mineral (Ahe) horizon. The profile may have a very thin eluviated mineral (Ae) horizon. The horizons underlying these surface horizons are similar to those of the Leith soil profile. Commonly, these soils are underlain by fine textured materials at depths of 3 to 5 feet. The following is a description of a typical Gage soil profile:

Horizon	Thickness in inches	Description
Ah	4	Very dark greyish brown (10YR 3/2, moist) sandy loam, weak granular, friable. pH 5.8.
Ahe	4	Dark greyish brown (10YR 4/2, moist) grading to dark grey (10YR 4/1, moist) with depth, mottled, sandy loam, weak granular, friable. pH 5.4.
Ae	½	Pale brown (10YR 6/3, moist) loamy sand, very weak platy, friable. pH 5.6.
AB	3	Brown (10YR 5/3, moist) sandy loam, weak fine subangular blocky, friable. pH 5.8.
Bt	5	Yellowish brown (10YR 5/4, moist) sandy clay loam, weak subangular blocky, firm. pH 5.6.
BC	5	Light yellowish brown (10YR 6/4, moist) bedded sandy loam and loamy sand with occasional laminae of sandy clay loam, weak granular, loose. pH 6.1.
Cca	at 22½ below surface	Similar to preceding horizon but with moderate accumulation of lime. pH 7.6.
Ck		Greyish brown (10YR 5/2, moist) loamy sand with beds of sandy loam and occasional laminae of sandy clay loam. Moderately calcareous. pH 7.4.

TABLE 15—Analyses of Culp and Gage Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size Sand %	Silt %	Clay % <2μ	Clay % <.2μ	pH	Chemical Analysis: N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Culp sandy loam—Orthic Grey Wooded—NE 16-83-4-W6																	
L-H	1	....	....	....	....	....	.....	.....	....	.....	....	....	....	....	....	....	....
Ae	5	66	30	4	2	7.0	0.04	0.41	11	5.7	86	9	2	3	0	100	7.8
AB	3	62	16	22	11	7.2	0.03	0.49	15	15.5	80	14	1	4	1	99	5.3
Bt	8	32	41	27	18	6.6	0.05	0.47	9	19.1	75	17	2	3	3	97	3.9
BC	8	64	24	12	7	6.5	0.03	0.32	10	13.2	77	15	2	2	4	96	4.5
Cca	at 25	59	25	16	8	7.6	0.03	0.32	10	.....	....	....	....	....	....	....	....
Gage loamy sand—Eluviated Black—SE 14-82-4-W6																	
Ah	4	78	12	10	3	5.3	0.48	5.84	12	38.6	81	12	2	2	3	97	5.8
Ahe	4	80	16	4	0	5.3	0.18	2.27	12	15.0	72	11	2	1	14	86	5.5
Ae	Trace	Not Analysed															
AB	3	73	20	7	4	5.9	0.06	0.61	10	5.9	63	18	2	2	15	85	3.2
Bt	5	75	14	11	7	5.6	0.05	0.46	9	8.5	47	34	4	2	13	87	1.2
BC	5	76	20	4	2	6.1	0.03	0.32	10	6.2	50	35	3	2	10	90	1.3
Cca	at 21	84	14	2	1	7.3	0.03	0.27	9	.....	....	....	....	....	....	....	....

Horizon	Conductivity mmhos/cm	Soluble Salt Analysis: Cations Ca++ %	Mg++ %	Na+ %	Total m.e./l.	Anions $SO_4^=$ %	Cl− %	HCO_3^- %	$CO_3^=$ %	Total m.e./l.
Culp sandy loam—Orthic Grey Wooded—NE 16-83-4-W6										
Ck (at 30 ins.)	2.1	77	20	3	26.9	88	1	11	0	26.5
Gage loamy sand—Eluviated Black—SE 14-82-4-W6										
Ck (at 25 ins.)	3.8	33	52	15	75.1	96	0	4	0	72.2

Agriculture: The Gage soils are under cultivation and are producing good crops. However, they are very vulnerable to wind erosion and soil drifting is very apparent in most of the cultivated areas. Good management practices that include measures to keep these soils covered throughout the year will greatly reduce this erosion hazard.

Soil Rating: Gage soils are good arable soils.

3. Brown to yellowish brown, slighty to moderately calcareous, sand material.

(a) Heart Complex—Podzolic and Brunisolic, loamy sand to sand.

Extent and Occurrence: Heart soils are found adjacent to Hines creek. There are about 10,000 acres in which these soils predominate. They occur in close association with Culp, Leith, and Organic soils in this area.

Topography: Undulating to rolling with complex slopes.

Native Vegetation: Woodland consisting of mixed stands of pine, aspen poplar, shrubs and grasses.

Profile Desciption: Heart soils exhibit a variety of profiles. Both Podzolic and Brunisolic profiles have been recognized but no further attempts have been made to make series separations of the soils formed on this material. These soils may be underlain by fine textured materials at depths of 4 to 6 feet. The following is a description of a weakly developed Bisequa Grey Wooded profile common to the Heart complex:

Horizon	*Thickness in inches*	*Description*
L-H	1	Very dark greyish brown (10YR 3/2, moist) leaf and grass litter. pH 6.2.
Ae	4	Pinkish white (7.5 YR 8/2, moist) grading with depth to pinkish grey (7.5YR 7/2, moist) loamy sand, very weak platy, very friable. pH 6.0.
AB	3	Light brown (7.5YR 6/4, moist) loamy sand, single grained, loose. pH 6.0.
Bt	7	Strong brown (7.5YR 5/6, moist) sandy loam, very weak fine subangular blocky, friable. pH 6.4.
BC	7	Light yellowish brown (10YR 6/4, moist) loamy sand, single grained, loose. pH 6.6.
Ck	at 22 below surface	Light yellowish brown (10YR 6/4, moist) sand. Slightly calcareous. Lime occurs as flecks throughout this sandy material. There is no lime accumulation in this material to depts of 60 inches. pH 6.8.

Agriculture: Heart soils should not be cultivated. Any disturbance of their protective vegetative cover will bring about serious soil drifting. These soils should be used as permanent pasture, or withheld for timber, or game reserves.

Soil Rating: Heart soils are non-arable.

4. Brown to pale brown, comparatively recent water deposited materials that are slightly calcareous.

A wide variety of profiles have developed on this material. The soils developed on the upper and older terraces commonly have thick, Ah horizons and weakly developed illuvial horizons, whereas the soils developed on the lower and younger terraces have thin or no Ah horizons and no visible evidence of illuviation.

On the larger terraces an attempt was made to classify these soils by grouping them according to similarity of profile characteristics. On the smaller terraces however, this was impracticable due to the scale of mapping and the soils were placed into an undifferentiated group. The following are descriptions of the soils developed on this material in this area.

(a) High Prairie Complex—Gleyed Black and Gleyed Dark Grey, fine sandy loam to clay loam.

Extent and Occurrence: High Prairie soils have a fairly wide distribution in this mapped area. They are found adjacent to the permanent and intermittent stream courses in association with Codner, Prestville, and Eaglesham soils. There are about 16,900 acres in which these soils predominate.

Topography: Depressional to undulating.

Native Vegetation: Coarse grasses, black poplar, willow, and dwarf birch.

Profile Description: High Prairie soils are characterized by surface horizons that are very dark grey to dark greyish brown in color and are fairly thick. The subsoil is brown in color, and consists of stratified materials that show weak to moderate horizon development and some evidence of gleying. The following is a description of a Gleyed Dark Grey profile typical of the High Prairie complex:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf and grass litter. pH 6.0.
Ahej	6	Very dark greyish brown (10YR 3/2, moist) with spots of dark grey (10YR 4/1, moist) silty clay loam, weak granular, friable. pH 5.9.
Btj	8	Brown (10YR 5/3, moist) silty clay loam, weak subangular blocky, firm. Splotched with dark grey (10YR 4/1, moist) stains. The degree of development in this horizon is quite variable. pH 5.5.
C	at 15 below surface	Brown to dark brown (10YR 4/3, moist) silt loam. pH 6.1.
Ckg	at 24 below surface	Dark greyish brown (10YR 4/2, moist) and brown (10YR 4/3, moist) very fine sandy and silty clay loam strata. Little uniformity as to thickness of strata. Iron staining common. Calcareous. pH 7.1.

Agriculture: Some of the larger areas of High Prairie soils are being cultivated and are producing a variety of crops. Evidence in-

dicates that good responses can be expected from supplementary applications of commercial fertilizers at recommended rates.

Soil Rating: Generally, good arable soils.

(b) Alluvium—Undifferentiated river-flat and river-beach deposits.

Extent and Occurrence: Alluvium has a fairly wide distribution. There are approximately 6,700 acres of Alluvium in the mapped area.

Topography: Level to undulating, often dissected by stream channels or oxbows.

Native Vegetation: Variable—some areas of Alluvium have heavy tree cover consisting of aspen and black poplar with a dense understory of willow and alders. Others have vegetation consisting of coarse grasses and scattered bluffs of poplar, willow, and alder.

Profile Description: Alluvium consists of a wide variety of soil materials found on the river flats and benches occurring adjacent to the rivers in this area. Since these flats are variable in size, in many cases too small to outline on this scale of mapping, and usually dissected by stream channels, no attempt was made to differentiate the soils formed on this material. Usually the soils vary in texture from sandy loam to silt loam and sometimes may have gravelly subsoils. The following is a description of a Rego Black profile examined on a river bench adjacent to the Peace river in an area south of Cherry Point:

Horizon	*Thickness in inches*	*Description*
Ah	5	Black (10YR 2/1, moist) silt loam, weak fine granular, friable. pH 6.8
C	at 5 below surface	Variable strata of brown (10YR 5/3, moist) silt loam and yellowish brown (10YR 5/6, moist) very fine sandy loam. pH 5.7.
IIC	at 20 below surface	Cobbly gravel.

Agriculture: The larger, more uniform areas of Alluvium, with favorable texture, are under cultivation in the mapped area and are producing a variety of crops. Elsewhere such areas have been utilized successfully for market gardening with the aid of sprinkler irrigation. In the smaller and dissected areas caution should be exercised in agricultural use as these flats may be vulnerable to water erosion during spring flooding.

Soil Rating: Generally fair to good arable soils.

(5) Brown and pale brown, slightly calcareous, coarse and medium textured materials that occur as a mantle (not exceeding 30 inches) overlying finer textured material of a different deposition.

This mantle, having a thickness of 10 to 30 inches may consist of beach, flood plain, or aeolian material.

The profiles formed on this material may be thin counterparts of profiles formed on similar and deeper deposits or may have very

weak development. The classification of these thin or indistinct profiles is tentative and subject to change with further study.

(a) Codesa Series—Orthic Grey Wooded, loamy sand to silt loam.

Extent and Occurrence: Gravel is common to many of the Codesa soils in this area. Gravelly phases have been indicated in most of the Codesa soil areas shown on the accompanying soil map. There are about 17,900 acres in which these soils predominate. They are found in association with Belloy, Donnelly, Hazelmere, Whitelaw, Boundary, and Clouston soils.

Topography: Undulating to rolling topography consisting mainly of simple slopes.

Native Vegetation: Woodland consisting of aspen poplar, white spruce, pine with a fairly dense undergrowth of native shrubs.

Profile Description: Codesa soils are characterized by a surface accumulation that has the appearance of an Ae horizon. Usually, careful examination permits a separation of weakly developed eluviated and illuviated horizons in this yellowish brown surface accumulation. This accumulation may be gravelly or may have a gravel layer at the contact with the underlying finer textured material. No further separations were made on the basis of differences in the underlying materials but the associated series indicated in the map unit provides a guide to the characteristics of the underlying material.

The recognition of Codesa soil depends on an appreciation of the characteristics common to many of the soils in this area. For example, a Donnelly soil profile is characterized by an Ae horizon that is rarely over 6 inches thick whereas the presence of an Ae-like yellowish brown surface accumulation exceeding a thickness of approximately 10 inches overlying the fine textured lacustro-till provides for a separation into the Codesa series. The following is a description of a profile formed on relatively uniform sandy material that is underlain by lacustro-till at a depth of 14 inches:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 6.1.
Ahe	1	Greyish brown (10YR 5/2, moist) sandy loam, weak fine granular, friable. pH 6.2.
Ae	4	Light yellowish brown (10YR 6/4, moist) loamy fine sand, very weak platy, friable. pH 5.3.
AB	3	Brown (10YR 5/3, moist) loamy sand to sandy loam, weak fine subangular blocky, friable. pH 5.1.
Btj	5	Yellowish brown (10YR 5/4 to 10YR 5/6, moist) sandy loam, weak subangular blocky, friable. Lenses of gravel are common in the lower portion. pH 5.0.
IIBC	3	Dark greyish brown (10YR 4/2, moist) clay, strong medium blocky, firm. Coarse materials from the horizon above commonly form a coating on the structural aggregates. pH 6.5.
IICk	at 17 below surface	Very dark greyish brown (10YR 3/2, moist) clay. Calcareous. pH 7.5.

Agriculture: The Codesa soils of the mapped area are not being cultivated. However, these soils are producing satisfactory crops in adjacent map areas under good management practices.

Soil Rating: Fair to fairly good arable soils. The gravelly and stony phases of these soils are generally non-arable.

(b) Belloy Series—Dark Grey Wooded, sandy loam to silt loam.

Extent and Occurrence: There are several areas, making up a total of about 6,300 acres in which Belloy soils prevail in this mapped area. Their distribution is mainly in the southeastern portion where they are found in association with Hazelmere, Albright, Whitelaw, Berwyn, Peoria, and Clouston soils.

Topography: Undulating to gently rolling:

Native Vegetation: Sparse woodland consisting of aspen poplar, willow, and coarse grasses.

Profile Description: Belloy soils are quite variable and may be gravelly. The gravelly phase of these soils is common to the areas indicated on the accompanying soil map. They are distinguished from the Codesa soils by their prominent Ah horizon. The following is a description of a Dark Grey Wooded profile common to the Belloy series:

Horizon	*Thickness in inches*	*Description*
L-H	1	Very dark greyish brown (10YR 3/2, moist) leaf and grass litter. pH 6.2.
Ahe	4	Dark grey (10YR 4/1, moist) in the upper portion, grading to dark greyish brown (10YR 4/2, moist) in the lower portion, sandy loam, weak fine granular, friable. pH 6.1.
Ae	2	Light yellowish brown (10YR 6/4, moist) loamy fine sand, very weak platy, friable. pH 5.5.
AB	2	Brown (10YR 5/3, moist) sandy loam, weak fine subangular blocky, friable. pH 5.7.
Btj	4	Yellowish brown (10YR 5/4 to 10 YR 5/6, moist) sandy loam, weak subangular blocky, friable. A gravelly layer is common at the contact with the underlying finer textured materials. pH 5.9.
IIBC	2	Dark greyish brown (10YR 4/2, moist) clay, strong blocky, firm. Coarse materials from the horizon above commonly form a coating on the structural aggregates. pH 6.6.
IICk	at 15 below surface	Very dark greyish brown (10YR 3/2, moist) clay. Calcareous. pH 7.4.

Agriculture: The Belloy soils of this mapped area are mostly under cultivation and are producing fairly satisfactory crops. These soils require good management practices which include the use of commercial fertilizers to produce good crop yields.

Soil Rating: Depending on the amount of gravel and stones, these soils are fair to good arable soils.

(c) Peoria Series—Eluviated Black, sandy loam to silt loam.

Extent and Occurrence: The Peoria soils in this mapped area have a fairly wide distribution. There are 12,800 acres in which these soils predominate with the largest acreage in the vicinity of Gage. They are found in association with Landry, Esher, Gage, Tangent, Albright, Berwyn, and Codner soils.

Topography: Mainly undulating.

Native Vegetation: Sparse woodland consisting of bluffs of aspen poplar and willow with native grasses.

Profile Description: Peoria profiles are distinguished by their thick Ah horizon developed on a fairly uniform sandy to silty material that is usually underlain at depths of 10 to 24 inches by a finer textured substratum. There may be a thin gravelly layer at the contact of the two materials. In many cases, however, this uniform stone-free parent material may be the result of an aeolian deposition . The following is a description of a typical Peoria soil profile:

Horizon	*Thickness in inches*	*Description*
Ah	4	Black (10YR 2/1, moist) loam, very weak fine granular, friable. pH 6.0.
Ahe	6	Dark greyish brown (10YR 4/2, moist) loam, weak fine granular, friable. pH 6.0.
Ae	½	Pale brown (10YR 6/3, moist) fine sandy loam, very weak fine platy, friable. Frequently absent. pH 6.0.
AB	2	Brown (10YR 5/3, moist) loam, weak fine subangular blocky, friable. pH 5.8.
Btj	6	Yellowish brown (10YR 5/4, moist) silt loam, weak medium subangular blocky, friable. pH 5.8.
IIBC	3	Dark greyish brown (10YR 4/2, moist) clay, strong blocky, firm, structural aggregates commonly coated with material from horizon above. pH 6.5.
IICk	at 22½ below surface	Very dark greyish brown (10YR 3/2, moist) clay. pH 7.5.

Agriculture: The majority of the Peoria soils in this mapped area are under cultivation and are being used for grain crop production. These soils are very vulnerable to wind erosion and drifting is very apparent in the area south of Gage. Farm management should include measures to reduce this hazard.

Soil Rating: Usually good to very good arable soils.

F. SOILS DEVELOPED ON COARSE OUTWASH AND BEACH MATERIALS

These deposits consist of fairly thick alternating layers of coarse sand and gravel or gravel with cobbles. They are found as shoreline remnants of post-glacial lakes, usually along the 2,150-foot contour, along old river channels, and as areas of varying size associated with till, glacio-fluvial, and lacustro-till deposits.

(a) Clouston Series—Orthic Grey Wooded, gravelly or stony loamy sand to sandy loam.

Extent and Occurrence: Clouston soils have a fairly wide distribution in this mapped area. There are approximately 10,400 acres in which these soils predominate. They are found in association with Grouard, Codesa, and Belloy soils.

Topography: Variable, consisting of low ridges, low knolls, and as fairly long uniform slopes.

Native Vegetation: Woodland consisting of aspen poplar with various native shrubs.

Profile Description: The Clouston soil profiles have a thin organic (L-H) horizon and may have a thin organic-mineral (Ahe) horizon underlying the organic horizon. These gravelly soils have a prominent Ae horizon but a less distinct B horizon. The B horizon is usually darker in color and has a slightly firmer consistence. The following is a description of a typical Clouston soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Very dark greyish brown (10YR 3/2, moist) leaf litter. pH 6.4.
Ahe	1	Dark greyish brown (10YR 4/2, moist) gravelly sandy loam, single grain, loose. May be absent. pH 5.3.
Ae	4	Light brownish grey (10YR 6/2, moist) gravelly loamy sand, very weak platy, very friable. pH 5.3.
AB	5	Greyish brown (10YR 5/2, moist) gravelly loamy sand, very weak fine subangular blocky, very friable. pH 5.6.
Btj	12	Yellowish brown (10YR 5/4, moist) gravelly loamy sand, very weak subangular blocky, very friable but has a detectable firmness that is not evident in the horizons above and below. pH 6.0.
BC	10	Brown (10YR 5/3, moist) gravelly loamy sand, single grain, loose. pH 6.5.
Ck	at 33 below surface	Brown (10YR 5/3, moist) gravelly and stony loamy sand. Lime is found accumulated on the underside of stones and pebbles. pH 7.0.

Agriculture: Clouston soils are not being cultivated in this mapped area. They are considered as unsuitable for crop production. Commercial use is made of the gravel in some portions of the Clouston soil areas.

Soil Rating: Generally poor arable soil, suitable for pasture or woodland.

(b) Grouard Series—Dark Grey Wooded, gravelly or stony loamy sand to sandy loam.

Extent and Occurrence: Grouard soils occur mostly in the southeastern portion of this mapped area. There are about 2,900 acres in which these soils predominate. They are found in association with Clouston, Codesa, Belloy, and Heart soils.

Topography: Variable, consisting of low ridges, low knolls, and fairly long uniform slopes.

Native Vegetation: Woodland consisting of aspen poplar with various native shrubs and grasses.

Profile Description: The profile of the Grouard soils is similar to that of the Clouston soils except for a thicker organic-mineral (Ahe) horizon. The following is a description of a typical Grouard soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Very dark greyish brown (10YR 3/2, moist) leaf litter. pH 6.2.
Ahe	4	Dark greyish brown (10YR 4/2, moist) gravelly sandy loam, single grain, loose. pH 6.0.
Ae	2	Light brownish grey (10YR 6/2, moist) gravelly loamy sand, very weak platy, very friable. pH 5.6.
AB	4	Greyish brown (10YR 5/2, moist) gravelly loamy sand, very weak fine subangular blocky, very friable. pH 6.0.
Btj	10	Yellowish brown (10YR 5/4, moist) gravelly loamy sand, very weak subangular blocky, very friable but has a detectable firmness that is not evident in the horizons above and below. pH 6.2.
BC	8	Brown (10YR 5/3, moist) gravelly loamy sand, single grain, loose. pH 6.6.
Ck	at 28 below surface	Brown (10YR 5/3, moist) gravelly loamy sand. Lime is found accumulated on the underside of stones and pebbles. pH 7.0.

Agriculture: Grouard soils are not being cultivated in this mapped area. These soils are droughty and have a low fertility reserve. They are considered as relatively unsuitable for crop production.

Soil Rating: Generally poor to fair arable soils.

G. SOILS DEVELOPED ON RESIDUAL AND MODIFIED RESIDUAL MATERIALS

In the mapped area there is a greyish colored, acidic, silty clay to clay material occurring in close association with grey shale that has veinlets of yellowish colored material along its bedding planes. This shale is found relatively close to the surface in the Clear hills and in the small hills common to the south-central, northwestern, and southeastern portions of the area. The soils formed on this material have a characteristic brownish color and may have small fragments of shale throughout the solum. Following is a description of the soils formed on this material:

(a) Boundary Complex—Undifferentiated Podzolic, clay loam to clay.

Extent and Occurrence: Boundary soils have a fairly wide distribution in this mapped area. They are found throughout the Clear hills and on small ridges scattered throughout the remainder of the mapped area. There are about 71,300 acres in which these soils

predominate. They are associated with Josephine, Alcan, Hazelmere, and Donnelly soils in this area.

Topography: Undulating to hilly.

Native Vegetation: Woodland consisting of aspen poplar, alder, and various native shrubs.

Profile Description: The Boundary soil profile possesses a thin organic (L-H) horizon and may have a thin organic-mineral (Ahe) horizon lying directly under this surface organic horizon. Underlying these horizons is usually a thin Ae horizon that is strongly acid in reaction. The brownish colored B horizon varies in color and is usually darker in the lower portion. Firm shale may be found at depths of from 24 to 40 inches. The following is a description of a Boundary soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) leaf litter. pH 6.0.
Ahe	1	Dark greyish brown (10YR 4/2, moist), clay loam, weak granular, friable. pH 5.6.
Ae	2	Light grey (10YR 7/2, moist) clay loam, weak platy, friable. pH 5.3.
Bf$\bar{t}$j1	8	Yellowish brown (10YR 5/4, moist) silty clay, subangular blocky, firm. pH 4.9.
Bf$\bar{t}$j2	10	Brown (10YR 4/3, moist) clay, subangular blocky, firm. pH 4.4.
C1	11	Very dark greyish brown (2.5Y 3/2, moist) with red (2.5YR 5/8, moist) streaks and blotches, clay with shale fragments. Bedding planes of weathered shale often discernible. pH 4.1.
C2	at 33 below surface	Olive grey (5Y 5/2, moist) firm shale material with a clay texture that has yellow (5Y 7/6, moist) streaks usually along bedding planes. pH 4.0.

Agriculture: Very few of the Boundary soil areas are being cultivated in this mapped area. Those that are being cultivated have produced poor crops. Unlike other Podzolic soils in this area, acidity is a factor that must be considered in the successful utilization of these soils for crop production. Preliminary investigations have shown a marked crop response from applications of commercial fertilizer and lime.

Soil Rating: Poor arable soils on level to gently rolling topography and non-arable soils on steeper topography.

TABLE 16—Analyses of a High Prairie Soil

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size: Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
High Prairie silty loam—Gleyed Black—NW 21-87-8-W6																	
Ahej ..	6	19	47	34	17	5.9	0.91	10.60	12	32.6	69	12	0	5	14	86	5.7
Btj	8	17	47	36	20	5.5	0.25	2.51	10	25.8	70	18	1	2	9	91	3.7
C	9	16	51	33	16	6.1	0.14	1.55	10	24.9	70	20	2	1	7	93	3.2
Ckg	at 24	56	24	20	8	7.1	0.17	2.06	12	16.0	75	22	1	1	1	99	3.3

TABLE 17—Analyses of a Boundary Soil

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size: Sand %	Silt %	Clay % <2μ	Clay % <.2μ	Chemical Analysis: pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+No Ratio	Free Fe_2O_3 %
Boundary silty clay loam—Textural Prodzol—SW 17-87-11-W6																		
L-H	1	....	....	....	....	6.4	1.63	35.20	22	81.5	67	13	0	3	17	83	5.1	....
Ae	2	23	47	30	10	4.6	0.06	1.11	19	10.5	12	5	0	3	80	20	2.4	1.3
Bftj1 ..	8	13	31	56	24	4.9	0.10	1.03	10	14.8	8	4	0	4	84	16	2.0	3.8
Bftj2 ..	10	7	27	66	31	4.3	0.10	0.58	6	16.8	5	3	0	3	89	11	1.7	4.2
C1	11	9	14	77	37	4.1	0.10	0.63	6	16.8	5	3	0	2	90	10	1.7	3.2
C2	at 33	8	24	68	30	4.0	0.10	0.62	6	16.8	5	3	0	2	90	10	1.7	8.6

II. POORLY DRAINED TO VERY POORLY DRAINED SOILS

Soils developed under wet conditions in the presence of a high or a highly fluctuating water table. These soils show gley characteristics distinguished by dull colors and by the presence of brownish or reddish colored mottles. Poorly drained soils that have less than 12 inches of a compacted L-H horizon are included in the Gleysolic Order whereas such soils characterized by an organic horizon exceeding a thickness of 12 inches are included in the Organic Order. In the mapped area, separations of these soils were made in the following manner:

A. SOILS DEVELOPED ON MEDIUM TO FINE TEXTURED MATERIALS

1. Brown to grey, moderately calcareous, medium to fine textured materials.

(a) Snipe Series—Low Humic Eluviated Gleysol, loam to clay loam.

Extent and Occurrence: Snipe soils occur in the low, poorly drained areas associated with soils developed on till, glacio-fluvial, lacustro-till, and lacustrine materials. While comparatively few areas of these soils have been outlined in the mapped area they are of common occurrence and have been mapped as associates with many of the better drained soil series. There are approximately 11,000 acres in which these soils predominate in the mapped area. No attempt was made to determine their extent in areas in which they were of secondary significance. Snipe soils occur in association with Alcan, Murdale, Donnelly, Esher, Hazelmere, Albright, Whitelaw, Berwyn, Nampa, Falher, Boundary, Goose, and Prestville soils in this area.

Topography: Depressional to level.

Native Vegetation: Coarse grasses and sedges with willow, dwarf birch, and black poplar.

Profile Description: Snipe soils are distinguished by an organic horizon underlain by a fairly thick, iron stained, light grey Aeg horizon that is medium to strongly acid in reaction. These horizons rest on a grey to dark grey, fine textured Btg horizon which shows evidence of iron staining. The color of this horizon is more drab than that of better drained soils developed on similar materials. It is medium to strongly acid in reaction. The following is a description of a profile typical of the Snipe series:

Horizon	*Thickness in inches*	*Description*
L	4	Dark brown (10YR 4/3, moist) peaty material. Commonly absent from burned-over areas. pH 5.5.
H	2	Very dark brown (10YR 2/2, moist) decomposed peat. pH 5.5.
Ahe	1	Dark greyish brown (10YR 4/2, moist) silt loam, weak granular, friable. Commonly absent. pH 5.6.
Aeg	6	Light grey (10YR 7/2, moist) silt loam, platy, friable with yellowish brown (10YR 5/4, moist) mottles. pH 5.2.

Horizon	*Thickness in inches*	*Description*
ABg	3	Grey (10YR 5/1, moist), silty clay loam, subangular blocky, firm. pH 4.9.
Btg	11	Grey (10YR 5/1, moist) clay, blocky, very firm. Aggregates have a waxy appearance when dry. pH 5.3.
BCg	7	Dark grey (10YR 4/1, moist) clay, subangular blocky, firm. pH 6.9.
Ck	at 34 below surface	Greyish brown (10YR 5/2, moist) clay. Calcareous. pH 7.5.

Agriculture: The larger areas of Snipe soils are not cultivated but the smaller areas that are associated with better drained soils are usually cultivated along with the better drained soils, providing drainage conditions permit such a practice.

The removal of tree cover results in a marked improvement in the drainage conditions of these soils. However, even with improved drainage, it is doubtful whether grain crops could be grown successfully for several years after breaking. Crops grown on poorly drained soils are much slower in maturing than those grown on adjacent better drained soils.

Successful utilization of these soils, after drainage, depends upon improvement in their physical characteristics and their fertility status. For this reason, grasses, legumes, and coarse grains should receive first consideration, supplemented by the periodic applications of fertilizer.

Soil Rating: These soils are suitable for pasture crop production and, when drained, are rated as fair arable soils.

(b) Goose Series—Orthic Humic Gleysol, silty clay loam to clay.

Extent and Occurrence: Goose soils are of common occurrence in the poorly drained areas and are found in association with other soils formed on medium and fine textured parent materials in the mapped area. There are approximately 24,100 acres in which these soils are predominant; no estimate was made of the areas of these soils that were too small to be shown on the accompanying soil map.

Topography: Depressional and level.

Native Vegetation: Meadow grasses, willow, dwarf birch, and occasional black poplar.

Profile Description: Goose soils are quite variable with respect to the thickness of their organic surface horizon. Usually this dark colored surface horizon is about 6 inches in thickness and has a granular to shot-like structure. Underlying the surface horizon is a dark grey, fine textured B horizon which contains few to many yellowish brown to reddish mottles. The following is a description of a representative Goose soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	2	Dark brown (10YR 3/3, moist) organic mat, may be peaty. pH 6.4.
Ah	6	Very dark grey (10YR 3/1, moist) silty clay loam, granular, friable. pH 6.2.
ABg	4	Dark grey (10YR 4/1, moist) silty clay with yellowish brown (10YR 5/4, moist) mottles, fine subangular blocky, firm. The thickness of this horizon is quite variable. pH 6.0.
Bmg	8	Dark grey (7.5YR 4/0, moist) with brown (7.5YR 4/4, moist) mottles, clay, massive, plastic when wet and very hard when dry. pH 6.5.
BCg	4	Grey (7.5YR 5/0, moist) clay with brown (7.5YR 4/4, moist) mottles, massive, plastic. On drying breaks to hard blocky fragments. pH 7.4.
Ckg	at 24 below surface	Dark grey (7.5YR 4/0, moist) clay. On drying breaks into hard blocky fragments. Calcareous. pH 7.6.

Agriculture: Goose soils are being used almost exclusively for pasture crop production in this area. These soils, even after draining, are "cold soils" and are not immediately suitable for grain crop production. Considerable success has been experienced in growing green feed, grasses, and legumes.

Soil Rating: Goose soils are very good for pasture crop production and after drainage become fairly good arable soils.

(c) Prestville Series—Peaty Humic Gleysol, silty clay loam to clay.

Extent and Occurrence: Prestville soils predominate in approximately 35,200 acres in the mapped area. No estimate was made of their extent in areas where they were of secondary significance. They are associated with other poorly drained soils such as Snipe, Goose, and Eaglesham soils.

Topography: Depressional.

Native Vegetation: Coarse grasses and sedges with bluffs of willow and dwarf birch.

Profile Description: The Prestville soil profile is characterized by a peaty surface horizon that may be up to 12 inches in thickness, underlain by an Ah horizon that is usually about 2 inches thick. These horizons lie on a grey iron-stained B horizon that is sticky and plastic when wet and very hard when dry. The following is a description of a typical Prestville soil profile:

Horizon	*Thickness in inches*	*Description*
L	7	Brown (10YR 4/3, moist) grading to dark brown (10YR 3/3, moist) fibrous peat. pH 5.8.
F	3	Dark brown (10YR 3/3, moist) semi-decomposed peat. pH 6.8.
Ah	2	Very dark brown (10YR 2/2, moist) silty clay loam, weak granular, friable. pH 7.2.
ABg	2	Dark greyish brown (10YR 4/2, moist) silty clay, massive. pH 7.4.

Horizon	*Thickness in inches*	*Description*
Bmg	6	Dark grey (7.5YR 4/0, moist) clay, massive, plastic when wet. pH 7.8.
BCg	6	Grey (7.5YR 5/0, moist) clay, granular to shot-like, firm. pH 7.6.
Cksg	at 26 below surface	Grey (7.5YR 5/0, moist) clay. Moderately calcareous and moderately saline. pH 8.0.

Agriculture: Prestville soils are generally not cultivated in the mapped area. However, with improved drainage, they can be developed into fairly good arable soils.

These soils are "cold soils" and are not generally suited immediately to grain production, but they can be used to advantage by growing crops for green feed. With improved drainage, grain crops can be ripened on these soils and mixed farming has yielded satisfactory returns.

Soil Rating: In their native state these soils are suitable for pasture. With improved drainage, they can be developed into fairly good arable soils.

2. Brown to greyish brown, acidic, medium to fine textured materials.

(a) Josephine Series—Humic Eluviated Gleysol, silty clay loam to clay.

Extent and Occurrence: The Josephine soils occur mainly in the south-central portion of the mapped area. There are approximately 11,600 acres in which these soils are predominant. They are found in association with Boundary, Esher, and Falher soils in this area.

Topography: Level to depressional.

Native Vegetation: Grasses with bluffs of poplar, willow, and alder.

Profile Description: The Josephine soil profile has a thin organic (L-H) horizon underlain by a pronounced Ah horizon. These horizons lie on a leached and iron-stained (Aeg) horizon that is relatively thin. Underlying these horizons is a dark brown B horizon that is also iron-stained. As compared with other poorly drained soils in this area, the solum of this series is more acid in reaction. The following is a description of a typical Josephine soil profile:

Horizon	*Thickness in inches*	*Description*
L-H	1	Dark brown (10YR 3/3, moist) grasses and leaf litter. pH 5.6.
Ah	3	Very dark brown (10YR 2/2, moist) silty clay, weak granular, friable. pH 5.3.
Aeg	1	Brown (10YR 5/3, moist) silty clay, weak platy, friable, with yellowish brown (10YR 5/6, moist) mottles. pH 5.3.
ABg	4	Brown (10YR 4/3, moist) silty clay, weak subangular blocky, friable with yellowish brown (10YR 5/6, moist) mottles. pH 5.2.

Horizon	Thickness in inches	Description
Btg	12	Dark greyish brown (10YR 4/2, moist) clay, blocky, firm, with dark yellowish brown (10YR 4/4, moist) mottles. pH 4.6.
BCg	6	Grey (5Y 5/1, moist) clay, weak blocky, firm, with dark yellowish brown (10YR 4/4, moist) mottles. pH 4.4.
Cg	at 27 below surface	Dark grey (5Y 4/1, moist) clay, mottled. pH 4.6.

Agriculture: A fairly large percentage of the Josephine soils in this mapped area are being cultivated. These soils have not been mapped previously, therefore little is known of their agricultural potential. However, from one year's results of field plot trials conducted by the staff of the Beaverlodge Experimental Farm it would appear that coarse grains and most grasses can be grown successfully on this soil with the use of commercial fertilizers and lime. In addition, drainage is a prime requirement in the utilization of this soil.

Soil Rating: On drainage Josephine soils are rated fair arable soils.

B. SOILS DEVELOPED ON COARSE TO MEDIUM TEXTURED MATERIALS

1. Brown to pale brown, moderately calcareous, coarse to medium textured materials.

(a) Wanham Series—Low Humic Eluviated Gleysol, sandy loam to silt loam.

Extent and Occurrence: The Wanham soils have a limited distribution in this mapped area. There are only about 100 acres in which these soils are predominant. No estimate was made of the extent of their occurrence in the areas where they were not predominant. They occur in many of the low-lying areas associated with Kathleen, Juhah, Davis, and Tangent soils.

Topography: Depressional.

Native Vegetation: Coarse grasses, willow, dwarf birch, and black poplar.

Profile Description: The profile of the Wanham soils has a fairly thick organic (L-H) horizon usually underlain by a relatively thin Ah horizon. These horizons lie on a light grey, iron-stained, Aeg horizon. The Btg horizon is usually greyish brown in color and has numerous brownish to reddish colored mottles. Its texture may vary from silty clay loam to clay. The parent materials of these soils have drab colors, commonly show gleying and are usually silty in texture. The following is a description of a typical Wanham soil profile:

Horizon	Thickness in inches	Description
L-H	4	Dark brown (10YR 3/3, moist) grass and leaf litter. pH 6.0.
Ah	2	Very dark brown (10YR 2/2, moist) silt loam, weak granular, friable. pH 6.0.
Aeg	4	Light grey (10YR 7/2, moist) very fine sandy loam, platy, friable, with yellowish brown (10YR 5/4, moist) mottles. pH 5.2.

Horizon	*Thickness in inches*	*Description*
ABg	3	Greyish brown (10YR 5/2, moist) silty clay loam, subangular blocky, firm, with yellowish brown (10YR 5/4, moist) mottles. pH 5.1.
Btg	6	Dark greyish brown (10YR 4/2, moist) silty clay, coarse subangular blocky, firm, with yellowish brown (10YR 5/6, moist) mottles. pH 5.6.
BCg	4	Grey (10YR 5/1, moist) silty clay loam, subangular blocky, firm, with yellowish brown (10YR 5/6, moist) mottles. pH 6.8.
Ckg	at 23 below surface	Grey (5Y 5/1, moist) silt loam with yellowish brown (10YR 5/6, moist) streaks and mottles and with occasional laminae of very fine sandy loam. Calcareous. pH 7.8.

Agriculture: Wanham soils are not extensively cultivated in this mapped area. They are "cold soils" that are not immediately adaptable to grain crop production. With improved drainage, grasses, clovers, and coarse grains can be grown on these soils quite successfully. It has been demonstrated that they respond favorably to applications of commercial fertilizers.

Soil Rating: Suitable for pasture crop production but with improved drainage they may be used for grain crop production.

(b) Codner Series—Orthic Humic Gleysol, sandy loam to silt loam.

Extent and Occurrence: The Codner soils have a fairly wide distribution in this mapped area. They occur in the low-lying areas associated with Gage, Leith, Culp, Tangent, and Davis soils. There are about 5,500 acres in which Codner soils predominate.

Topography: Depressional.

Native Vegetation: Coarse grasses and scattered bluffs of willow, dwarf birch, and black poplar.

Profile Description: Codner soil profiles have a fairly thick organic-mineral (Ah) horizon. These horizons rest on a dull brownish colored B horizon that has reddish brown stains and varies in texture from sandy loam to silt loam. The following is a descirption of a typical Codner soil profile of this area:

Horizon	*Thickness in inches*	*Description*
F	5	Very dark brown (10YR 2/2, moist) semi-decomposed plant remains. pH 5.8.
Ah	4	Very dark grey (10YR 3/1, moist) loam, weak granular, friable. pH 5.7.
ABg	3	Dark grey (10YR 4/1, moist) silt loam, granular, firm, with yellowish brown (10YR 5/4, moist) mottles. pH 5.8.
Bmg	6	Dark greyish brown (10YR 4/2, moist) silt loam, weak fine subangular blocky, firm, with strong brown (7.5YR 5/6, moist) mottles. pH 5.8.
Ckg	at 18 below surface	Grey (10YR 4/1, moist) silt loam with laminae of silty clay and sandy loam. Reddish brown (5YR 5/4, moist) mottles. Slightly calcareous. pH 7.0.

TABLE 18—Analyses of Snipe, Goose, and Josephine Soils

Horizon	Thickness (inches)	Mechanical Analysis: Particle Size Sand %	Silt %	Clay % <2μ	Clay % <.2μ	pH	N %	Org. C %	C/N Ratio	Exchangeable Cations: Total m.e./100 g.	Ca %	Mg %	Na %	K %	H %	Base Sat. %	Ca/Mg+Na Ratio
Snipe silt loam—Low Humic Eluviated Gleysol—SE 10-81-8-W6																	
L-H + Ah	6	....	....	....	....	5.5	0.98	16.3	17	56.8	53	12	0	2	23	67	4.4
Aeg	6	18	71	11	0	5.9	0.03	0.35	11	3.7	46	22	0	5	27	73	2.1
ABg	3	14	50	36	14	5.9	0.07	0.64	10	17.5	58	30	0	3	9	91	1.9
Btg	12	15	36	49	38	6.4	0.05	0.64	13	28.8	59	33	1	2	5	95	1.7
BCg	7	7	28	65	38	6.8	0.05	0.72	16	31.4	62	33	1	2	2	98	1.8
Ck	at 34	9	32	59	26	7.6	.....	.....	....	.....	....	....	....	....	....	....	....
Goose silty clay loam—Orthic Humic Gleysol—SE 9-84-10-W6																	
L-H	1	....	....	....	....	6.7	.....	.....	...	.....	...	...	...	...	...	...	...
Ah	4	5	65	30	0	6.7	0.62	8.05	13	37.9	70	19	0	5	6	94	3.7
Bmg	4	7	38	55	20	6.4	0.76	0.90	10	21.9	60	28	0	4	8	92	2.1
BCg	8	4	31	65	33	6.7	0.78	0.91	12	23.4	58	35	0	4	3	97	1.7
Ckg	at 20	2	18	80	34	7.2	0.80	0.92	12	27.9	64	33	1	2	0	100	1.9
Josephine sitly Clay—Humic Eluviated Gleysol—SE—28-81-8-W6																	
L-H	1	....	....	....	....	....	.....	.....	....	.....	....	....	....	....	....	....	....
Ah	3	....	....	....	....	5.6	1.48	9.10	6	72.6	64	15	0	5	16	84	4.3
Aeg	1	3	41	56	31	5.3	0.32	3.18	10	26.5	59	23	0	7	11	89	2.6
ABg	4	2	38	60	30	5.2	0.15	1.36	9	19.8	47	28	0	3	22	78	1.7
Btg	12	0	34	66	35	4.6	0.15	1.10	8	18.9	32	25	0	3	40	60	1.3
BCg	6	0	34	66	33	4.5	0.14	0.86	6	18.8	29	26	1	3	41	59	1.1
Cg	at 27	3	32	65	15	4.6	0.12	0.66	6	18.7	30	25	1	3	41	59	1.1

Horizon	Soluble Salt Analysis: Conductivity mmhos./cm.	Cations: Ca++ %	Mg++ %	Na+ %	Total m.e./l.	Anions: $SO_4^=$ %	Cl− %	HCO_3− %	CO_3= %	Total m.e./l.
Snipe silt loam—Low Humic Eluviated Gleysol—SE 10-81-8-W6										
BCg	0.1	0	71	29	2.1	100	0	0	0	1.3
Ck	0.2	23	44	33	4.3	100	0	0	0	2.3

Agriculture: Codner soils are not extensively cultivated in this mapped area. In adjacent mapped areas considerable success has been experienced in the production of forage crops. With improved drainage, these soils can be used for grain crop production.

Soil Rating: Codner soils are well suited for pasture crop production. However, with improved drainage, they become fairly good arable soils.

C. ORGANIC SOILS

These bog soils are characterized by an accumulation of brown to black, coarse to fine peat that, on compaction, exceeds a thickness of 12 inches. The reaction of these materials ranges from strongly acid to alkaline.

For the purposes of this survey, these soils were separated into two groups on the basis of the dominant characteristics of the accumulated peat.

1. Dark brown to black fibrous peat consisting of the remains of sedges and coarse grasses.

(a) Eaglesham Series—Fibrous peat, (High Nutrient Bogs).

Extent and Occurrence: Eaglesham soils have a wide distribution in this mapped area. There are about 43,100 acres in which these soils predominate. In addition, there are numerous areas that were too small to show on the accompanying soil map.

Topography: Depressional.

Native Vegetation: Sedges and coarse grasses with occasional bluffs of willow, dwarf birch, and black spruce.

Profile Description: The profile of the Eaglesham soils is separated into horizons on the basis of composition, color, and degree of decomposition of the peat material. The peat in this group of soils is usually dark colored, medium to fine textured, and rarely exceeds a thickness of 40 inches in this area. The following is a description typical of an Eaglesham soil profile:

Horizon	*Thickness in inches*	*Description*
L	16	Dark brown (10YR 3/3, moist) easily discernible sedge and grass remains. pH 5.8.
F	8	Very dark brown (10YR 2/2, moist) partly decomposed sedge and grass remains. May be wet. pH 6.8.
H	4	Black (10YR 2/1, moist) well decomposed peat. Plant remains are not recognizable. Usually wet. pH 7.3.
IICkg1	at 28 below surface	Grey (5Y 6/1, wet) clay, massive, very plastic. Numerous rust stains and streaks. Calcareous. pH 7.8.
IICkg2	at 40 below surface	Grey (5Y 6/1, moist) clay. Rust stains and streaks are common, particularly in the upper portion. Calcareous. pH 7.9.

Agriculture: Eaglesham soils are not cultivated in the mapped area. Good use can be made of these soil areas for pasture purposes and cutting of grasses for hay. On drainage, some success has been experienced in agricultural crop production.

Soil Rating: Non-arable unless reclaimed.

2. Brown to dark brown coarse peat consisting predominantly of sphagnum moss, leaves, and stems.

(a) Kenzie Series—Sphagnum peat, (Low Nutrient Bogs).

Extent and Occurrence: Kenzie soils have a wide distribution in this area. In the areas outlined, there are about 82,600 acres in which these soils are predominant. They are found in association with Eaglesham and Prestville soils in this mapped area.

Topography: Depressional.

Native Vegetation: Sphagnum moss, labrador tea, variable stands of black spruce and tamarack, and occasional cranberries, sedges, birch, and willow.

Profile Description: The peat in this group of soils is brownish in color, medium to coarse in texture, and has a pronounced acidic reaction. Usually, the accumulation consists of differently colored layers of peat with the darkest layer occurring close to the mineral substratum. The thickness of peat is quite variable but in some places may approach a thickness of about 8 feet. In some of the tree covered portions of these bogs, the peat may be frozen at a depth of about 24 inches during the latter part of the summer. The facing illustration and the following description is typical of a Kenzie soil profile.

Horizon	*Thickness in inches*	*Description*
L	10	Dark brown (10YR 4/3, moist) undecomposed moss and tree roots remains. pH 4.7.
F	15	Brown (10YR 5/3, moist) partially decomposed peat containing recognizable remains of mosses and roots with occasional beds of fine peat. pH 4.3.
F-H	8	Dark brown (10YR 3/3, moist) fairly well decomposed peat with some recognizable plant remains. pH 4.8
IICg1	at 33 below surface	Grey (5Y 6/1, wet) clay, massive, very plastic. Numerous rust stains and streaks, pH 6.8.
IICkg2	at 50 below surface	Grey (5Y 6/1, moist) clay. Rust stains are common, particularly in the upper portion. Calcareous. pH 7.8.

Agriculture: Kenzie soils are inferior agricultural soils even after drainage, and are not being cultivated in this mapped area.

Peat deposits play an important role in the storage and conservation of ground water. Thus, from the standpoint of moisture conservation it would be desirable that the larger and deeper peat deposits be protected and permanently withheld from cultivation.

Soil Rating: Non-arable unless reclaimed.

Low Nutrient Organic Soil

LOW NUTRIENT ORGANIC SOIL

These soils are found in the wooded portion of the province; in areas where the local climate is humid. Usually they form in depressional areas. The surface cover is generally Labrador tea with scattered dwarf birch, black spruce, and tamarac. The depth of organic material (peat) varies from two or three feet to over ten feet.

This soil is called a Kenzie. It is characterized by the deep layer of raw, brown sphagnum moss (L). It is very low in plant nutrients and is acid in reaction. These areas should be left native, primarily as water reservoirs.

This organic soil should not be confused with sedge peat which is dark colored (often muck like). These latter peats are fairly rich in plant nutrients.

Alberta Soil Survey

S-S-Series 2 Aug. 1963

Available from:
Department of Extension
University of Alberta
Edmonton, Alberta, Canada

Figure 22—Cover typical of the Kenzie soil areas.

Figure 23—Cover typical of the Eaglesham soil areas.

AGRICULTURAL CONSIDERATIONS

Land Development

Tree cover is the major impediment to agricultural development in this area. Through the use of adapatable power equipment, however, methods are being developed to bring about a rapid, efficient, and more economical improvement of bush lands. The cost of clearing, piling and breaking vary with the size and density of tree cover, the size of the equipment and the efficiency of the operator. In the mapped area, the custom charges averaged from $10.00 per hour to $15.00 per hour (depending on the size of the machinery used) for clearing and piling and about $9.00 per acre for breaking. Fairly open areas or areas with a light tree cover can be cleared at the rate of four acres per hour, whereas in those areas that have a fairly heavy tree cover the rate of clearing may not exceed one acre per hour. (The distribution of tree cover in the mapped area is indicated in Figure 15.)

While power clearing has speeded up the development of new areas, it still is a relatively costly undertaking to the average new settler. As a result, desirable soil areas that have a fairly heavy tree cover are often passed up in favor of areas that are open or have light tree cover. Frequently such areas are at considerable distance from transportation and market facilities. Some also consist of inferior agricultural land. In many cases, the absence of tree cover is the direct result of repeated forest fires. Since there are numerous suitable soil areas, adjacent to settlement, that have a fairly dense stand of both fire-killed and green poplar, some consideration might be given to opening up such areas through a program of supervised and controlled burning. Such a program supplemented by a broadcast seeding of burned over areas with a grass-legume mixture should result in the development of fairly open grassed areas at a fraction of the cost required for power clearing. It could also serve to protect areas in which there are stands of commercial timber.

Water Supply

The domestic water supply for the Cherry Point and Hines Creek area comes from reserves of surface water, streams, wells and springs.

In general, surface water is the most common water source for domestic use for the major portion of this area. The settlers, except those in the vicinity of Bluesky and Whitelaw, have to resort to reserves of water stored in dug-outs or small earthen dams across drainage courses.

In the Bluesky-Whitelaw area good supplies of water are obtainable from dug and bored wells and springs at almost any point along the ridge of glacio-fluvial deposits extending across the eastern portion of the mapped area. Several attempts have been made, in other portions of this mapped area, to obtain water by drilled

wells but only a very few of these have been productive. One of these productive wells is located in section 27 of township 81 range 3. This well was drilled about 40 years ago to a depth of 380 feet and has a water rise of about 60 feet.

Figure 24—Springs provide an excellent source of water for domestic use in the Bluesky-Whitelaw area.

Dug-outs and dams appear to be satisfactory sources of water supply for the major portion of this area provided that they are properly constructed, well maintained, and suitably situated. Plans for the construction of suitable dug-outs can be obtained from District Agriculturists.

Soil Management and Conservation

If an enduring agriculture is to be established and sustained, constant attention must be given to the conservation of the soil resources. This involves careful consideration of the selection of a sequence of crops, maintenance of soil fertility, and the use of soil and moisture conserving practices. The implementation of these practices will make the most use of rainfall and will prevent serious permanent injury to the land. It is more profitable to keep the soil fertile than it is to try to build it up after it has been allowed to deteriorate.

The main soil-management practices of this area pertain to conservation of moisture, build-up and maintenance of fertility, and control of erosion and weeds.

Erosion is rapidly becoming a problem of major significance for a number of soil areas in this mapped area. Areas of Esher, Landry, Albright, Doig, and Judah soils require attention to water erosion during spring run-off periods, and areas of Leith, Gage, and Peoria soils, especially in the Gage area, require immediate preventative measures against wind erosion. Cultivation accelerates losses of soil by wind and water erosion and unless adequate measures are taken to prevent this erosion it can become the most potent factor contributing to the deterioration of productive land.

Details regarding recommended cropping practices, control of erosion, fertilizer applications, and methods of weed control may be obtained from District Agriculturists, the Experimental Farm at Beaverlodge, and the University of Alberta.

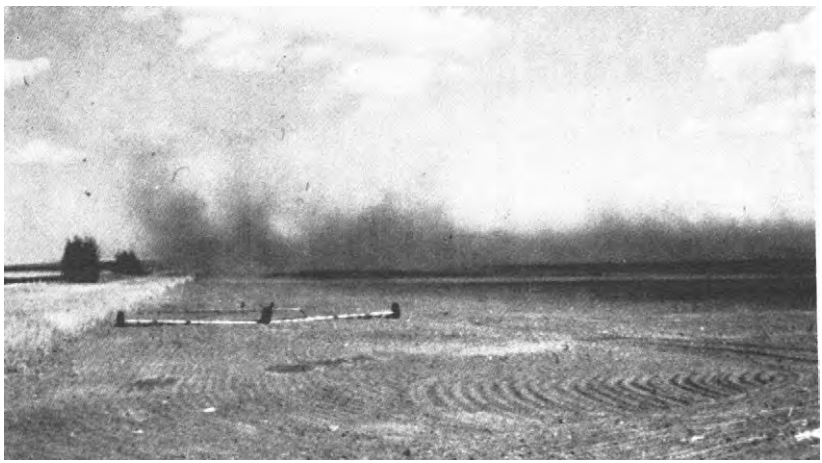


Figure 25—Wind erosion in a Peoria soil area northwest of Fairview.

APPENDICES

The appendices of this report deal with the methods used for chemical and physical analyses, definitions of descriptive soil terms, and the classification of the soils of the Cherry Point and Hines Creek area.

APPENDIX I

ANALYTICAL METHODS

Chemical and physical analyses of representative soil profiles are presented throughout the report. The samples were collected from virgin sites representative of the major soil series found in the mapped area.

The analytical methods used in determining the reported results were as follows:

1. *Mechanical Analysis*—Pipette method of Kilmer and Alexander as modified by Toogood and Peters, 1953. Can. J. Agr. Sci 33: 159-171.
2. *Reaction (pH)*—Soil paste method of Doughty, 1941. Soil Sci. 22: 135-138, and utilizing the Coleman Glass Electrode apparatus.
3. *Nitrogen*—Kjeldahl method of Prince, 1945. Soil Sci. 59: 47-52, using mercury as a catalyst.
4. *Organic Carbon*—A.O.A.C. method, 8th Edition, 1955. Washington, D.C.
5. *Exchange Capacity*—A.O.A.C. magnesium oxide method, 8th Edition 1955. Washington, D.C.
6. *Exchangeable Cations*—A.O.A.C. extraction method, 8th Edition, 1955, Washington, D.C. Beckman DU flame spectrophotometer method for calcium, magnesium, sodium and potassium by Baker, 1956. Soil and Crop Sci. Soc. Florida Proc. 16: 272-282, and modifications to the instrument by Mathieu and Burch, 1961, Can. J. Sci. 41: 134-135, and Mathieu and Carson, 1961. Can. J. Soil Sci. 41: 136-137, and utilizing the cleaning solution proposed by Choiniere, 1956. Can. J. Agr. Sci. 36: 203-204.
7. *Conductivity and Soluble Salts*—Saturated soil extract methods as proposed by Hayward, et al, 1954. U.S. Regional Salinity Laboratory Agr. Handbook 60. U.S. Dept. Agr., Washington, D.C.

APPENDIX II

DEFINITIONS OF DESCRIPTIVE TERMS

Throughout the report frequent use was made of descriptive terms in describing features of significance within the mapped area. The following are definitions of some of these descriptive terms:

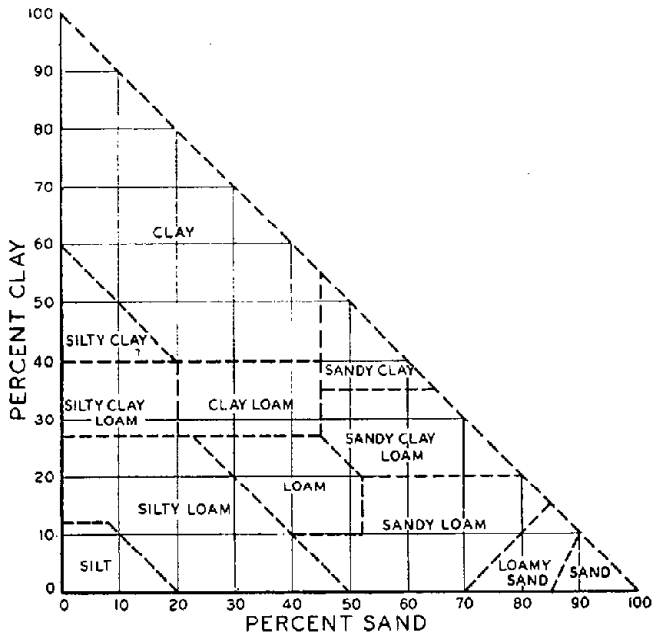
1. **SOIL TEXTURE**

(a) **Soil Separates (Particle Size) on which Textural Classes are Based**

Separates		*Diameter in Millimeters*
Very Coarse Sand (V.C.S.)		2.0 -1.0
Coarse Sand (C.S.)		1.0 -0.5
Medium Sand (M.S.)	Sand (S.)	0.5 -0.25
Fine Sand (F.S.)		0.25-0.10
Very Fine Sand (V.F.S.)		0.10-0.05
Silt (Si.)		0.05-0.002
Clay (C.)		less than 0.002
Fine Clay (F.C.)		less than 0.0002

(b) Proportions of Soil Separates in Various Soil Textural Classes

From: Toogood, J.A.—A Simplified Textural Classification Diagram. Can. J. Soil Sci. 38: 54-55. 1958.



A further separation of sands is made according to the prevalence of different sized sand fractions. Medium and coarse sands may contain over 25 percent coarse sand but not over 50 percent fine sands. Fine and very fine sands must contain over 50 percent of the respective fine sand fractions.

Figure 26—Chart showing proportions of soil separates.

2. SOIL HORIZONS

From: Report of the National Soil Survey Committee of Canada, March 1963.

(a) Organic Horizons

L—An organic layer characterized by the accumulation of organic matter in which the original structures are discernible.

F—An organic layer characterized by the accumulation of partly decomposed organic matter in which the original structures are discernible with difficulty.

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

If not possible to subdivide the organic layer combinations of these may be used, e.g. L-H, L-F, F-H.

(b) Mineral Horizons

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

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

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

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

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

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

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

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

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

C—A mineral horizon or horizons comparatively unaffected by the pedogenic processes operative in A and B, excepting:

(1) the process of gleying, and

(2) the accumulation of dolomite and salts more soluble in water (Cca, Csa, Cg, and C).

The mineral horizons are subdivided as follows:

ca—A horizon with secondary carbonate enrichment where the concentration of lime exceeds that present in the unenriched parent material.

e—A horizon characterized by the removal of clay, iron, aluminum or organic matter. Lighter in color by 1 unit of value or chroma when dry than the layer below (eluviated).

f—A horizon enriched with hydrated iron (fe). It has a chroma of 3 or more and is redder than the horizon below. It contains 0.5 percent more free iron than the C horizon and is without well or moderately well developed blocky structure.

g—A horizon characterized by reduction and grey colors; often mottled (gley).

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

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

k—Presence of carbonate as indicated by visible effervescence with dilute HCl (Kalk).

m—A horizon slightly altered by hydrolysis, oxidation, and/or solution to give a change in color and/or structure. Suffix to be used with B and then only alone or with suffixes k, s, or g.

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

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

sa—A horizon with secondary enrichment of salts more soluble than carbonates and where the concentration of salts exceeds that present in the unenriched parent materials.

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

t—A horizon enriched with silicate clay, and meeting the following requirements:

(1) Where an eluviated A horizon remains and there is no lithologic discontinuity between the A and the t horizon, it contains more clay as follows:

(a) if the A has less than 15 percent clay in the fine earth fraction, the t horizon must contain at least 2 percent more clay than the A;

(b) if the A has more than 15 percent and less than 40 percent clay in the fine earth fraction, the ratio of clay in the t horizon to that in the A must be 1.2 or more;

(c) if the A has more than 40 percent clay in the fine earth fraction the t horizon must contain at least 8 percent more clay than the A.

(2) The t horizon must be at least one-tenth the thickness of the sum of all overlying horizons, or more than 6 inches thick.

(3) The t horizon does not necessarily have more clay than the C horizon but it should have more fine clay than the C when expressed as a percent of total clay.

3. SOIL STRUCTURE AND CONSISTENCE

From: Report of the National Soil Survey Committee of Canada, March 1963.

Soil structure refers to the aggregation of the primary soil particles into compound particles, or clusters of primary particles, which are separated from adjoining aggregates by surfaces of weakness. The aggregates differ in grade of development (degree of distinctness) as follows: weak, moderate, and strong. They vary in class (size) as follows: very fine, fine, medium, coarse, and very coarse. They also vary in kinds (character of the faces and edges of the aggregates). The kinds mentioned in this report are: *Single-grain*—loose, incoherent mass of individual particles as in sands. *Blocky*—faces rectangular and flattened, vertices sharply angular. *Subangular blocky*—faces subrectangular, vertices mostly oblique, or subrounded. *Columnar*—vertical edges near top of columns are not sharp (columns may be flat-topped, round-topped, or irregular). *Granular*—spheroidal, characterized by rounded vertices. *Platy*—horizontal planes more or less developed.

Soil consistence comprises the attributes of soil materials that are expressed by the degree and kind of cohesion and adhesion or by the resistance to deformation and rupture. It deals with the strength and nature of the forces of attraction within a soil mass. The terms used in describing soils in this report follow: *Loose*—noncoherent. *Friable* (specifies friable when moist)—soil material crushes easily under gentle to moderate pressure between thumb and forefinger, and coheres when pressed together. *Firm* (specifies firm when moist)—soil material crushes under moderate pressure between thumb and forefinger but resistance is distinctly noticeable. *Hard* (specifies hard when dry)—moderately resistant to pressure, can be broken in the hands without difficulty but rarely breakable between thumb and forefinger. *Compact*—term denotes a combination of firm consistence and a close packing or arrangement of particles. *Plastic* (specifies plastic when wet)—wire formable by rolling the soil between the thumb and forefinger and moderate pressure required for deformation of the soil mass.

4. SOIL MOISTURE CLASSES

From: Report of the National Soil Survey Committee of Canada, March 1963.

Soil moisture classes are defined in terms of (a) actual moisture content in excess of field moisture capacity, and (b) the extent of the period during which such excess water is present in the plant root zone.

(1) *Rapidly drained*—soil moisture content seldom exceeds field capacity in any horizon except immediately after water additions.

(2) *Well drained*—soil moisture content does not normally exceed field capacity in any horizon except possibly the C, for a significant part of the year.

(3) *Moderately well-drained*—soil moisture in excess of field capacity remains for a small but significant period of the year.

(4) *Imperfectly drained*—soil moisture in excess of field capacity remains in subsurface horizons for moderately long periods during the year.

(5) *Poorly drained*—soil moisture in excess of field capacity remains in all horizons for a large part of the year.

(6) *Very poorly drained*—free water remains at or within 12 inches of the surface most of the year.

Specific reference to surface drainage may be designated in terms of run-off and described as high, medium, low, or ponded. Similarly specific reference to the characteristics of horizons within the profile may be designated in terms of permeability or percolation and described as rapid, moderate, slow, very slow, and none.

5. TOPOGRAPHIC CLASSES

From: Report of the National Soil Survey Committee of Canada, March 1963.

Topographic classes involve an appreciation of important variations in surface features. These include steepness of slope, and the shape and frequency of various slopes, which determine the comparative roughness of the surface. The important types of topography have been classed as follows:

Simple Topography		Complex Topography		
Single slopes (regular surface)		Multiple slopes (irregular surface)	Percent Slopes	Mapped Phases
A	Depressional to level	a	0 - 0.5	level and undulating
B	Very gently sloping	b	0.5- 2.0	
C	Gently sloping	c	2 - 5	gently rolling
D	Moderately sloping	d	6 - 9	rolling
E	Strongly sloping	e	10 -15	
F	Steeply sloping	f	16 -30	hilly
G	Very steeply sloping	g	30 -60	
H	Extremely sloping	h	over 60	

The topographical classes used in this report are presented under mapped phases in the above classification to show their relationship to the topographical classes proposed by the National Soil Survey Committee. The mapped phases, as indicated, include both simple and complex topography but allowance is made for simple topography by permitting an overlap in percent slope between phases.

The mapped phases are indicated on the soil map by hatching. Rough land that borders and forms the banks of drainage courses in this area was indicated on the soil map by the symbol R.B. (Rough, broken land).

6. CLASSES OF STONY LAND

S_0—*Stone free.*
S_1—*Occasional stones*—no serious handicap to cultivation.
S_2—*Moderately stony*—requiring removal, occasional stone piles in the field.
S_3—*Very stony*—serious handicap to cultivation, frequent stone piles in the fields.
S_4—*Excessively stony*—too stony to permit cultivation.

7. CLASSES OF TREE COVER

T_0—*Open land*—trees no handicap to cultivation.
T_1—*Light tree cover*—can be cleared by heavy, crawler type, clearing machinery at a rate of about 4 acres per hour.
T_2—*Medium tree cover*—can be cleared by heavy, crawler type, clearing machinery at a rate of about 2 acres per hour.
T_3—*Heavy tree cover*—can be cleared at a rate of about 1 acre per hour.
T_4—*Excessively heavy tree cover* preferably left for timber.
Further designations, relating to the prevailing types of trees, are often included in this field classification.

8. CLASSIFICATION OF CALCAREOUS SOIL MATERIALS

Cc_1—*Slightly Calcareous*—materials usually contain less than the equivalent of 1 percent calcium. Weak effervescence to dilute hydrochloric acid.

Cc_2—*Moderately Calcareous*—materials that contain the equivalent of from 1 to about 5 percent calcium. Moderate effercescence to dilute hydrochloric acid.

Cc_3—*Very Calcareous*—materials that contain the equivalent of from 5 to about 10 percent calcium. Strong effervescence to dilute hydrochloric acid.

Cc_4—*Extremely Calcareous*—materials that contain the equivalent of over 10 percent calcium. Violent effervescence to dilute hydrochorlic acid.

APPENDIX III

PHYSICAL ANALYSISES OF SOME REPRESENTATIVE SOILS OF THE CHERRY POINT AND HINES CREEK AREA

This portion of the report was conducted as a joint project of the Highway Research Division and the Soils Division of the Research Council of Alberta.

Soil Survey collected and supplied the soil samples, and determined the particle size. The Highway Research Division determined the shrinkage limits, liquid limits, and plastic limits of the soils.

Methods

1. *Particle Size*—Pipette method by Toogood and Peters, 1953. Can. J. Agr. Sci 33: 159-171.
2. *Shrinkage Limit*—ASTM procedures for testing soils, 1958. 1916 Race St., Philadelphia 3, Pa. Designation D427-39.
3. *Liquid Limit*—ASTM procedures for testing soils, 1958. 1916 Race St., Philadelphia 3, Pa. Designation D423-54T.
4. *Plastic Limit*—ASTM procedures for testing soils, 1958. 1916 Race St., Philadelphia 3, Pa. Designation D424-54T.
5. *Activity*—Predication of swelling potential for compacted soils by H. Bolton Seed, et al, 1962. J. Soil Mech. and Found. Div., Proc. Am. Soc. Civil Engl. 88 No. SM3: 53-87.

Results

The results are presented in tabular form showing the location of each soil series sampled, and are arranged by parent materials.

TABLE 19—Physical Analyses of Some Representative Soils

Soil Series and Location	Horizons	Particle Size: Sand (S) Percent (2-0.05 mm)	Particle Size: Silt (Si) Percent (0.05-0.002 mm)	Particle Size: Clay (C) Percent (<0.002 mm)	Shrinkage Limit (Ws)	Liquid Limit (We)	Plastic Limit (Wp)	Plasticity Index (We-Wp) (PI)	Activity $A = \frac{PI}{C-5}$
Till Materials									
Alcan (NE 31-87-10-W6)	Bt	11	29	60	16	57	25	32	0.6
	C	20	38	42	13	39	18	21	0.6
Alcan (NE 36-86-12-W6)	Bt	8	36	56	13	55	25	30	0.6
	C	12	33	55	15	51	23	28	0.6
Glacio-Fluvial Materials									
Whitelaw (NW 15-83-1-W6)	Bt	18	22	60	....	45	22	23	0.4
	C	15	32	53	15	43	23	20	0.4
Berwyn (NW 9-82-1-W6)	Bt	19	39	42	13	43	21	22	0.6
	C	21	43	36	14	41	19	22	0.7
Berwyn (SW 2-82-3-W6)	Bt	24	39	37	13	39	20	19	0.6
	C	29	38	33	14	39	19	20	0.7
Lacustro-Till									
Hazelmere (NW 10-83-3-W6)	Bt	16	41	43	11	41	21	20	0.5
	C	20	42	38	13	43	20	23	0.7
Albright (NE 12-82-2-W6)	Bt	14	48	38	11	44	23	21	0.6
	C	17	49	34	15	41	20	21	0.7
Albright (SE 29-87-7-W6)	Bt	13	33	54	16	50	22	28	0.6
	C	15	41	44	13	40	19	21	0.5
Donnelly (NE 26-85-8-W6)	Bt	5	24	71	13	61	28	33	0.5
	C	2	15	83	17	67	30	37	0.5
Landry (SE 1-83-9-W6)	Bt	2	9	89	12	74	30	44	0.5
	C	5	9	86	....	78	38	40	0.5
Lacustrine Materials									
Nampa (SE 35-80-12-W6)	Bt	11	23	66	11	57	25	32	0.5
	C	10	23	67	17	55	24	31	0.5
Falher (NW 19-86-6-W6)	Bt	.7	23	70	11	56	30	26	0.4
	C	1	19	80	17	69	30	39	0.5
Falher (NW 36-86-9-W6)	Bt	10	34	56	10	54	24	30	0.6
	C	17	40	43	12	51	21	30	0.7
Rycroft (SW 30-86-7-W6)	Bt	6	28	66	15	61	33	28	0.5
	C	3	27	70	16	69	28	41	0.6

TABLE 19—Physical Analyses of Some Representative Soils—Continued

Soil Series and Location	Horizons	Particle Size: Sand (S) Percent (2-0.05 mm)	Particle Size: Silt (Si) Percent (0.05-0.002 mm)	Particle Size: Clay (C) Percent (<0.002 mm)	Shrinkage Limit (Ws)	Liquid Limit (We)	Plastic Limit (Wp)	Plasticity Index (We-Wp) (PI)	Activity $A = \frac{PI}{C-5}$
Till Materials									
Beatton	Bt	1	32	67	12	60	26	34	0.6
(SE 1-82-6-W6)	C	1	41	58	17	55	25	30	0.6
Doig	Bt	4	40	56	....	60	26	34	0.7
(NE 21-82-1-W6)	C	6	60	34	20	45	26	19	0.7
Alluvial Materials									
High Prairie	Bt	17	47	36	14	46	23	23	0.7
(NW 21-87-8-W6)	C	16	51	33	18	41	22	19	0.7
Josephine	Bt	1	36	63	19	66	35	31	0.5
(SE 28-81-8-W6)	C	2	32	65	16	33	21	12	0.2
Tangent	Bt	28	49	23	16	32	19	13	0.7
(NE 1-83-4-W6)	C	32	49	19	19	35	23	12	0.8
Culp	Bt	32	41	27	13	33	15	18	0.8
(NE 16-83-4-W6)	C	59	25	16	19	32	23	9	0.8
Gage	Bt	75	14	11	16	23	16	7	1.1
(SE 15-82-4-W6)	C	84	14	2	17	22	17	5	0
Residual Materials									
Boundary	Bt	10	29	61	19	52	30	22	0.4
(SW 17-87-11-W6)	C	8	19	73	....	51	30	21	0.3
Boundary	Bt	18	48	34	....	34	21	13	0.4
(NE 32-83-3-W6)	C	8	42	50	16	41	27	14	0.3

APPENDIX IV

CLASSIFICATION OF THE SOILS OF THE CHERRY POINT AND HINES CREEK AREA AS RELATED TO DRAINAGE AND TO PARENT MATERIALS

ORDER	GREAT GROUP	SUBGROUP	SERIES — PARENT MATERIALS: Till	Glacio-Fluvial	Lacustro-Till	Lacustrine	Alluvial Aeolian	Outwash Beach	Residual Modified-Residual
WELL DRAINED TO IMPERFECTLY DRAINED									
Chernozemic	Black	Eluviated Black					Gage		
		Gleyed Black					Peoria / High Prairie		
Solonetzic	Solodized Solonetz	Dark Grey			Grimshaw				
	Solod	Grey Wooded	Alcan		Hazelmere / Donnelly	Nampa / Beatton			
		Dark Grey	Murdale		Albright / Esher	Falher / Doig			
		Black			Fairview / Landry	Rycroft			
Podzolic	Grey Wooded	Orthic Grey Wooded	Braeburn	Whitelaw		Kathleen	Davis / Culp / Codesa	Clouston / Codesa (Gr*)	
		Dark Grey Wooded		Berwyn		Judah	Tangent / Leith / Belloy	Grouard / Belloy (Gr*)	
	Undifferentiated						Heart		Boundary
POORLY DRAINED TO VERY POORLY DRAINED									
Gleysolic	Humic Gleysol	Orthic Humic Gleysol	Goose	Goose	Goose	Goose	Codner	Codner	
		Peaty Humic Gleysol	Prestville	Prestville	Prestville	Prestville			
	Eluviated Gleysol	Humic Eluviated Gleysol			Josephine	Josephine			Josephine
		Low Humic Eluviated Gleysol	Snipe	Snipe	Snipe	Snipe	Wanham		

Notes: 1. Alluvium is undifferentiated river flat and river bench deposits.
2. Organic soils have been classified as: (a) Low Nutrient bogs—[sphagnum (moss) peat]—Kenzie series.
(b) High nutrient bogs—[fibrous (sedge) peat]—Eaglesham series.

*Gravelly phase.

GLOSSARY*

Aggregate (soil)——A single mass or cluster of soil consisting of many soil particles held together, such as a prism, granule, or crumb, etc.

Alluvium—Water-transported, recently deposited material on which the soil-forming processes have not acted long enough to produce distinct soil horizons.

Available plant nutrients—Plant nutrients in soluble form, readily available to the plant roots.

Calcareous material—Material containing more than 2 percent calcium carbonate equivalent. Will effervesce visibly when treated with hydrochloric acid.

Claypan—A dense and heavy soil horizon underlying the upper part of the soil; hard when dry and plastic when wet.

Cleavage—The capacity of a soil on shrinkage to separate along certain planes more readily than on others.

Concretions—Local concentrations of certain chemical compounds such as calcium carbonate or compounds of iron, that form hard grains or nodules of mixed compositions and of various sizes, shapes, and coloring.

Drift—Material of any sort deposited in one place after having been moved from another. Glacial drift includes all glacial deposits whether unstratified or stratified.

Erosion—The wearing away of the land surface by running water, wind or other erosive agents. It includes both normal and accelerated soil erosion. The latter is brought about by changes in the natural cover or ground conditions and includes those due to human activity.

(a) *Sheet*—Removal of a more or less uniform layer of material from the land surface.

(b) *Rill*—A type of accelerated erosion that produces small channels which can be obliterated by tillage.

(c) *Gully*—Erosion-produced channels that are larger and deeper than rills and which cannot be obliterated by tillage. Ordinarily they carry water only during and immediately following rains or following the melting of snows.

Flocculate—To aggregate individual particles into small groups or granules, used especially with reference to clay and collodial behaviour. The reverse of flocculate is deflocculate, commonly referred to as puddling.

Flood Plain—The nearly flat surface, subject to overflow, along stream courses.

Gley—Gleying is a reduction process that takes place in soils that are saturated with water for long periods of time. The horizon of most intense reduction, is characterized by a grey, commonly mottled appearance, which on drying shows numerous rusty brown iron stains or streaks. It is generally very sticky when wet and hard when dry. Those horizons in which the gleying is intense are designated with the subscript *g*.

Green manure crop—Any crop that is plowed under for the purpose of improving the soil, especially by the addition of organic matter.

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

Impervious materials—Materials which resist the passage of drainage water and plant roots.

*This is not a complete glossary, but is primarily to define some of the terms commonly used in this report.

Mature soil—A soil with well-developed characteristics produced by the natural processes of soil formation and in equilibrium with its environment.

Muck—Fairly well decomposed organic material relatively high in mineral content, dark in color and accumulated under conditions of imperfect drainage.

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

Organic matter—The decomposition residues of plant material derived from (1) plant materials deposited on the surface of the soil; and (2) roots that decay beneath the surface of the soil.

Orthic—A term used in soil classification to denote the subgroup that typifies the central concept of the great group.

Peat—Unconsolidated soil material consisting largely of undecomposed to partially decomposed organic matter accumulated under conditions of excessive moisture.

pH—A notation used to designate the relative acidity or alkalinity of soils and other materials. A pH of 7.0 indicates neutrality, higher values indicate alkalinity, and lower values acidity.

Podzolization—A general term referring to that process by which soils are depleted of bases, become acid, and develop leached A horizons. Specifically, the term refers to the proces by which Podzol soils are formed and in which iron and aluminum are removed from the upper part of the profile more rapidly than is the silica. This results in the development of a light-colored surface horizon and an accumulation of iron, aluminum, and organic matter in the B horizon.

Relief—The elevations or inequalities of a land surface when considered collectively. Minor surface configurations, such as slight knolls, ridges, or shallow depressions are referred to as micro-relief.

Saline material—Material that has an electrical conductivity greater than 4 mmhos./cm.[1]

Solodization—A soil-forming process that is somewhat similar to podzolization in that the soil becomes acid in the surface horizons and develops an Ae horizon. Through improved drainage and an accompanying decrease in the salt content, Solonetz soils develop a leached A horizon accompanied by a general breakdown of the hard B horizon that ultimately results in the development of a Solod soil. The process of change of Solonetz to Solod is called "solodization".

Solum—The upper part of the soil profile, which is above the parent material and in which the processes of soil formation operate. It comprises the A and B horizons.

Stratified—Composed of or arranged in strata or layers. The term is applied to parent materials. Those layers that are produced in soils by the processes of soil formation are called soil horizons, while those inherited from the parent material are called strata. Layers that are less than one centimeter in thickness are referred to as *laminae*, while layers that are one or more centimeters in thickness are referred to as *beds*. When thickness is implied, reference to cross-stratification will involve consideration of *cross-bedding* or *cross-lamination*.

Terrace—A flat or undulating plain bordering a river or a lake. Many streams are bordered by a series of terraces at different levels indicating flood plains at successive periods. Although many older terraces have become more or

[1] U.S. Regional Salinity Laboratory Agr. Handbook 60. U.S. Dept. Agr. Washington, D.C.

less hilly through dissection by streams or wind action, they are still regarded as terraces.

Till—A heterogeneous mixture of stones, sand, silt, and clay transported by glaciers and deposited during the melting of the ice and subsequent recession of the ice front.

Till plain—A level or undulating land surface covered by till.

Varves—Distinctly marked annual deposits of sediments regardless of their origin.

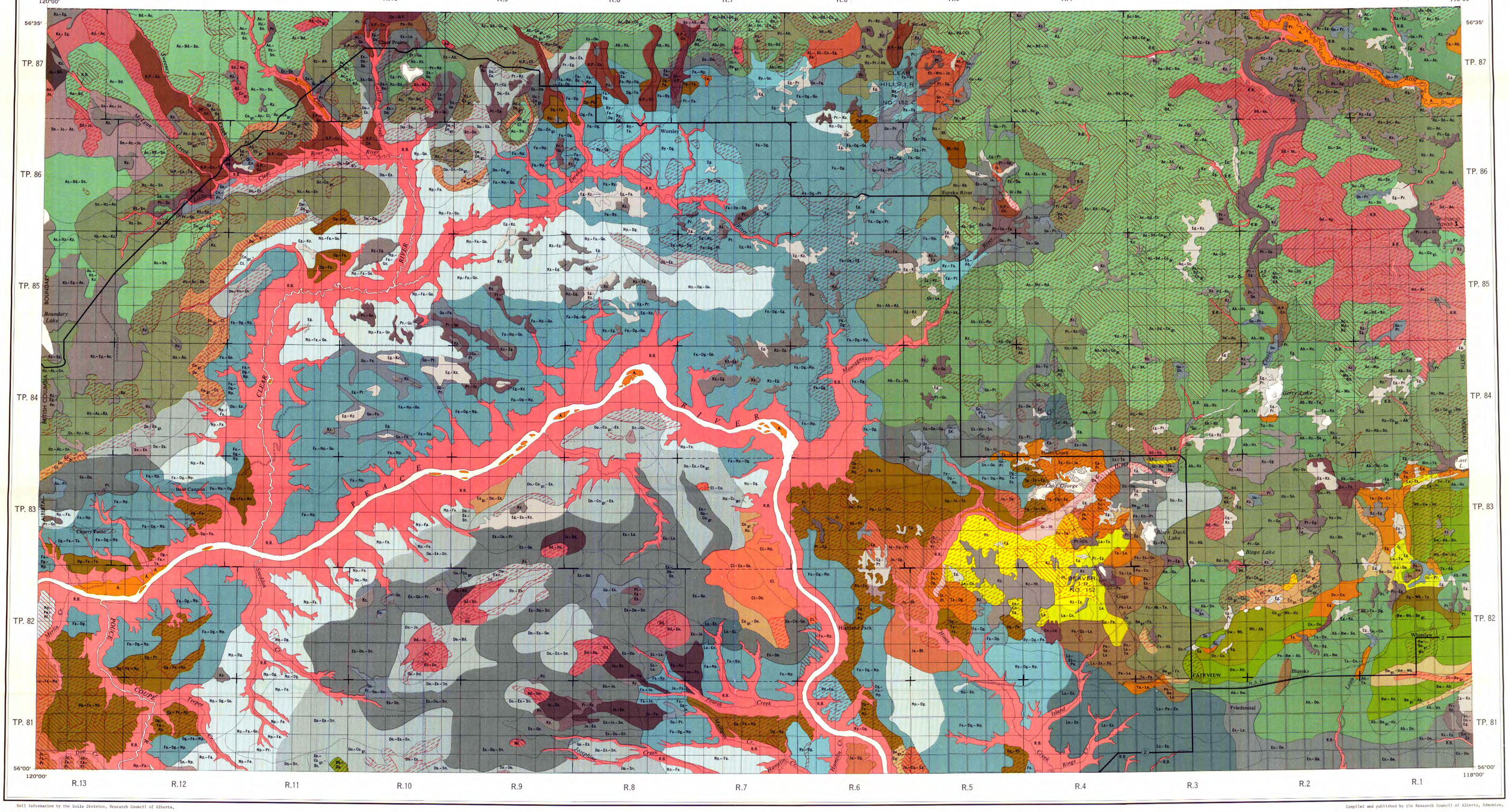
Water table—The upper limit of the part of the soil or underlying material wholly saturated with water.

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

SOIL SURVEY OF THE CHERRY POINT–HINES CREEK SHEETS

PROVINCE OF ALBERTA

84 D SOUTH HALF



Soil information by the Soils Division, Research Council of Alberta, with the cooperation of the Research Branch, Canada Department of Agriculture, and the University of Alberta, Edmonton. Map to be used in conjunction with Alberta Soil Survey Report No. 23.

Compiled and published by the Research Council of Alberta, Edmonton, 1965. Base mapping and cartography by the Technical Division, Alberta Department of Lands and Forests.

LEGEND

Scale: 1″ to 3 miles or 1:190,080

3 2 1 0 3 6 9 12 MILES

Parent Material	Yellowish brown to greyish brown, slightly calcareous, loam to clay loam – TILL				Brown to greyish brown, slightly calcareous, saline, clay loam to clay – TILL						Dark brown to greyish brown, moderately calcareous, slightly saline, loam to clay loam with pockets and bands of silt, sand, and gravel – GLACIO-FLUVIAL				Grey to greyish brown, moderately calcareous, saline, clay loam to clay with strata of yellowish brown and greyish brown sandy loam to clay loam that may be gravelly – LACUSTRO-TILL						Grey to dark greyish brown, moderately calcareous, saline, clay loam to clay with occasional thin strata of silty clay loam and with occasional stones – LACUSTRO-TILL									
Series and Map Symbol	BRAEBURN	Bb			ALCAN	Ac			MURDALE	Mu			WHITELAW	Wh			BERWYN	Bw			HAZELMERE	Hz			ALBRIGHT	Ab			FAIRVIEW	Fv			GRIMSHAW	Gm			DONNELLY	Do			ESHER	Es			LANDRY	La		
Acreage	300				217,800				Not Determined				10,900				20,000				196,700				124,000				7,800				200				108,600				150,200				29,600			
Classification	Orthic Grey Wooded				Grey Wooded Solod				Dark Grey Solod				Orthic Grey Wooded				Dark Grey Wooded				Grey Wooded Solod				Dark Grey Solod				Black Solod				Dark Grey Solodized Solonetz				Grey Wooded Solod				Dark Grey Solod				Black Solod			
Drainage	Moderately Well				Imperfect				Imperfect				Moderately Well				Moderately Well				Imperfect				Imperfect				Imperfect				Imperfect				Imperfect				Imperfect				Imperfect			
Topography Phases Acreage	Hilly 300				Level-Undulating 46,300	Gently Rolling 100,500	Rolling 52,000	Hilly 19,000	Level-Undulating Not Determined	Gently Rolling	Rolling		Level-Undulating 6,200	Gently Rolling 4,700			Level-Undulating 16,900	Gently Rolling 3,100			Level-Undulating 133,900	Gently Rolling 61,100	Rolling 1,700		Level-Undulating 106,300	Gently Rolling 17,400	Rolling 300		Level - Undulating 7,800				Level - Undulating 200				Level-Undulating 91,900	Gently Rolling 16,500	Rolling 200		Level-Undulating 148,200	Gently Rolling 1,700	Rolling 300		Level-Undulating 29,000	Gently Rolling 600		
Soil Rating	Pasture – Woodland				Fairly Good	Fair	Poor	Pasture-Woodland	Good	Fairly Good	Fair		Fairly Good	Fair			Good	Fairly Good			Fairly Good	Fair	Poor		Good	Fairly Good	Fair		Very Good				Fairly Good				Fairly Good	Fair	Poor		Good	Fairly Good	Fair		Very Good	Good		

Parent Material	Grey to dark grey, moderately calcareous, saline, clay – LACUSTRINE								Brown to greyish brown, moderately calcareous, saline, silty clay loam to silty clay that may have strata of brown and dark grey clay – LACUSTRINE					Brown, moderately calcareous, silty clay loam to silty clay – LACUSTRINE					Brown to yellowish brown, very calcareous, variable, loam to silt loam – ALLUVIAL and AEOLIAN				Brown to yellowish brown, moderately calcareous, variable, loamy sand to sandy loam – ALLUVIAL and AEOLIAN									
Series and Map Symbol	NAMPA	Np			FALHER	Fa			RYCROFT	Ry			BEATTON	Bt			DOIG	Dg			KATHLEEN	Kt			JUDAH (complex)	Ju			DAVIS	Dv			TANGENT	Ta			CULP	Cu			LEITH	Le			GAGE	Ga		
Acreage	112,100				256,800				31,200				1,000				69,300				6,000				17,900				2,600				16,800				1,600				7,800				1,000			
Classification	Grey Wooded Solod				Dark Grey Solod				Black Solod				Grey Wooded Solod				Dark Grey Solod				Orthic Grey Wooded				Dark Grey Wooded and Dark Grey				Orthic Grey Wooded				Dark Grey Wooded				Orthic Grey Wooded				Dark Grey Wooded				Eluviated Black			
Drainage	Imperfect				Imperfect				Imperfect				Imperfect				Imperfect				Moderately Well				Moderately Well				Moderately Well				Moderately Well				Moderately Well				Moderately Well				Moderately Well			
Topography Phases Acreage	Level-Undulating 110,600	Gently Rolling 400	Rolling 1,100		Level-Undulating 236,700	Gently Rolling 19,300	Rolling 800		Level-Undulating 25,200	Gently Rolling 5,800	Rolling 200		Level - Undulating 1,000				Level-Undulating 26,100	Gently Rolling 38,900	Rolling 4,300		Level-Undulating 5,200	Gently Rolling 800			Level-Undulating 7,200	Gently Rolling 3,500	Rolling 7,200		Level - Undulating 2,600				Level-Undulating 9,300	Gently Rolling 5,100	Rolling 2,400		Level-Undulating 300	Gently Rolling 1,000	Rolling 300		Level-Undulating 5,300	Gently Rolling 2,400	Rolling 100		Level - Undulating 1,000			
Soil Rating	Fairly Good	Fair	Poor		Good	Fairly Good	Fair		Very Good	Good	Fairly Good		Fairly Good				Good	Fairly Good	Fair		Fairly Good	Fair			Good	Fairly Good	Fair		Fairly Good				Good	Fairly Good	Fair		Fair	Poor	Pasture-Woodland		Fairly Good	Fair	Poor		Good			

Parent Material	Brown to yellowish brown, moderately calcareous, loose sand – ALLUVIAL and AEOLIAN				Brown to pale brown, slightly calcareous, comparatively recent flood-plain materials, sandy loam to clay loam – ALLUVIAL					Brown to pale brown, slightly calcareous, coarse to medium textured materials that occur as a mantle (not exceeding 30 inches) overlying finer textured materials – ALLUVIAL and AEOLIAN									Brown to pale brown, gravelly and stony loamy sand to sandy loam – COARSE OUTWASH and BEACH MATERIALS								Grey and dark grey acidic, shaly, silty clay loam to silty clay – RESIDUAL and MODIFIED RESIDUAL					
Series and Map symbol	HEART (complex)	Ht			HIGH PRAIRIE (complex)	H.P.			ALLUVIUM	A.			CODESA	Co			BELLOY	Be			PEORIA	Pe			CLOUSTON	Cl			GROUARD	Gr			BOUNDARY (complex)	Bd		
Acreage	10,000				16,900				6,700				17,900				6,300				12,800				10,400				2,900				71,300			
Classification	Undifferentiated Podzolic and Brunisolic				Gleyed Black and Gleyed Dark Grey				Undifferentiated				Orthic Grey Wooded				Dark Grey Wooded				Eluviated Black				Orthic Grey Wooded				Dark Grey Wooded				Undifferentiated Podzolic			
Drainage	Well				Imperfect				Well				Well to Imperfect				Well to Imperfect				Well to Imperfect				Well				Well				Moderately Well			
Topography Phases Acreage	Level-Undulating 2,300	Gently Rolling 6,300	Rolling 1,400		Level - Undulating 16,900				Level - Undulating 6,700				Level-Undulating 7,200	Gently Rolling 8,200	Rolling 2,200	Hilly 300	Level-Undulating 5,400	Gently Rolling 900			Level - Undulating 12,800				Level-Undulating 8,800	Gently Rolling 1,500	Rolling 100		Level-Undulating 1,600	Gently Rolling 600	Rolling 700		Level-Undulating 19,000	Gently Rolling 25,000	Rolling 17,900	Hilly 9,400
Soil Rating	Pasture – Woodland				Good				Fairly Good				Fairly Good	Fair	Poor	Pasture-Woodland	Good	Fairly Good			Very Good				Poor and Fair	Poor	Pasture-Woodland		Fair	Poor and Fair	Poor		Poor and Fair	Poor	Pasture-Woodland	

Parent Material	Brown to grey, slightly to moderately calcareous, frequently somewhat saline, medium to fine textured materials				Brown to greyish brown, acidic, medium to fine textured materials			Brown to pale brown, moderately calcareous, coarse to medium textured materials			Dark brown to black, fine peat developed mainly from sedge and coarse grasses – ORGANIC		Brown and dark brown, coarse peat developed mainly from sphagnum moss – ORGANIC		
Series and Map Symbol	SNIPE	Sn	GOOSE	Go	PRESTVILLE	Pr	JOSEPHINE	Jo	WANHAM	Wm	CODNER	Cn	EAGLESHAM	Eg	KENZIE	Kz
Acreage	11,000		24,200		35,200		11,600		100		5,500		43,100		82,600	
Classification	Low Humic Eluviated Gleysol		Orthic Humic Gleysol		Peaty Humic Gleysol		Humic Eluviated Gleysol		Low Humic Eluviated Gleysol		Orthic Humic Gleysol		High Nutrient Bog		Low Nutrient Bog	
Drainage	Poor		Poor		Poor		Poor		Poor		Poor		Very Poor		Very Poor	
Topography Phases Acreage	Depressional – Level 11,000		Depressional 24,200		Depressional 35,200		Depressional and Level 11,600		Depressional and Level 100		Depressional 5,500		Depressional 43,100		Depressional 82,600	
Soil Rating	Poor and Fair		Fair and Fairly Good		Fair and Fairly Good		Poor and Fair		Poor and Fair		Fair and Fairly Good		Pasture – Woodland		Pasture – Woodland	

TOPOGRAPHY CLASSES

Percent slope:

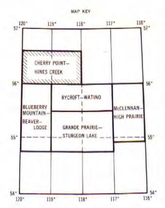
- 0.0 – 0.5, 0.5 – 1.5 ..... Level and Undulating
- 2 – 5 ..... Gently Rolling
- 6 – 9 ..... Rolling
- 10 – 15 ..... Rolling
- 16 – 30 ..... Hilly
- Rough, broken land adjacent to drainage courses

Gravelly phase ..... gr.
Soil boundaries (determined)
Topography boundaries

DIAGRAM OF TOWNSHIP

31	32	33	34	35	36	
30	29	28	27	26	25	
19	20	21	22	23	24	
18	17	16	15	14	13	
7	8	9	10	11	12	
6	5	4	3	2	1	

MAP KEY



REFERENCE

- Roads – gravelled and paved highway 2
- local road, well travelled
- local road, not well travelled
- wagon road or trail
- Railway
- Township boundary (surveyed)
- Township boundary (unsurveyed)
- Township corners
- Section line
- Stream
- Permanent lake
- Town, village
- Indian and Metis Reserve boundaries

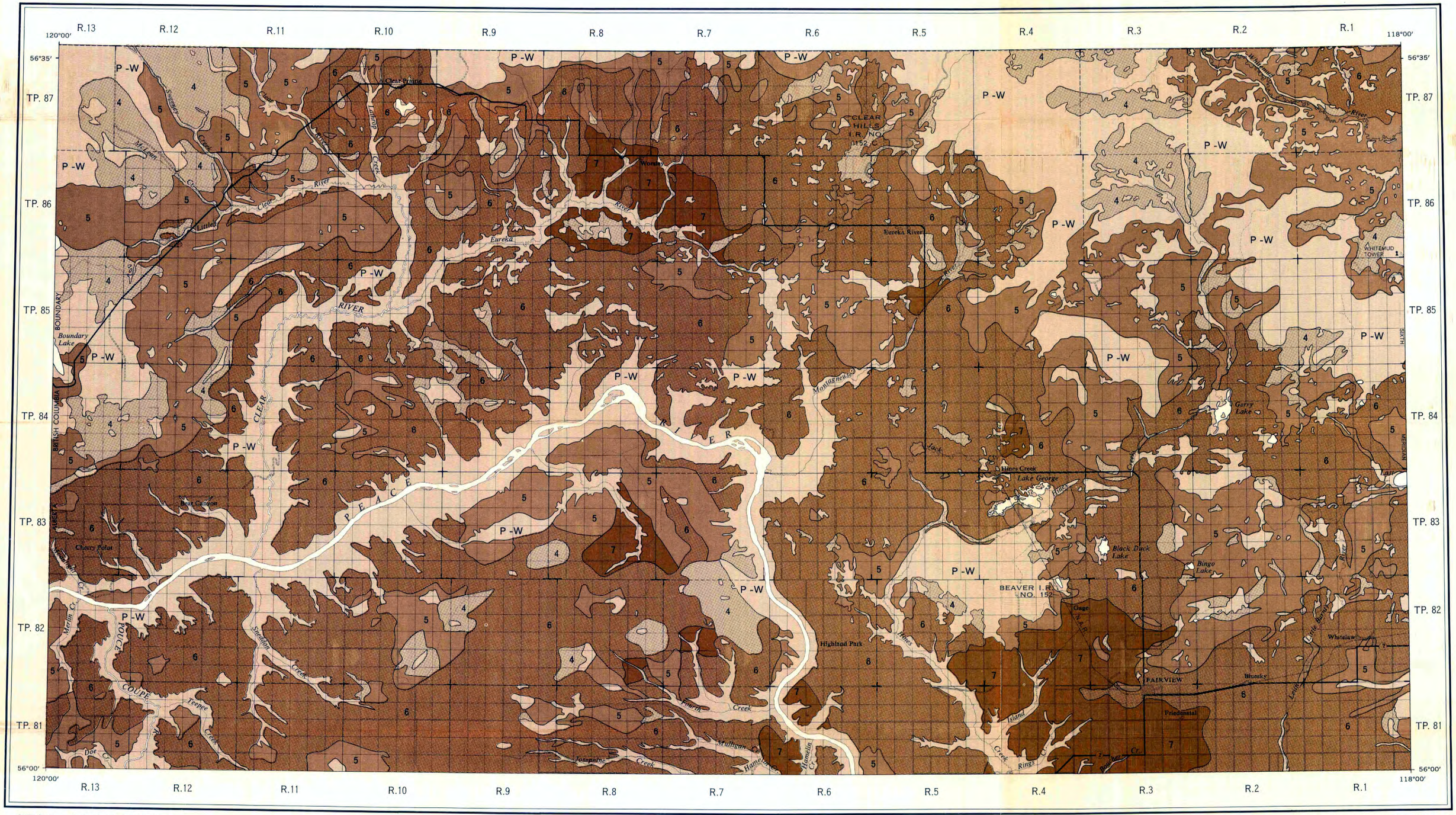
SOIL RATING MAP OF THE CHERRY POINT–HINES CREEK SHEETS

PROVINCE OF ALBERTA

84 D SOUTH HALF

Scale: 1" to 4 miles or 1:253,440

2 1 0 2 4 6 8 10 MILES



Rating based on soil and other physical features as determined by the Soils Division, Research Council of Alberta, with the co-operation of the Research Branch, Canada Department of Agriculture, and the University of Alberta, Edmonton. Map to be used in conjunction with Alberta Soil Survey Report No. 23.

Compiled and published by the Research Council of Alberta, Edmonton, 1965. Base mapping and cartography by the Technical Division, Alberta Department of Lands and Forests.

LEGEND

Pasture and Woodland — P-W

Poor to Fair Arable — 4

Fair to Fairly Good Arable — 5

Fairly Good to Good Arable — 6

Good to Very Good Arable — 7

SOIL SURVEY MAP

WEST OF DUNVEGAN FROM SADDLE HILLS TO CLEAR HILLS

BOUNDARY BETWEEN THE PROVINCES OF ALBERTA AND BRITISH COLUMBIA

RESEARCH COUNCIL OF ALBERTA.
Natural Resources Division. 1930.

SCALE
1 inch to 4 miles

By: F. A. Wyatt and
O. R. Younge. 1929.

LEGEND

Parkland soils	A2
First class wooded soils	W1
Second class wooded soils	W2
Third class wooded soils	W3
Muskeg	M
Eroded	E
Boundaries not determined	