OPEN FILE REPORT 1984-30

SOIL SURVEY OF ROCHON SANDS PROVINCIAL PARK AND INTERPRETATION FOR RECREATIONAL USE

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Number M-83-9

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Alberta Research Council

Edmonton, Alberta, Canada
1984

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PREFACE

This report is one of a series describing detailed and semi-detailed soil surveys which have been conducted in Alberta provincial parks and recreation areas. As well as Rochon Sands Provincial Park, soil surveys were conducted in the following provincial parks during the summer of 1975: Gooseberry Lake, Big Knife, Vermilion, Pembina River, and Garner Lake. Also included were areas in the vicinities of Upper and Lower Kananaskis Lakes, Cold Lake (Lund's Point), Calling Lake, and Notikewin River. The total area mapped was approximately 11,380 ha.

A general guidebook has been prepared to accompany soil survey reports written for Alberta provincial parks and recreation areas (Greenlee, 1981). It includes general discussions of the following: soil formation; the Canadian soil classification system; soil characteristics and other factors that affect the use of soils for recreational and related purposes; Luvisolic, Organic, and Solonetzic soils; soil erosion; methodology, soil and landform maps that accompany the soil survey reports; an explanation of soil interpretations and guidelines for developing them; chemical and physical properties of soils; and the landform classification system used by Canadian soil pedologists. Also included is a glossary. Specific results and interpretations for the areas covered by this study are presented in the ensuing report.

Also in 1975, soil samples were collected from an archaeological site excavated by the Parks Planning Branch in the Cypress Hills. A detailed field soil profile description was made, laboratory analyses have been completed and a report will be prepared.

ACKNOWLEDGEMENTS

The Alberta Research Council provided the staff and the Parks Planning Branch of Alberta Recreation, Parks and Wildlife contributed the operating costs for the 1975-76 Provincial Parks soil survey program. The University of Alberta provided office and laboratory space.

Mrs. Sharon DeFelice, Mrs. Kathie Skogg and Miss Ruby Wallis typed and assisted in compiling and proof reading the report, while Mrs. J. Dlask drafted the soil, landform and soil limitations for recreation maps. The soil chemical analyses were determined by the Alberta Soil and Feed Testing Laboratory.

Able field assistance was given by Mr. M. Hennie.

Special acknowledgement is given to the Park Rangers, as well as other park employees, who cooperated by allowing soil investigations to be conducted throughout the parks, and also invariably offered assistance.

SUMMARY

Rochon Sands Park, only about 90 ha in size, is adjacent to the southern shore of Buffalo Lake, about 10 km west and 16 km north of Stettler. The majority of the park is covered by a veneer of moderately to very coarse

textured glaciofluvial sediments (sand), overlying moderately coarse textured till. Glaciolacustrine sands occur as beaches, adjacent to the lake and bordering numerous large ponds within the park. The climate is described as a cold snow-forest type characterized by cool summers, and humid winters with frozen ground and snow cover of several months duration. The average temperature of the coldest month is less than -3° C, and of the warmest month is between 10 and 22° C. The park is situated in the aspen grove section of the boreal forest region, where prairie and meadow patches were interspersed with aspen bluffs in the original vegetation.

Five map units were recognized in Rochon Sands Park. The key profile types are Orthic Black Chernozems, Gleyed Eutric Brunisols, Rego Black Chernozems, and Gleyed Black Solodized Solonetz Carbonated phase. These are distributed over the landscape in relation to landform, parent material, and drainage. Each map unit is a single soil series, and their distribution is shown on the soil map.

Soil interpretations of each map unit are made for fully serviced campgrounds, picnic areas, lawns and landscaping, paths, buildings, septic tank absorption fields, and road location.

The most suitable soils for recreational development in Rochon Sands Park are those of Map Unit 1 when found on suitable topography. However, they have formed on steep slopes throughout most of the park, so have severe limitations. Map Unit 2 soils, in the northwestern and northeastern corners, have moderate limitations; and Map Unit 3 soils, adjacent to the lake shore, have very severe limitations. Map Unit 1 soils, when found on suitable topography, and Map Unit 2 soils are well suited for road construction; while Map Unit 3 soils have severe limitations. Careful study of the soil map and Tables 3 to 10 inclusive (soil limitation tables) will reveal areas suitable for particular uses.

A soil survey properly interpreted can be one of the most useful tools management has in making a proper design for a recreational area. However, all soil differences which occur in the field cannot be shown on the soil map. Thus for design and construction of specific recreational facilities, an on-site investigation is usually required.

INTRODUCTION

SIZE AND LOCATION

Rochon Sands Park is only about 90 ha in size, and is adjacent to the southern shore of Buffalo Lake. It is located about 10 km west and 16 km north of Stettler (Figure 1). The Park includes part of the west half of section 19, part of the southwest quarter of section 30, township 40, range 20; the northeast quarter of section 24, and part of the southeast quarter of section 25, township 40, range 21; all west of the fourth meridian.

PHYSIOGRAPHY AND SURFICIAL DEPOSITS

Rochon Sands Park lies in the Eastern Alberta Plains division of the Interior Plains physiographic region (Government and the University of Alberta, 1969). According to Le Breton (1971), the area is dominated by

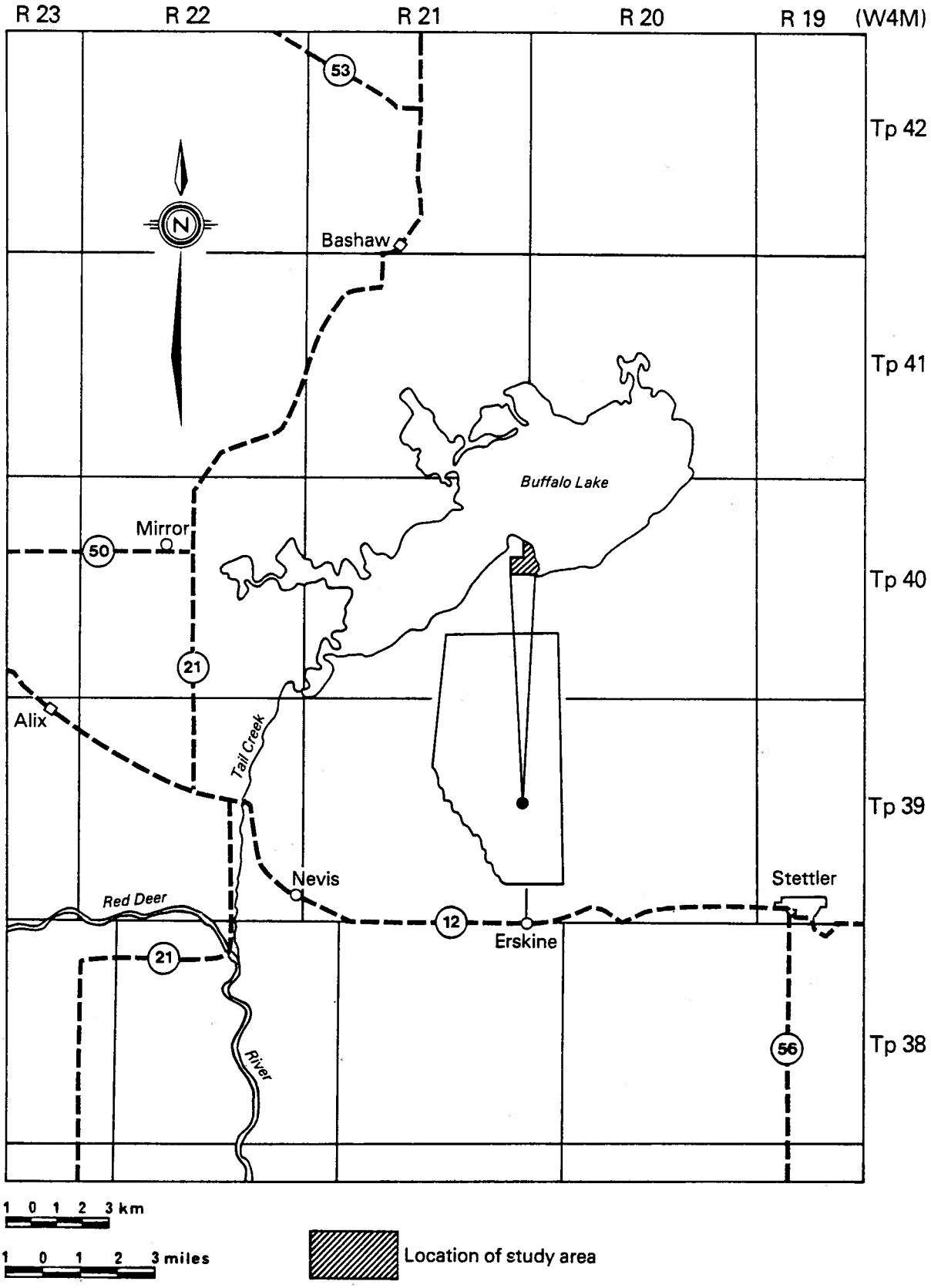


Figure 1. Map showing location of study area.

northwest-trending ridges with a local relief of 35 to 105 m. The highest elevation within the park is about 760 m, and local relief is approximately 30 m. Green (1972) has classified the bedrock as the Upper Cretaceous Horseshoe Canyon Formation, which is mainly non-marine. The park is drained into Buffalo Lake, which in turn is drained via Tail Creek into the Red Deer River to the south.

The majority of the park is covered by a veneer of moderately to very coarse textured glaciofluvial sediments (sand), overlying moderately coarse textured till. Glaciolacustrine sands occur as beaches, adjacent to the lake and bordering numerous large ponds within the park. Also deeper deposits of glaciofluvial sands occur in the northwestern and northeastern portions.

CLIMATE

The climate is designated in Koppen's classification of climates as humid microthermal (Trewartha and Horn, 1980). It is described as a cold snow-forest climate characterized by cool summers, and humid winters with frozen ground and a snow cover of several months duration. The average temperature of the coldest month is less than -3° C, and of the warmest month is between 10 and 22° C.

Records for 1951 through 1980 from a weather station at Stettler, about 18 km to the southeast and at an elevation of 823 m, show the following values (Environment Canada, 1982): a mean annual temperature of 2.5° C. July is the warmest month with a mean temperature of 17.0° C, and January is the coldest month with a mean temperature of -15.2° C. The mean annual precipitation is 431 mm with 75% falling as rain. The average frost free period is 118 days.

VEGETATION

The park is situated in the aspen grove section of the boreal forest region (Rowe, 1972), where only trembling aspen is abundant in the natural stands. Balsam poplar is frequently present on moist lowlands, and occasionally prominent on uplands after fire. White birch has a sporadic distribution, but is usually found only on rough broken land. Prairie and meadow patches were interspersed with the aspen bluffs in the original vegetation.

Specifically in the park the vegetation is predominantly aspen, with occasional grassland patches on south-facing slopes. The beach areas are sparsely vegetated with balsam poplar and some aspen.

Since the Outdoor Recreation Planning Branch of Alberta Recreation and Parks conducts biological studies in provincial parks and recreation areas, the vegetation is not discussed extensively in this report. However, some of the more common plant species indicated as part of the map unit descriptions are listed as follows (Moss, 1959; Cormack, 1967): aspen (Populus tremuloides), balsam poplar (Populus balsamifera), saskatoon-berry (Amelanchier alnifolia), choke cherry (Prunus virginiana), dogwood (cornus stolonifera), pin cherry (Prunus pensylvanica), low-bush cranberry (Viburnum edule), Canadian buffalo-berry (Shepherdia canadensis), wild rose (Rosa spp), wild red raspberry (Rubus strigosus), wild currant (Ribes spp),

wolf willow (Elaeagnus commutata), buckbrush (Symphoricarpos occidentalis), native grass (various species), pasture sagewort (Artemisia frigida), prairie sagewort (Artemisia ludoviciana), slough grass (Beckmannia syzigachne), sedge (Carex spp), common cattail (Typha latifolia), and foxtail barley (Hordeum jubatum).

SOILS

Five map units were recognized in Rochon Sands Park. The soils of three were classified in the Chernozemic Order; and one in each of the Brunisolic and Solonetzic Orders of the Canadian soil classification system (Canada Soil Survey Committee, 1978). The system is outlined in Greenlee (1981). Pertinent features of the map units are outlined in Table 1.

Soils of the Chernozemic Order are well to imperfectly drained mineral soils of good structure, with very high natural fertility and productive capacity. They are characterized by dark coloured surface virgin (Ah or Ahe) or cultivated (Ap) horizons, darkened by the accumulation of organic matter (humus) from the decomposition of grasses and forbs representative of grassland communities or of grassland-forest communities with associated shrubs and forbs. The A horizon is commonly referred to as "topsoil" and ranges from 10 to 25 cm in thickness. In some regions it is much thicker. Chernozemic soils are further divided into four major divisions, the Brown, Dark Brown, Black and Dark Gray Great Groups. These are distinguished by measurable differences in colour of the A horizons, which together with other associated features of depth, organic matter content, and structure reflect significant differences in the climates and vegetation under which they have developed, and which continue to influence and distinguish their characteristics and relative use capabilities.

In general, Brown Chernozemic soils have A horizons that are lower in organic matter content, lighter in colour and thinner than those of the other Chernozemic Great Groups; and are found in southern and south-eastern Alberta. Black Chernozemic soils have A horizons that are higher in organic matter content, darker in colour and thicker than those of the other great groups; and are found in central and east-central Alberta. Dark Brown Chernozemic soils have A horizons with characteristics intermediate between those of the Browns and the Blacks; and are found in south-central and east-central Alberta. Dark Gray Chernozemic soils have A horizons with variable colours, thicknesses and modifications of structural pattern indicative of degradation of the typical Chernozemic A horizon. Under virgin conditions, the Dark Grays usually have leaf mats (L-H horizons) overlying the mineral soil, and degradation of the A horizons frequently causes a banded or "salt and pepper" effect. The organic matter content varies with the degree of degradation, from high accumulations in slightly degraded soils comparable to that of Blacks; to significantly lower amounts in the more strongly degraded types. These latter types are intergrades to Dark Gray Luvisolic soils of the Luvisolic Order. Dark Gray Chernozemics are found primarily in transitional areas of grassland and forest in north-central Alberta and in the Peace River region.

Rapidly drained Black Chernozemic soils, developed on a veneer of moderately to very coarse textured glaciofluvial sediments (sand) overlying moderately coarse textured till, cover the majority of the park. Also,

Table 1. Key to the Soils.

Map Unit	Classification	Parent Material	Surface Texture	Slope (class & gradient)	Surface Stoniness	Drainage	Comments and Limitations
1	Orthic Black Chernozem	moderately to very coarse textured glaciofluvial sediments (sand), overlying moderately coarse textured till	sandy loam to loamy sand	d,f (> 5 to 30%)	0	rapid	(1) Texture of Ah and Bm_1 occasionally loam. (2) Texture of soil solum below 60 cm usually loamy sand to sand. (3) Cca occasionally found, usually below 120 cm. (4) Moderately coarse textured till usually below 150 cm, occasionally within 90 cm of surface. Slight to severe limitations - sandy surface texture, excessive slope, erosion hazard, rapid permeability (droughtiness), groundwater contamination hazard.
2	Orthic Black Chernozem	very coarse textured glaciofluvial sediments (sand)	sand	c,d (> 2 to 9%)	0	rapid	Slight to severe limitations - sandy surface texture, rapid permeability (droughtiness), groundwater contamination hazard.
3	Gleyed Eutric Brunisol	very coarse textured glaciolacustrine sediments (sand)	sand	b (> 0.5 to 2%)	0	imperfect	(1) Ccag occasionally within 75 - 100 cm, usually below 120 cm. (2) Water table often found at 100 cm. Severe to very severe limitations - sandy surface texture, flooding hazard (overflow), seasonally high groundwater table or surface ponding, lack of Ah horizon, rapid permeability, groundwater contamination hazard.
4	Rego Black Chernozem	moderately coarse textured till	sandy loam	G (> 30 to 60%)	0	well drained	Till has a very low content of small pebbles. Very severe limitations - excessive slope, erosion hazard.
5	Gleyed Black Solodized Solonetz, Carbonated phase	very coarse textured glaciofluvial sediments (sand), overlying moderately coarse textured till	loamy sand	c (> 2 to 5%)	0	imperfect	Moderately coarse textured till occurs below 135 cm. Moderate to severe limitations - seasonally high groundwater table, solonetzic soil, high lime content (soil nutrient imbalance), sandy surface texture, possible concrete corrosion hazard (soluble sulfate), rapid permeability, groundwater contamination hazard.

rapidly drained Black Chernozemic soils, developed on glaciofluvial sands, occur in the northwestern and northeastern portions.

Soils of the Brunisolic order are rapidly to imperfectly drained mineral soils with sufficient profile development to exclude them from the Regosolic order, but that lack the degrees or kinds of horizon development specified for soils of other orders. Their common characteristic of identification is the development in situ of the prominent brownish Bm horizon with sufficient alteration by hydrolysis, oxidation or solution to produce significant changes in colour, structure and composition different from those of an A or C horizon. Because the processes of leaching and weathering are relatively weakly developed in Brunisolic soils, they tend to reflect the chemical characteristics, particularly the base status and acidity, of parent materials from which they have been derived.

Imperfectly drained Brunisolic soils, developed on glaciolacustrine sands, occur in beach locations adjacent to the lake and bordering numerous large ponds within the park.

Soils of the Solonetzic Order are well to imperfectly drained mineral soils having Solonetzic B horizons and saline C horizons. A Solonetzic B is characterized by a columnar (round or flat-topped) or prismatic macrostructure that can usually be broken into a blocky mesostructure. These blocks, which have hard to very hard consistence when dry and are relatively impermeable, usually show dark surface stains or coatings. Chemically, the Solonetzic B horizons show evidence of alkalinization and have ratios of exchangeable calcium to exchangeable sodium of 10 or less, which is significantly lower than that for other, non-Solonetzic B horizons. The C horizons are generally saline and usually show an accumulation of salts.

Solonetzic soils are further divided into three major divisions, the Solonetz, Solodized Solonetz, and Solod Great Groups. Solonetz and Solodized Solonetz soils have Solonetzic B horizons that are essentially intact and have not undergond significant breakdown. Generally, an abrupt break appears between the A and B horizons, and the A horizon is usually thin in relation to the B. Solodized Solonetz soils are characterized by the presence of an acidic Ae horizon, which is lacking in Solonetz soils. Solod soils are characterized by a greater development of this acidic Ae horizon and an AB transitional horizon in which the former Solonetzic B structure is in the process of physical disintegration. A horizons are generally thicker in relation to B horizons than in associated Solonetz and Solodized Solonetz soils. The contact between the AB and Solonetzic B horizons is not well defined, and the remnant B horizons are more easily broken into darkly stained aggregates than in Solonetz and Solodized Solonetz soils.

Structural limitations of Solonetzic B horizons, which tend to become sticky and plastic when wet and very hard when dry, restrict moisture penetration and root development. Rainwater usually remains at or near the surface, and much is lost by evaporation. Because of the proximity of saline and alkaline subsoils, periodic salinization of surface horizons occurs when these soils are irrigated. This presents further limitations to healthy plant growth and to water availability. Consequently,

Solonetzic soils are usually distinctly inferior in productivity to other associated soils. Another limitation of Solonetzic soils is their high erodibility, due to unstable soil aggregates cuased by high sodium contents. In Solod soils, the limitations of structure and salinity are moderate in comparison to those for Solonetz and Solodized Solonetz soils. Solods, although somewhat inferior, more closely approach associated non-Solonetzic soils in general productivity. Management problems in the cultivation of Solonetzic soils involve the timely use of tillage equipment to conserve moisture, and to prevent caking of surface clods and dessication of the underlying B horizon.

Only one very small patch of Solonetzic soil, developed on glaciofluvial sand, was found near the southeastern corner of the park.

Very minor differences exist among some map units. However, the differences are usually significant with regard to a particular recreational or engineering use, and thus justify separation of different map units. they are described in chronological order, and horizon thicknesses represent averages. Thicknesses of comparative horizons in identical soil profiles often vary as much as 10 to 40 percent from the norm at different points in the landscape.

The dominant plant species are listed using common names. These are very general lists, and not purported to be complete.

Map Unit 1

Classification: Orthic Black Chernozem
Parent material: moderately to very coarse textured glaciofluvial sediments (sand), overlying moderately coarse textured till.
Landform: glaciofluvial veneer overlying hummocky morainal ($F^{G}v/Mh$).
Slope: gently to strongly rolling (greater than 5 to 30%)
Surface stoniness: nonstony (0)
Drainage: rapid
Vegetation: aspen, saskatoon-berry, choke cherry, dogwood, wild rose; some pin cherry, low-bush cranberry, wild red raspberry, wild currant; occasional south facing slope with native grass and patches of buckbrush and wolf willow.
Profile description: Orthic Black Chernozem

Horizon	Thickness (cm)	Field Texture	Structure	Consistence
L-H	2-5	leaf and root litter		
Ah	20-30	sandy loam to loamy sand	granular	very friable to loose, moist
Bm1	30-40	sandy loam to loamy sand	prismatic, breaking to subangular blocky	slightly hard to loose, dry
Bm2	0-40	loamy sand to sand	amorphous	loose, dry
Cca	at 60+	loam to sandy loam	subangular blocky	soft, dry

Comments: (1) The texture of the Ah and Bm1 horizons is occasionaly loam.
(2) The texture of the soil solum below a depth of 60 cm is usually loamy sand to sand.
(3) The Cca horizon is only occasionally found, and the texture is usually loamy sand to sand below the upper 15 cm. Usually this horizon occurs below the 120 cm depth.
(4) Moderately coarse textured till usually occurs below the 150 cm depth, but is occasionally within 90 cm of the surface. Numerous pockets of coarse sand occur, as well as occasional gravel pockets and occasional thin layers (about 10 cm thick) of clay loam textured material.

Limitations: Slight to severe-slight on suitable topography for buildings, and road location; slight to moderate on suitable topography for campgrounds, picnic areas, and paths; severe for lawns and landscaping, and septic tank absorption fields. Specific limitations include sandy surface texture, excessive slope, erosion hazard, rapid permeability (droughtiness), and groundwater contamination hazard.

Map Unit 2

Classification: Orthic Black Chernozem
Parent material: very coarse textured glaciofluvial sediments (sand)
Landform: hummocky glaciofluvial (Fh), undulating glaciofluvial (Fu).
Slope: undulating to gently rolling (greater than 2 to 9%)
Surface stoniness: nonstony(0)
Drainage: rapid
Vegetation: aspen, saskatoon-berry, choke cherry; some pin cherry, and wild red raspberry.
Profile Description: Orthic Black Chernozem

Horizon	Thickness (cm)	Field Texture	Structure	Consistence
L-H	5	leaf and root litter		
Ah	20-25	sand	amorphous	loose, moist
Bm	75-80	sand	amorphous	loose, dry

Comment: Occasional gravelly pockets occur in these profiles.
Limitations: Slight to severe-slight for buildings, and road location; moderate for campgrounds, and picnic areas; severe for lawns and landscaping, paths, and septic tank absorption fields. Specific limitations include sandy surface texture, rapid permeability (droughtiness), and groundwater contamination hazard.

Map Unit 3

Classification: Gleyed Eutric Brunisol
Parent material: very coarse textured glaciolacustrine sediments (sand)
Landform: level glaciolacustrine ($L1^G$)
Slope: gently undulating (greater than 0.5 to 2%)
Surface stoniness: nonstony (0)
Drainage: imperfect
Vegetation: sparse-mostly small balsam poplar, some small aspen; dogwood, wild rose; occasional patch of wolf willow, and Canadian buffalo-berry
Profile description: Gleyed Eutric Brunisol

Horizon	Thickness (cm)	Field Texture	Structure	Consistence
L-H	1-3	leaf and root litter (loose and fragile)		
Cg	100	sand	amorphous	loose, moist or dry

Comments: (1) A Ccag horizon is occasionally found 75 to 100 cm below the surface, but is usually below the 120 cm depth.
(2) Occasional gravelly pockets occur in these soil profiles.
(3) A water table is often found 100 cm below the surface.

Limitations: Severe to very severe-severe for buildings, and road location; very severe for all other uses. Specific limitations include sandy surface texture, flooding hazard (overflow), seasonally high groundwater table or surface ponding, lack of Ah horizon, rapid permeability, and groundwater contamination hazard.

Map Unit 4

Classification: Rego Black Chernozem
Parent material: moderately coarse textured till
Landform: inclined morainal (Mi)
Slope: very steeply sloping (greater than 30 to 60%)
Surface stoniness: nonstony (0)
Drainage: well drained
Vegetation: native grass, pasture sagewort, prairie sagewort; occasional patch of wolf willow
Profile description: Rego Black Chernozem

Horizon	Thickness (cm)	Field Texture	Structure	Consistence
Ah	20	sandy loam	granular	very friable, moist
Cca	80	sandy loam	prismatic, breaking to subangular blocky	very friable, moist; hard, dry

Comment: The till has a very low content of small pebbles
Limitations: Very severe for all uses due to excessive slope and erosion hazard.

Map Unit 5

Classification: Gleyed Black Solodized Solonetz, Carbonated phase.
Parent material: very coarse textured glaciofluvial sediments (sand), overlying moderately coarse textured till.
Landform: glaciofluvial veneer, overlying undulating morainal (FG/Mu)
Slope: undulating (greater than 2 to 5%)
Surface stoniness: nonstony (0)
Drainage: imperfect
Vegetation: native grass, buckbrush, wild rose; patches of aspen
Profile description: Gleyed Black Solodized Solonetz, Carbonated phase.

Horizon	Thickness (cm)	Field Texture	Structure	Consistence
Ahkg	30	loamy sand	amorphous	loose, moist
ABkg	15	sand	amorphous	loose, dry
Aekg	10	sand	amorphous	loose, dry
Bhtkg	15	sandy loam	columnar, breaking to blocky	very hard, dry
BCkg	20	loam	subangular blocky	very firm, moist
Ccag	at 90	loamy sand	amorphous	loose, moist

Comments: (1) Moderately coarse textured till occurs below the 135 cm depth.

(2) The lime content for soil horizons of Map Unit 5 profiles is reported as nil in Table 2. However, all horizons showed visible effervescence when tested with dilute HCl in the field.
Limitations: Moderate to severe-severe for septic tank absorption fields; moderate for all other uses. Specific limitations include seasonally high groundwater table, solonetzic soil, high lime content (soil nutrient imbalance), sandy surface texture, possible concrete corrosion hazard (soluble sulfate), rapid permeability, and groundwater contamination hazard.

Special Features

The soils in Alberta have been classified into broad general zones (Figure 2) as established by Alberta Soil Survey during the normal course of soil surveys, and correlated with temperature and precipitation records. Annual precipitation amounts change gradually from one soil zone to another, and are not abrupt changes at the point where a zone boundary has been located. Thus a zone boundary is a broad transitional belt, which can be many kilometres across. Topsoil colours reflect this gradual change. For example, in the centre of the Brown Soil Zone (annual precipitation about 30 to 33 cm), topsoil colours are brown. Similarly in the centre of the Dark Brown Soil Zone (annual precipitation about 38 cm), topsoil colours are dark brown. Between these two zones, topsoil colours are brown to dark brown, and annual precipitation is about 35 cm. The boundary between the two soil zones has been placed approximately at that mid-point.

Zonal soils are soils with well developed soil characteristics that reflect the zonal or normal influences of climate and living organisms, mainly vegetation, as active factors of soil genesis. Examples are Brown, Dark Brown, or Black soils of the Brown, Dark Brown, or Black Soil Zones respectively. Intrazonal soils are soils with morphology that reflects the

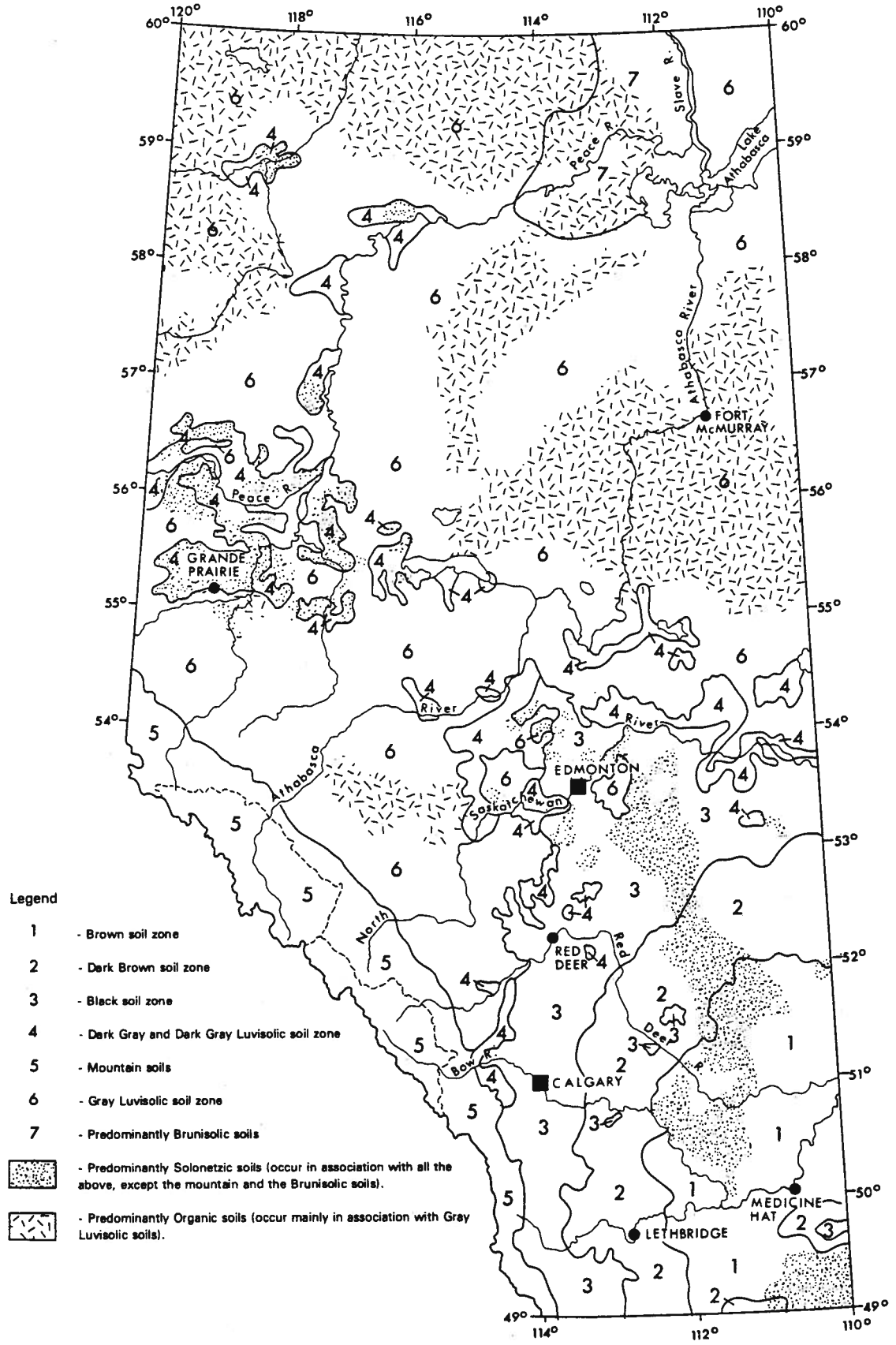


Figure 2. Map showing soil zones of Alberta (from Soil Group Map of Alberta, Alberta Institute of Pedology, undated).

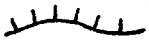
influence of some local factor of relief, parent material, or age; rather than of climate and vegetation. An example is Solonetzic soils, which develop as a result of salinization. This may originate internally from a saline parent material, or from saturation by external saline waters. Solonetzic soils are found across many soil zones (Figure 2). Azonal soils are soils without distinct genetic horizons, and are represented by Regosolic soils in Canada. These occur across all the soil zones in the province.

Rochon Sands Park is situated in the black soil zone (Figure 2) and most of the soils have been classified as Black Chernozemic, which are zonally normal. Exceptions are the Solonetzic and Brunisolic soils, which are intrazonal. Brunisolic soils, although uncommon in this region, occur in most of the soil zones. The Chernozemic and Solonetzic soils can be considered typical, both locally and regionally (Bowser et al., 1951).

Special features of soils in Rochon Sands Park relate to their very coarse textures, and consequential very low moisture holding capacities. The Chernozemic soils are rapidly drained, and droughty in nature. The Brunisolic soils, prominent near the lake shore, have loose consistence, rendering them prone to rapid deterioration under human foot traffic. Also these soils lack Ah horizons, and are thus very low in soil organic matter, an important soil-binding agent.

MISCELLANEOUS SYMBOLS

B.S. This symbol indicates beach sand adjacent to the lake shore.


This symbol indicates an escarpment.


This symbol indicates a marsh or depressional area. These areas are periodically wet or inundated, and are characterized by the growth of hydrophytic vegetation including slough grass, sedge, common cattail, and foxtail barley. They are unsuitable for all uses due to seasonally high groundwater tables and flooding hazard (overflow).

SLF This symbol indicates a sanitary landfill site.

SOIL INTERPRETATIONS

An explanation of soil interpretations and definitions of the soil limitation ratings are given in Greenlee (1981). The results of soil chemical analyses are given in Table 2.

The most suitable soils for recreational development in Rochon Sands Park are those of Map Unit 1 when found on suitable topography. However they have formed on steep slopes throughout most of the park, so have severe limitations. Map Unit 2 soils, in the northwestern and northeastern corners of the park, have moderate limitations due to sandy surface textures. Map Unit 3 soils, adjacent to the lake shore, have very severe limitations due to sandy surface textures, flooding hazard (overflow) and seasonally high groundwater tables.

Map Unit 1 soils, when found on suitable topography, and Map Unit 2 soils are well suited for road construction; while Map Unit 3 soils have severe limitations.

Specific limitations of the various soils for selected uses are shown in Tables 3 to 10 inclusive. The ratings were determined on the basis of morphological, physical, and chemical properties of the soils, as well as steepness of slope. The principal limiting properties are indicated, and are generally listed in decreasing order of importance. Limitations due to slope are not further subdivided once the slope becomes steep enough to cause a very severe limitation for a specified use. It follows, however, that the steeper the slope, the more severe the limitation, and this fact should be kept in mind while using the soil interpretation tables. The soil limitations for various uses have been designated as none to slight, moderate, severe and very severe.

TABLE 2. Chemical Analyses of Selected Map Units[1]

MAP UNIT	DEPTH cm	pH H20	[2] EC	[3] Na	[3] SO4	[3] OM	[3] CaCO3
1	0 - 15	7.1	0.4	L-	[4] nd	M-	-
	30 - 45	6.8	0.2	L	nd	M-	-
2	0 - 15	6.6	0.2	L	nd	M-	-
	30 - 45	7.5	0.3	L-	nd	M-	-
3	0 - 15	6.5	0.2	L+	nd	L+	L+
	15 - 30	7.0	0.7	L-	nd	L-	L+
4	0 - 15	7.6	0.4	L-	nd	M-	L
	15 - 30	7.2	0.6	L-	nd	M-	M
5	0 - 15	8.0	0.4	L-	nd	M-	-
	30 - 45	8.0	0.3	L-	nd	M-	-

[1]Chemical Analyses done by Alberta Soil and Feed Testing Laboratory, [2]EC - electrical conductivity, millimhos/cm, [3]These tests are rated into 4 categories: High (H), Medium (M), Low (L), and None (-). The degree within each category is indicated by a + or - sign. The tests for OM (organic matter) and CaCO3 (free lime) are visual estimates only. [4]nd - not determined.

TABLE 3. Soil Limitations for Fully Serviced Campgrounds

MAP SYMBOL [1]	DEGREE OF LIMITATION [2]	MAP SYMBOL	DEGREE OF LIMITATION
1/d0	SL to M - Sandy		
1/f0	S - Slope, Er, Sandy		
2/c0 2/d0	M - Sandy		
3/b0	VS - Sandy, Flood, Wet		
4/G0	VS - Slope, Er		
5/c0	M - Wet, Solz		

1. For explanation, see Soil Map.
2. SL - None to slight, M - Moderate, S - Severe, VS - Very severe.

ABBREVIATIONS

BR - Shallow depth to bedrock
Clay - High clay content
Er - Erosion hazard
Flood - Flooding hazard (overflow)
Org - Organic soil
Org Surf - Organic surface layer > 15 cm thick
Sandy - Sandy surface texture
Slip - Slippery or sticky when wet
Slope - Excessive slope
Sl Perm - Slow permeability
Solz - Solonetzic soil
Stony - Surface stoniness
Wet - Seasonally high groundwater table or surface ponding

TABLE 4. Soil Limitations for Picnic Areas

MAP SYMBOL [1]	DEGREE OF LIMITATION [2]	MAP SYMBOL	DEGREE OF LIMITATION
1/d0	SL to M - Sandy		
1/f0	S - Slope, Er, Sandy		
2/c0 2/d0	M - Sandy		
3/b0	VS - Sandy, Wet		
4/G0	VS - Slope, Er		
5/c0	M - Wet, Solz		

1. For explanation, see Soil Map.
2. SL - None to slight, M - Moderate, S - Severe, VS - Very severe.

ABBREVIATIONS

BR - Shallow depth to bedrock
Clay - High clay content
Er - Erosion hazard
Flood - Flooding hazard (overflow)
Org - Organic soil
Org surf - Organic surface layer > 15 cm thick
Sandy - Sandy surface texture
Slip - Slippery or sticky when wet
Slope - Excessive slope
Sl Perm - Slow permeability
Solz - Solonetzic soil
Stony - Surface stoniness
Wet - Seasonally high groundwater table or surface ponding

TABLE 5. Soil Limitations for Lawns and Landscaping

MAP SYMBOL [1]	DEGREE OF LIMITATION [2]	MAP SYMBOL	DEGREE OF LIMITATION
1/d0	S - R Perm, Sandy		
1/f0	S - Slope, Er, R Perm		
2/c0 2/d0	S - Sandy, R Perm		
3/b0	VS - Sandy, Wet, Thin Ah		
4/G0	VS - Slope, Er		
5/c0	M - Wet, Lime, Solz		

1. For explanation, see Soil Map.
2. SL - None to slight, M - Moderate, S - Severe, VS - Very severe.

ABBREVIATIONS

BR - Shallow depth to bedrock
Clay - High clay content
Er - Erosion hazard
Flood - Flooding hazard (overflow)
Lime - High lime content (soil nutrient imbalance)
Org - Organic soil
Org Surf - Organic surface layer > 15 cm thick
R Perm - Rapid permeability (droughtiness)
Saline - Surface soil salinity
Sandy - Sandy surface texture
Slope - Excessive slope
Sl Perm - Slow permeability
Solz - Solonetzic soil
Stony - Surface stoniness
Thin Ah - Thin or no Ah horizon
Wet - Seasonally high groundwater table or surface ponding

TABLE 6. Soil Limitations for Paths

MAP SYMBOL [1]	DEGREE OF LIMITATION [2]	MAP SYMBOL	DEGREE OF LIMITATION
1/d0	SL to M - Sandy		
1/f0	S - Slope, Er, Sandy		
2/c0 2/d0	S - Sandy		
3/b0	VS - Sandy, Wet		
4/G0	VS - Slope, Er		
5/c0	M - Wet, Sandy, Solz		

1. For explanation, see Soil Map.
2. SL - None to slight, M - Moderate, S - Severe, VS - Very severe.

ABBREVIATIONS

Clay - High clay content
Er - Erosion hazard
Flood - Flooding hazard (overflow)
Org - Organic soil
Org Surf - Organic surface layer > 15 cm thick
Sandy - Sandy surface texture
Slip - Slippery or sticky when wet
Slope - Excessive slope
Solz - Solonetzic soil
Stony - Surface stoniness
Wet - Seasonally high groundwater table or surface ponding

TABLE 7. Soil Limitations for Buildings with Basements

MAP SYMBOL [1]	DEGREE OF LIMITATION [2]	MAP SYMBOL	DEGREE OF LIMITATION
1/d0	SL		
1/f0	S - Slope		
2/c0 2/d0	SL		
3/b0	S - Flood, Wet		
4/G0	VS - Slope		
5/c0	M - Wet, Sulfate		

1. For explanation, see Soil Map.
2. SL - None to slight, M - Moderate, S - Severe, VS - Very severe.

ABBREVIATIONS

BR - Shallow depth to bedrock
Clay - High clay content
Flood - Flooding hazard (overflow)
Frost - Susceptibility to frost heave
M Sh-Sw - Moderate shrink-swell potential
Org - Organic soil
Sh-Sw - High shrink-swell potential
Slope - Excessive slope
Stony - Surface stoniness
Sulfate - Possible concrete corrosion hazard (soluble sulfate)
Wet - Seasonally high groundwater table or surface ponding

TABLE 8. Soil Limitations for Buildings Without basements

MAP SYMBOL [1]	DEGREE OF LIMITATION [2]	MAP SYMBOL	DEGREE OF LIMITATION
1/d0	SL		
1/f0	S - Slope		
2/c0 2/d0	SL		
3/b0	S - Flood, Wet		
4/G0	VS - Slope		
5/c0	M - Wet		

1. For explanation, see Soil Map.
2. SL - None to slight, M - Moderate, S - Severe, VS - Very severe.

ABBREVIATIONS

BR - Shallow depth to bedrock
Flood - Flooding hazard (overflow)
Org - Organic soil
Slope - Excessive slope
Stony - Surface stoniness
Wet - Seasonally high groundwater table or surface ponding

TABLE 9. Soil Limitations for Septic Tank Absorption Fields

MAP SYMBOL [1]	DEGREE OF LIMITATION [2]	MAP SYMBOL	DEGREE OF LIMITATION
1/d0	S - R Perm, GW		
1/f0	S - R Perm, GW, Slope		
2/c0 2/d0	S - R Perm, GW		
3/b0	VS - Wet, GW, R Perm		
4/G0	VS - Slope		
5/c0	S - Wet, GW, R Perm		

1. For explanation, see Soil Map.
2. SL - None to slight, M - Moderate, S - Severe, VS - Very severe.

ABBREVIATIONS

BR - Shallow depth to bedrock
Clay - High clay content
Flood - Flooding hazard (overflow)
GW - Groundwater contamination hazard
Org - Organic soil
R Perm - Rapid permeability
Slope - Excessive slope
Sl Perm - Slow permeability
Wet - Seasonally high groundwater table or surface ponding

TABLE 10. Soil Limitations for Road Location

MAP SYMBOL [1]	DEGREE OF LIMITATION [2]	MAP SYMBOL	DEGREE OF LIMITATION
1/dO	SL		
1/fO	S - Slope		
2/cO 2/dO	SL		
3/bO	S - Wet, Flood		
4/GO	VS - Slope		
5/cO	M - Wet		

1. For explanation, see Soil Map.
2. SL - None to slight, M - Moderate, S - Severe, VS - Very severe.

ABBREVIATIONS

BR - Shallow depth to bedrock
Clay - High clay content
Er - Erosion hazard
Flood - Flooding hazard (overflow)
Frost - Susceptibility to frost heave
M Sh-Sw - Moderate shrink-swell potential
Org - Organic soil
Sh-Sw - High shrink-swell potential
Slope - Excessive slope
Stony - Surface stoniness
Wet - Seasonally high groundwater table or surface ponding

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SOIL LIMITATIONS FOR RECREATION IN ROCHON SANDS PROVINCIAL PARK

Tp 40, R 20-21, W4M

LEGEND:

SL	- none to slight soil limitations
M	- moderate soil limitations
S	- severe soil limitations
VS	- very severe soil limitations

LEGEND:

- soil limitation line
- boundary of mapped area
- escarpment
- marsh or depressional area
- SLF - sanitary landfill site
- BS - beach sand
- direction of slope
- W - water

APPROXIMATE SCALE 1:8000

666 0 666 1332 1998 Feet

160 0 160 320 480 Metres

Compiled on uncontrolled mosaic
Mapped and Compiled by:
G.M. Greenlee, P. Ag.
Soils Department
1984

ALBERTA RESEARCH COUNCIL

SOIL MAP OF ROCHON SANDS PROVINCIAL PARK

Tp 40, R 20-21, W4M

SOIL CLASSIFICATION			
MAP UNIT	SOIL ORDER	SOIL SUBGROUP	SOIL PARENT MATERIAL
1	Chernozemic	Orthic Black Chernozem	moderately to very coarse textured glaciofluvial sediments (sand), overlying moderately coarse textured till
2	Chernozemic	Orthic Black Chernozem	very coarse textured glaciofluvial sediment (sand)
3	Brunisolic	Gleyed Eutric Brunisol	very coarse textured glaciolacustrine sediments (sand)
4	Chernozemic	Rego Black Chernozem	moderately coarse textured till
5	Solonetzic	Gleyed Black Solodized Solonetz, Carbonated phase	very coarse textured glaciofluvial sediments (sand), overlying moderately coarse textured till

LEGEND:

Map Symbol:

1/f0 — 1 = map unit; f0 = surface stoniness rating; topographic class

- soil line
- boundary of mapped area
- escarpment
- marsh or depressional area
- SLF - sanitary landfill site
- BS - beach sand
- direction of slope
- W - water

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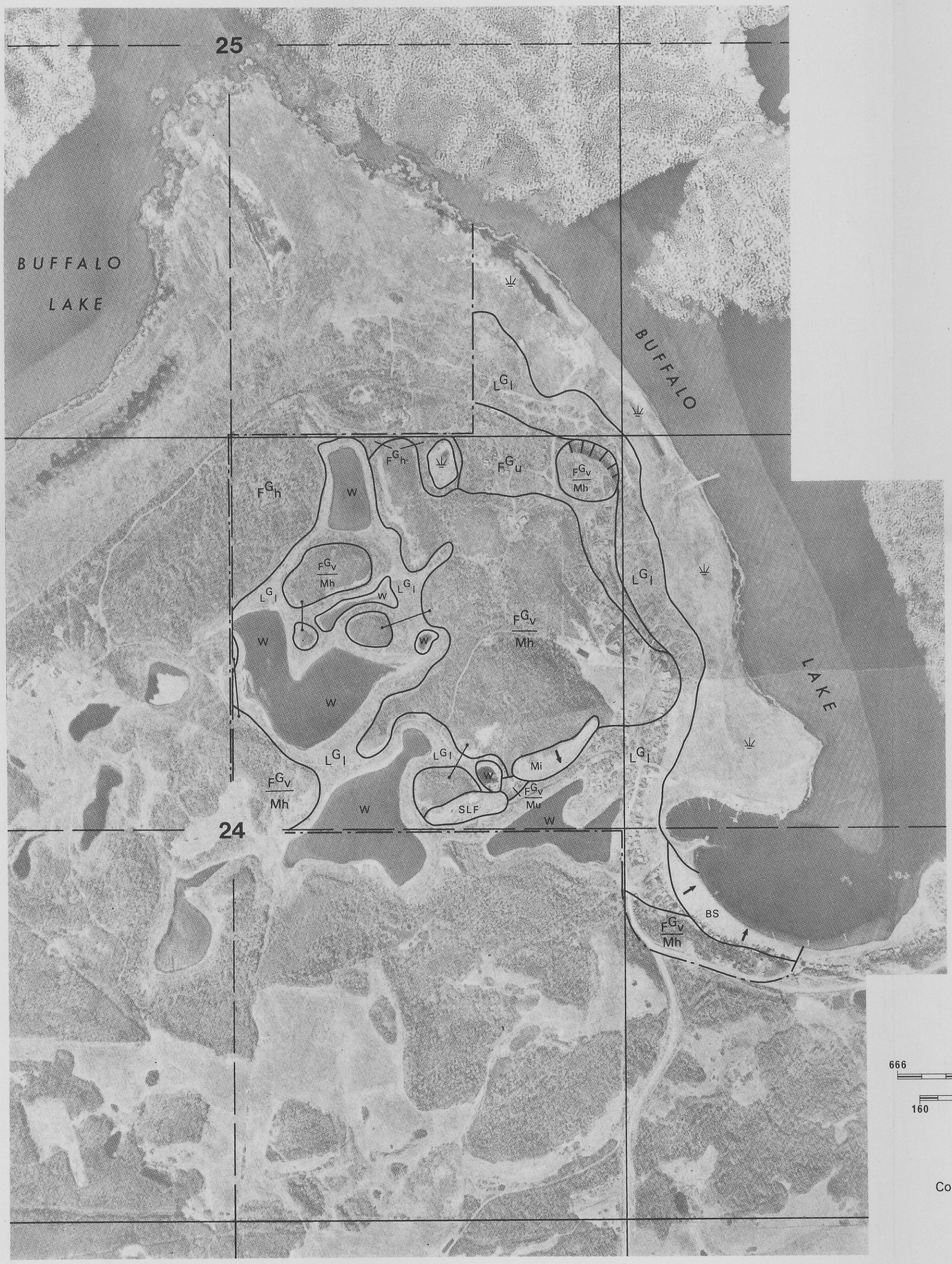
LANDFORM MAP OF ROCHON SANDS PROVINCIAL PARK

Tp 40, R 20-21, W4M



LEGEND:

F - Fluvial

F^{G}_{h} - hummocky glaciofluvial

F^{G}_{u} - undulating glaciofluvial

$\frac{F^{G}_{v}}{Mh}$ - glaciofluvial veneer, overlying hummocky morainal

$\frac{F^{G}_{v}}{Mu}$ - glaciofluvial veneer, overlying undulating morainal

L - Lacustrine

L^{G}_{l} - level glaciolacustrine

M - Morainal

Mi - inclined morainal

LEGEND:

- landform line
- boundary of mapped area
- escarpment
- marsh or depressional area

SLF - sanitary landfill site

BS - beach sand

- direction of slope

W - water

APPROXIMATE SCALE 1:8000

666 0 666 1332 1998 Feet

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