SOIL RESOURCES

of the

BLUEBERRY RIVER INDIAN RESERVE NO. 205

by

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with a section on Residential Suitability

by

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PREFACE

This report contains information about the soils of the Blueberry River Indian Reserve, and their potential for agriculture and the construction of small buildings. First there is a brief description of the landscape. Then there are descriptions of the soils, followed by sections on Agricultural Capability and Residental Suitability. More detailed descriptions of the individual soil areas are contained in an appendix. Two maps accompany the report; one shows the different soil areas, identifies them by a number, and also shows their rating for agriculture, the other shows the same soil areas and their ratings for residential suitability.

The survey was done at the request of the Blueberry River Band, and I am grateful to the Band and their Chief, Joe Apsassin, for granting us access to the Reserve. Russell Apsassin, Ken Denholm, Alan Lidstone, and Jeremy Joyce helped with the field work. Martin Kobayakawa, the District Planner for I.N.A.C. in Fort St. John, made many of the local arrangements necessary for the survey. Soil analyses were carried out by L.K. Chan, Agriculture Canada, and soil test results and fertilizer recommendations were furnished by the Soil Testing Laboratory, Ministry of Agriculture and Food, Kelowna. Mosaics and map overlays were prepared by Energy, Mines and Resources Canada and Nadir Mapping Corporation, Vancouver. Greg Cheesman, Ministry of Environment, Victoria, supplied the climate information upon which the Agricultural Capability was based, and John Jungen, Ministry of Environment, Kelowna, advised on some of the Agricultural Capability ratings. Jackie Melzer typed the Tables in the report.

Keith Valentine

Vancouver
May 1985.

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GENERAL DESCRIPTION OF THE RESERVE AND ITS SURROUNDINGS

Location and Size

The Blueberry River Indian Reserve is approximately 113 km northwest of Fort St. John, on the Blueberry River. Access to the village is by a publicly maintained road that heads east from the Alaska Highway, No. 97, at Mile 72 (km 115). The Reserve consists of 1326 ha (3278 acres), of which about one quarter has been cleared and left to grass. The rest is trees or open wetland. In 1984 the total membership of the Band was 137, of whom 125 lived on the Reserve.

Landscape and Geology

In this part of the Peace River District the landscape is a rolling plain with creeks and rivers draining southwards into the Peace River. The bigger rivers, such as the Blueberry, run through relatively narrow, steep-sided valleys that lie below the general level of the plain. The Blueberry River Reserve spans a part of the Blueberry River valley. It therefore comprises, on either side of the river, flat terraces, steep valley sides (many of which are eroding), and a thin strip of the rolling plain. The elevation of the river terraces is about 650m above sea level, and the elevation of the edge of the plain is about 700m.

The climate is continental; there are long cold winters and short warm summers, with a moderate amount of precipitation. The Atmospheric Environment Service climate station at Rose Prairie, just to the south, is typical of land on the plain. Average daily temperatures are above 0° celsius only from April through October. Average total precipitation is 470mm, most of which falls in the summer. Terraces in valley bottoms will be a little colder than land on the plain because cold air will flow down onto them. More details of the climate are given in the section on Agricultural Capability below.

The Reserve lies in the Boreal Forest Region (Rowe 1959), or the Boreal White and Black Spruce Biogeoclimatic Zone (Krajina 1969). Common tree species, in addition to white and black spruce, are trembling aspen, tamarack (in wetlands), and black cottonwood (in valleys). Shrubs include willows, common red-osier dogwood, soopolallie, wild rose and blueberries. Some common ground level plants, in addition to grasses, are twinflower, twinberry honeysuckle, common red indian paintbrush and blue-leaved wild strawberry. Parts of the Reserve have been repeatedly burnt in springtime to create open grassy areas on which to graze horses.

The rocks lying under the Reserve are principally shales and sandstones of Cretaceous age. They are soft, flat lying, and extremely susceptible to slumping and erosion on steeper slopes. During the last Ice Age, until about 10 000 years ago, the whole area was covered by ice, which left behind a mantle of clayey glacial till on the higher parts of the plain. As the ice melted, what was to become the Peace River Valley and many of its major tributary valleys were transformed into a huge lake. In this lake were laid down clayey sediments, which, unlike the glacial till, contain no stones. Later still, this lake drained, and rivers such as the Peace, Doig, Beatton and Blueberry began to cut their valleys down through the lake sediments, glacial till, and bedrock.

GENERAL DESCRIPTION OF THE RESERVE AND ITS SURROUNDINGS

Location and Size

The Doig River Indian Reserve is approximately 80 km northeast of Fort St. John, on the Doig River. Access to the village is by a publicly maintained road that heads east from a paved road at Rose Prairie. The Reserve consists of 1180 ha (2913 acres), of which about one quarter has been cleared and left to grass. The rest is trees or open wetland. The Band also owns approximately 450 ha (1110 acres) of adjoining land to the west. All of this has been cleared. In 1984 the total membership of the Band was 120, of whom 75 lived on the Reserve.

Landscape and Geology

In this part of the Peace River District the landscape is a rolling plain with creeks and rivers draining southwards into the Peace River. The bigger rivers, such as the Doig, run through relatively narrow, steep-sided valleys that lie below the general level of the plain. The Doig River Reserve spans a part of the Doig River valley. It therefore comprises, on either side of the river, flat terraces, steep valley sides (many of which are eroding), and a strip of the rolling plain. The elevation of the river terraces is about 650m above sea level, and the elevation of the edge of the plain is about 700m.

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This valley formation continues today, producing the steep valley walls and terraces adjacent to the rivers. Any slopes, especially those undercut by the Blueberry River, are susceptible to slumping.

These deposits, laid down during or after the last ice age, are the materials in which the soils of the Reserve have formed. On the edges of plain, on either side of the valley, there are glacial till and lacustrine clay soils. On the valley sides are unstable clay soils that are quite thin over bedrock. The terraces, close to the river, have sandy alluvial soils. At a very general scale, the soils have been mapped for the whole of the Peace River District (Farstad et al. 1965, Lord and Green 1985). In these generalized surveys the edges of the plain, above the valleys, have been mapped as Beatton (well drained lacustrine), Buick (poorly drained glacial till), or Goose (poorly drained lacustrine) Soils. The sides of the valleys are mapped as Rough Broken Land, and the terraces are shown as Alluvial Soils.

SURVEY METHODS

Soils

The Reserve was mapped from field observations of soil and land features, and from what could be seen on air photographs (scale 1:20 000). Stretches of land were mapped that had uniform soil or land characteristics. They are called Soil Areas in this report, and each is identified by a unique number. They were distinguished on the basis of the following characteristics:

slope or topography
texture and depth of soil materials
moisture regime or water content
erosion
gravel content
susceptibility to river flooding
how complex the pattern of soils was

Six days were spent in the field. Soils were inspected with a one metre auger or a shovel. Land features, such as slope or any evidence of flooding, were noted as well. Most of the survey was done on foot. The total area mapped was 1326 ha, with 190 inspections of soil and land features. This means there was one inspection for every 7 ha of land, and 71% of the Soil Areas had at least one inspection, which makes this a Detailed Survey at a Survey Intensity Level of 2 (Mapping System Working Group 1981).

Descriptions of Soil Areas were recorded on standard forms, and are reproduced in Appendix 1. Definitions of terms used to describe soils may be found in Walmsley et al (1980) or Day (1983). Each Soil Area, identified by a number, is shown on the map that accompanies this report. General descriptions of the major features of the soils are given in the next section. Composite samples were taken from a number of Soil Areas and analyzed for their physical and chemical characteristics. Some samples were also sent to the Ministry of Agriculture and Food laboratory in Kelowna. The results of these analyses, with recommendations for improving the soil, are given in the section on Agricultural Capability.

Agricultural Capability

After each Soil Area had been described and mapped it was rated for agriculture. The ratings are shown on the map after the Area number. The Land Capability Classification for Agriculture used in British Columbia rates land according to its potential for field crops or grazing. Classes indicated relative potential, and subclasses indicate problems such as stoniness, lack of soil moisture or steep slopes. Classes 1 to 4 are capable of supporting field crops. Classes 5 and 6 are only suited to grazing, the Class 7 is non-agricultural. The classification is explained in the legend accompanying the map, and in two further publications listed in the References (Canada Land Inventory 1965, and Kenk 1983).

Before the soil can be rated for agriculture it is necessary to determine how suitable the climate is for agriculture. The climate is also rated in seven classes, and no soil can be rated higher than the climate class. The

Atmopsheric environment Service climate station at Rose Prairie is typical of land on the plain near the Reserve. Its records give the following information:

elevation (m)	670
growing degree days	988
freeze free period (days)	77
annual precipitation (mm)	470
growing season precipitation (mm)	318
potential evapotranspiration (mm)	377
climate moisture balance (mm)	-60

Any depressions, such as valleys of rivers like the Blueberry, will have even shorter freeze free periods and fewer growing degree days, because cold air drains into them.

On the basis of these figures the climate class of the Reserve has been set at 3 for the lands on the plain, and 4 for the slopes and terraces of the river valley. No Soil Area can be rated better than this.

The ratings eventually assigned to each Soil Area are shown on the Agricultural Capability map after the Area number.

Residential Suitability

After the soils had been mapped and assessed for agriculture, the map and soil descriptions were given to Martin Kobayakawa and Jeremy Joyce, who were District Planner and Student Assistant respectively of Indian and Northern Affairs Canada in Fort St. John. They rated the Soil Areas according to their suitability as sites for small residential buildings. The ratings are shown on the Development Suitability map included with this report. A description of how the ratings were done is given below in the section on Residential Suitability.

DESCRIPTIONS OF SOIL AREAS

The map shows 71 different soil areas. Each one is described in detail in Appendix 1. However, many of them were quite similar, and can be grouped together. The major similarities are among those areas on the edge of the plains, those on the sides of the river valleys, and those on the terraces. Within these three main parts of the landscape there are also some contrasting areas because of soil texture, water content or topography. This gives six general types of soil areas, and these will be described in the following sections. They are shown diagrammatically, as a cross section across the valley, in Figure 1.

Plains, moderately dry, clay areas

Soils Areas 02, 03, 04, 06, 08, 21, 22, 28, 39, 49, 51, 57, 62, 63, 66, 67, 71.

The outer edges of the Reserve cover parts of the rolling plains where they border the river valleys. Slopes are usually less than 5%, but can be as steep as 10% in some places. The texture of the soil is clay loam or clay, both in the topsoil and subsoil. There are very few stones, and the soils have a strong blocky structure that allows roots to penetrate to well below 50 cm. The moisture regime is commonly humid to perhumid, and most soils are moderately well drained. Being so clayey, the soils are only slowly permeable to water. They are not susceptible to erosion, except when bare and exposed on steeper slopes. When wet they become very sticky, making driving difficult. Topsoils analyses from one of these areas (Table 1) show it to be acid, fairly rich in organic matter, and to have a cation exchange capacity typical of fine-textured topsoils. These areas have been mapped as the Beatton Soils on generalized maps of the area (Lord and Green 1985).

Plains, wet, clay areas

Soil Areas 17, 19, 20, 32, 33, 34, 50, 55, 64, 68.

Water collects on some flatter areas of the plains to make the soil much wetter than those described above. Here slopes are usually less than 2%, and alwaysw less than 5%. Some areas are so wet that the topsoil is organic with no clay. In the wettest spots the whole soil is organic, down to more than one metre below the surface. These are bogs with sphagnum moss and black spruce. The soil moisture regime is aquic or peraquic, and the soils are poorly or very poorly drained. Water is at, or close to the surface all year. In spite of some of these areas being much wetter than those above, their soil chemical characteristics are fairly similar (Table 1). On generalized soil maps these areas have been mapped as the Buick, Goose and Kenzie Soils (Lord and Green 1985).

Plains, old stream channels

Soil Areas 05, 31, 56.

In three places there are shallow linear depressions that are old stream channels. Their floors are flat. They have water at the surface nearly all the year, and have soils whose surface layers are organic. In contract, the sides

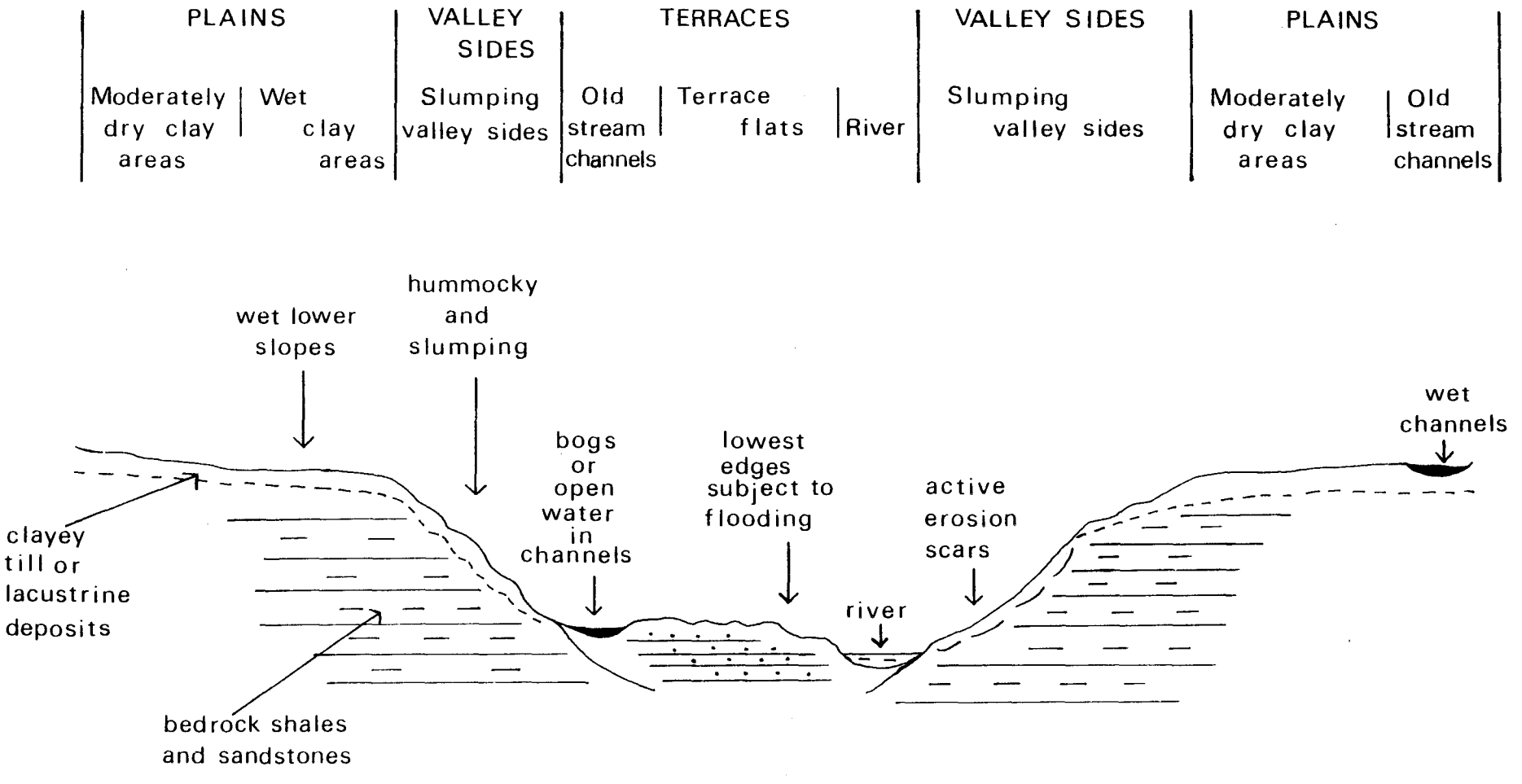


Figure 1 Generalized Cross Section of the valley

Table 1: Soil Analyses

Soil Area Number	Sample Depth(cm)	pH ($CaCl_2$)	Organic Matter(%)	Total N (%)	C:N	C.E.C.* (me/100g)
Plains, Moderately, Dry Clay Areas						
02	0-20	5.8	8.6	.38	13	32
08	0-20	5.1	5.1	.28	11	24
	50	4.4	2.3	.15	9	28
39	0-20	4.7	7.3	.38	11	34
49	0-20	5.1	7.3	.35	13	32
57	0-20	5.1	8.8	.40	13	41
67	0-20	6.0	8.4	.37	13	37
Plains, Wet clay Areas						
50	0-20	4.9	7.8	.38	12	39
River Valley Sides						
14	50	4.9	1.7	.10	10	18
Terraces, flats						
16	0-20	6.0	5.7	.31	11	17
37	0-20	4.8	5.1	.24	12	15
42	0-20	5.2	4.2	.22	11	16
48	0-20	4.6	7.2	.41	10	22
52	0-20	5.3	5.4	.29	11	17
70	0-20	5.1	4.5	.21	12	18

*C.E.C. is Cation Exchange Capacity

of these depressions can slope up to 15%, are moderately well drained and have clay topsoils with few stones. These depressions are too small to be shown on generalized soil maps.

River Valley Sides

Soil Areas 01, 07, 09, 12, 14, 18, 44, 45, 65.

From the edge of the plains the ground slopes down to the Blueberry River and its terraces at angles of between 20 and 30%. The soils are still clays or clay loams, but on these slopes they are either well or moderately well drained. Their moisture regimes are either humid or perhumid. However, their most important characteristic is their susceptibility to slumping and erosion. On treed or grass slopes this will show as irregular hummocks. Where the river is undercutting the foot of the slope there will be active erosion scars and exposed bedrock. There is one such slope opposite the present village site. On two much flatter areas within the general valley sides there are small hollows with much wetter soils (Soil Areas 09 and 44). These are very similar to the wet areas of the clay plains. The one Area that was sampled for analyses was acid, and contained little organic matter, nitrogen or phosphorus (Table 1). This was, however, a subsoil sample. The river valley sides have been mapped on generalized soil maps as Rough Broken Land (Lord and Green 1985).

Terraces, flats

Soil Areas 10, 11, 13, 15, 16, 23, 24, 25, 26, 27, 29, 35, 36, 37, 40, 41, 42, 43, 48, 52, 53, 59, 60, 61, 69, 70.

The Blueberry River winds from one side of its valley to the other, leaving alternate terraces on either side. The general slope of these terraces is less than 2%, but often there are parallel ridges running across them. The ridges can be one or two metres high, and their sides can slope as steeply as 25%. Topsoil textures are sandy loam or loamy sand, and subsoil textures, below 50cm, are sand. Of the terraces that were inspected, none had deep gravel deposits, although there are thin patches of gravel on the terrace where the present village stands. Soil moisture regimes are humid or subhumid, and all soils are well drained. Permeability is rapid, and no soils suffer from excess water. On the other hand, the lowest edges of the terraces, bordering the river, are subject to flooding. Topsoil samples (Table 1) were acid, contained considerable organic matter, but had lower cation exchange capacities than the clay soils of the plains. These terraces have been mapped as Alluvial Soils on generalized soil maps (Lord and Green 1985). Because the river winds from one side of the valley to the other, terraces on the same side of the river do not join. This makes access difficult. In most cases, a track has to be made to each one down the valley side from the plains above.

Terraces, Old Stream Channels

Soil Areas 30, 46, 47, 58.

On some terraces there are remnants of previous channels of the Blueberry River. Some are small marshy lakes. Some are bogs with organic soils, sphagnum peat and black spruce. In the latter, peat was frozen at about 20cm in early July. All the channels have peraquic moisture regimes, and are very poorly drained. They are too small to be shown separately on generalized soil maps, but would be similar to the Kenzie Soils, and would be included in areas mapped as Alluvial Soils (Lord and Green 1985).

AGRICULTURAL CAPABILITY AND FERTILIZER RECOMMENDATIONS

Plains, Moderately Dry, Clay Areas

The Agricultural Capability Climate Class for these areas is 3. This means that soils that would otherwise be excellent for agriculture can be rated no better than moderately productive, because primarily of a short growing season. Agricultural Capability ratings refer to the potential of the soils to produce field crops like wheat or barley (Kenk 1983). In fact all the soils in these areas suffer from the additional limitation of wetness. Their clay or clay loam texture means that water can move through them only slowly. They remain wet and cold for a considerable time after snow melt in the spring. However, they do eventually dry out so that they can be seeded and cultivated. They have been rated 4w; marginal for field crops. Some other areas are quite steep in addition to suffering from slow water permeability. They have been rated 5wt; only capable of use as grazing land.

The results of soil test analyses done on composite samples taken from two of these areas (04 and 49) are given in Table 2. Both areas were moderately acid and although they had considerable organic matter they had very little nitrate nitrogen. One of them (04) was also deficient in phosphorus, and slightly saline. The fertilizer recommendations in Table 3 show application rates for nitrogen and phosphorus. For oats and barley nitrogen should be broadcast and incorporated into the soil before seeding. For rapeseed (canola) it should be applied in early spring. There are two rates shown for grass-legumes. The first (80kg ha^{-1}) should be applied in early spring. The second (55kg ha^{-1}) should be applied after the first cut to encourage regrowth for a second cut or fall grazing. No liming is required on these areas, and the salinity detected in Area 04 will not be detrimental to crops normally grown in the Peace River District.

These higher plain areas on the border of the Reserve probably offer the most potential for agriculture. They do not lie in frost pockets like the lower terraces, and as long as they are not too wet or too steep they can be cultivated successfully, as the surrounding farms show. However, because of the shape of the Reserve many of them occur as isolated triangles above the valley. They would not be easy to work efficiently.

Plains, Wet Clay Areas

Wherever the land is flat or depressional the plains are wet. Soils stay wet even through the summer; the cultivation of field crops is impossible. However, some areas have a good cover of native grasses, and have potential for grazing. They have been rated 5w, 5wt, or 6w. In the wettest spots there are bogs with sphagnum mosses and black spruce. These are rated 7w; unusable for agriculture. Tables 2 and 3 show the soil test analyses for one such area (50). They indicate application rates for nitrogen, phosphorus and lime if this area were ever to be cleared and reseeded for improved grasses. However, it would not be worth attempting to improve this land before other land, more suitable for agriculture, had been cultivated.

Table 2 Soil Test Analyses

Soil Area	Lab #	Organic Matter %	pH ($CaCl_2$)	NO_3-N (ug mL^{-1})	P (ug mL^{-1})	K (ug mL^{-1})	Salts (d m^{-1})
Plains, dry clay areas							
04	84/459-2	11.0	6.2	-	32	262	1.32
49	84/459-6	5.4	5.4	1	118	205	0.44
Plains, wet clay areas							
50	84/459-5	5.8	5.0	-	13	218	0.24
Terraces							
10	84/459-3	11.7	5.6	-	14	126	0.32
27	84/459-1	8.7	5.4	-	16	163	0.36
52	84/459-4	9.0	5.0	-	28	111	0.28

Analyses were done by Soil Testing Laboratory, Ministry of Agriculture and Food, Kelowna.

Table 3. Fertilizer Recommendations for Crops (Kg/ha)

	Oats	Barley	Rapeseed (Canola)	Grass-Legumes
Plains, clay, dry				
Soil Area #04				
Nitrogen (N)	60	70	60	80/55
Phosphate (P_2O_5)	30	40	50	40
Potash (K_2O)	0	0	0	0
Lime (t ha^{-1})	0	0	0	0
Soil Area #49				
Nitrogen (N)	60	70	60	80/55
Phosphate (P_2O_5)	0	0	0	0
Potash (K_2O)	0	0	0	0
Lime (t ha^{-1})	0	0	0	0
Plains, clay, wet				
Soil Area #50				
Nitrogen (N)	60	70	60	80/55
Phosphate (P_2O_5)	70	80	90	80
Potash (K_2O)	0	0	0	0
Lime (t ha^{-1})	0	7.5	7.5	7.5
Terraces				
Soil Area #10				
Nitrogen (N)	60	70	60	80/55
Phosphate (P_2O_5)	70	80	90	80
Potash (K_2O)	15	30	40	40
Lime (t ha^{-1})	0	0	0	0
Soil Area #37				
Nitrogen (N)	60	70	60	80/55
Phosphate (P_2O_5)	60	70	80	70
Potash (K_2O)	15	30	40	40
Lime (t ha^{-1})	0	0	0	8.5
Soil Area #52				
Nitrogen (N)	60	70	60	80/55
Phosphate (P_2O_5)	40	50	60	50
Potash (K_2O)	20	30	40	40
Lime (t ha^{-1})	0	8.5	8.5	8.5

Recommendations from Soil Testing Laboratory, Ministry of Agriculture and Food, Kelowna.

Lime application rates are for the pH level recommended for the crop.

Plains, Old Stream Channels

There are three small linear depressions on the plains that were originally stream channels and are still very wet, even in the middle of summer. they offer potential only for grazing, had have been rated 5w, 5tw, 6w, or in one case 7w (no potential).

River Valley Sides

The slopes along the Blueberry River valley are so steep and unstable that they are completely unsuitable to any form of cultivation. However, under the trees there is often a dense cover of native grasses and herbs. Such areas have some potential for grazing and have been rated 6te. Steeper and actively eroding land has been rated 7te. This is all but impossible to graze.

Terraces, Flats

The Agricultural Capability Climate Class of the terraces is 4. They suffer not only the short growing season of this part of the Peace River District, but also are susceptible to additional frost hazard due to cold air drainage. Even soils that are otherwise excellent for agriculture can be rated no higher than class 4. In fact these soils have few other limitations for agriculture. Their topsoils are loamy sand, and their subsoils are invariably sand. Their ability to hold water and nutrients is, therefore, rather limited, and the low ridges that run across them would require some levelling before cultivation. But generally they offer limitations that are no more severe than the overall limitation of climate. Most have therefore been rated as 4ct. Those where the ridges are particularly large have been rated as 5t. However, even though 4ct imples that field crops such as barley or oats could be cultivated, it would probably be better to retain them in their present use, that of native hay production.

Composite samples were taken from three areas (10, 37, and 52) for soil test analyses and fertilizer recommendations. The results are shown in Tables 2 and 3. Although each area is well supplied with organic matter, they have little nitrate nitrogen and little phosphorus. For grass-legumes, applications of nitrogen and phosphate are recommended. Application methods are the same as those for the dry, clay areas of the plains above. The topsoils of each area are moderately acid, and liming is recommended for one (52).

Terraces, Old Stream Channels

On some terraces there are inundated depressions that were old stream channels. They contain either marshy vegetation or open water. They have no potential for agriculture and have been rated 7w.

RESIDENTAL SUITABILITY

By Martin Kobayakawa and Jeremy Joyce.

There were three steps to assessing residential suitability; collecting information about the soil in the field, interpreting this information for specific types of development, and determining an overall rating for residential suitability. Specific and overall ratings are shown on the map of "Development Suitability" that accompanies this report. The following paragraphs explain how these ratings were made.

Collecting Field Information

This was done by the Agriculture Canada soil survey crew. Residential Suitability was determined for the same Soil Areas, using the same information about each area (Appendix 1), as were used to assess Agricultural Capability.

Interpretations for Specific types of Development

Suitability for the following types of development was assessed for each Soil Area:

buildings with basements
local roads
septic tank fields
sand and/or gravel extraction.

Development suitability was determined by evaluating a number of critical factors for each type of development as shown in Tables 4, 5 and 6. Table 7 gives the critical factors for frost action and shrink swell, which are additional limitations to the construction of buildings with basements and local roads.

Three classes of ratings were derived systematically as shown in Figure 2. They are defined as follows:

Good	Site characteristics which are generally favorable for the rated use, with limitations that are minor and easily overcome;
Moderate	Site characteristics that are unfavorable, but that can be overcome or modified by special planning and design;
Poor	Site characteristics that are so unfavourable, and so difficult to overcome, that they require major soil reclamation and/or special designs.

Determinating the Overall Suitability Rating

This rating combines the three assessments for buildings with basements, local roads, and septic tanks. A Soil Area is rated GOOD if all the specific ratings are GOOD. It is rated as MODERATE if one or more of the specific ratings is MODERATE, and POOR if any one of the specific ratings is POOR.

Table 4: Limiting Factors for Constructing Buildings with Basements and Local Roads

Limiting Factors	Rating Classes and Criteria		
	Good	Moderate	Poor
Slope	0-10%	11-20%	≫ 20%
Soil Texture	Sand to Sandy Loam	Fine Sandy Loam to Sandy Clay Loam	Clay Loam, Clay and Organic
Soil Coarse Fragments	0-29%	30-59%	60-99%
Soil Coarse Fragments, larger than 2.5 cm dia.	0-19%	20-39%	40-99%
Drainage Class	Rapid	Well to Moderately Well	Imperfect to Very Poor
Permeability Class	Rapid	Moderate	Slow to Very Slow
Excess Water	None to Occasional	Occasional minor damage to frequent	Frequent (perennial) to Submerged
Flooding	None	-	Occasional to Flooded
Erosion Class	None	Slight to Moderate	Severe to Eroded

References: Maynard (1979), and TERA Environmental Consultants Ltd., and T.M. Thomson and Associates Ltd. (1984).

Table 5: Limiting Factors for Septic Tank Effluent Absorption

Limiting Factors	Rating Classes and Criteria		
	Good	Moderate	Poor
Slope	0-10%	11-15%	> 15%
Soil Texture	Sandy Loam to Silt Loam	Loamy Sand to Silty Clay Loam	Sand; Clay and Organic
Soil Coarse Fragments	0-19%	20-49%	50-99%
Soil Coarse Fragments, larger than 2.5 cm dia.	0-9%	10-19%	20-99%
Drainage Class	Well	Moderately well or rapid	Imperfect, Poor to Very Poor
Excess Water	None to Occasional	Occasional Minor to Frequent	Frequent (perennial) to Submerged
Flooding	None	None	Occasional to Flooded
Erosion Class	None	Slight	Moderate to Eroded
Moisture Regime	-	Subaquic to Peraquic	Subaquic to Peraquic
Shallowest Depth of Ground Water during year	> 99 cm	> 99 cm	< 100 cm
Structure	Granular, sub angular blocky	Blocky, platy or Prismatic	Massive or Structurelss

References: Epp (1984).

Table 6: Suitability for Sand and/or Gravel Extraction

Soil Characteristics	Rating Classes and Criteria		
	Good	Moderate	Poor
Texture	Sand to Loamy Sand	Sandy Loam to Fine Sandy Loam	Loam, Clay Loam, Clay and Organic
Coarse Fragments	60-99%	30-59%	0-29%
Coarse Fragments larger than 2.5 cm dia.	20-99%	10-19%	0-9%
Coarse Fragments larger than 7.5 cm dia.	20-99%	10-19%	0-9%

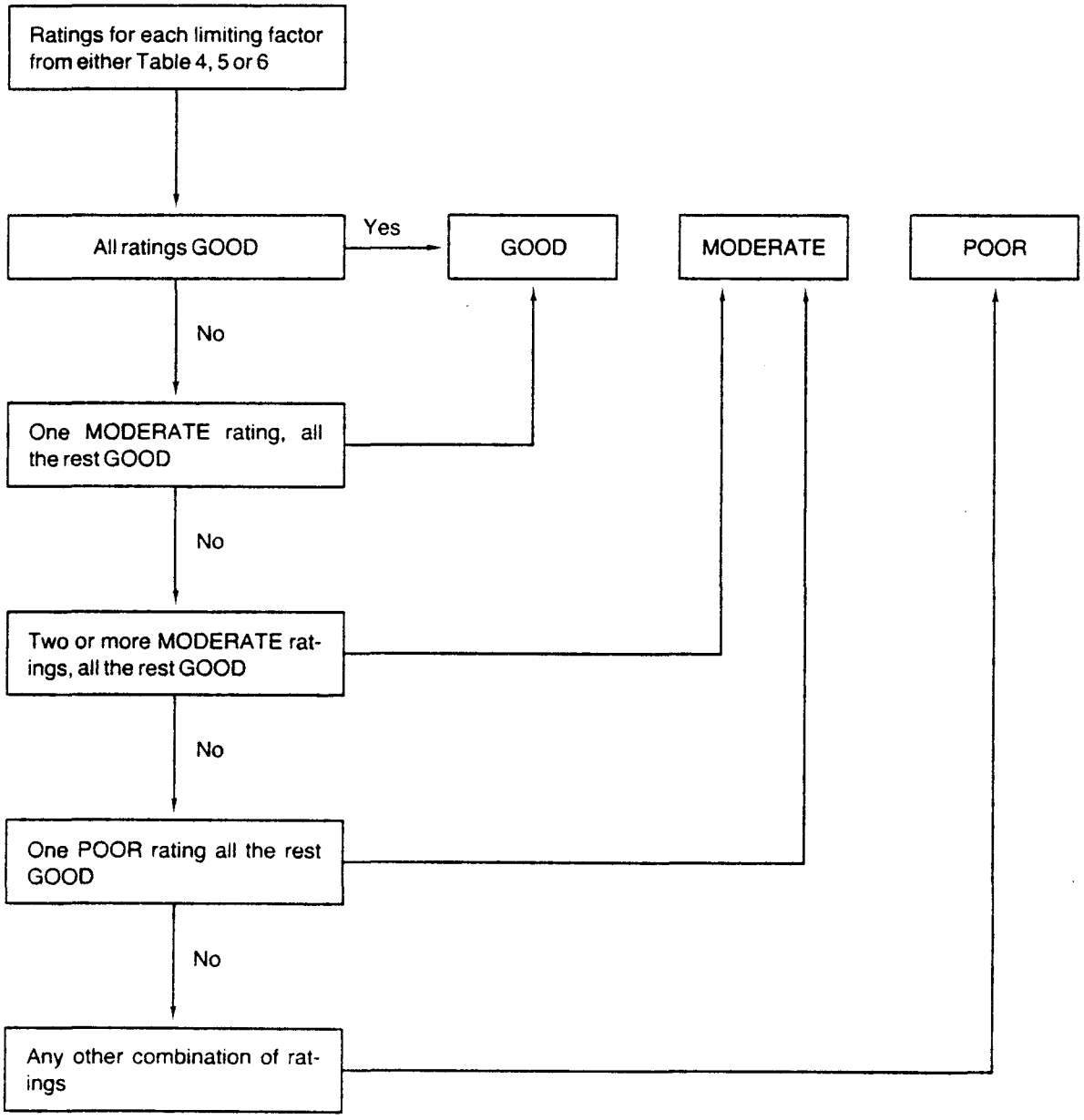
Reference: Maynard (1979).

Table 7: Limiting Criteria for Classes of Frost Action and Shrink-Swell

FROST ACTION		Texture		
		Silt Loam, Silty Clay, Clay Loam	Clay, Fine Sandy Loam, Loam	Sand, Loamy Sand, Sandy Loam, Organic
Moisture Regime	Semiarid to Perhumid	Moderate	Low	Low
	Subaquic to Peraquic	High	Moderate	Moderate

SHRINK SWELL		Texture		
		Silt Loam, Silty Clay, Clay Loam	Clay, Fine Sandy Loam, Loam	Sand, Loamy Sand, Sandy Loam, Organic
Moisture Regime	Semiarid to Perhumid	Low	Low	High
	Subaquic to Peraquic	High	Moderate	High

Figure 2. Derivation of ratings for buildings with basements, local roads, or septic tank fields.



Note: Some Soil Areas contain two contrasting soils. In this case each soil was rated separately. If the two ratings differed, the whole Soil Area was rated as follows:

A GOOD rating with a MODERATE or POOR rating = MODERATE

A MODERATE rating with a POOR rating = POOR

REFERENCES

Canada Land Inventory. 1965. Soil Capability Classification for Agriculture. Rept. No. 2, Dept. Environment, Ottawa, 16pp.

Day, J.H. (ed). 1983. The CanSIS Soil Information System; Manual for describing soils in the field. Expert Committee on Soil Survey, Agriculture Canada, Ottawa.

Epp, P.F. 1984. Soil Constraints for Septic Tank Effluent Absorption. Min. Environment, Kelowna, B.C., 90pp.

Farstad, L., Lord, T.M., Green, A.J., and Hortie, H.J. 1965. Soil Survey of the Peace River Area in British Columbia. B.C. Soil Survey Rept. No. 8, Univ. British Columbia, B.C. Dept. of Agric. and Canada Dept. of Agric.

Kenk, E. 1983. Land Capability Classification for Agriculture in British Columbia. MOE, Manual 1, Ministries of Environment and Agriculture and Food, Kelowna, B.C., 62pp.

Krajina, V.J. 1969. Ecology of Forest Trees in British Columbia. Ecology of Western North America, 2(1), 1-146.

Lord, T.M., and Green, A.J. 1985. Soils of the Fort St John-Dawson Creek Area, British Columbia. B.C. Soil Survey, Rept. No. 42, Agriculture Canada, Ottawa.

Mapping System Working Group. 1981. A Soil Mapping System for Canada: Revised. Land Resource Research Institute, Contribution No. 142, Agriculture Canada, Ottawa, 94 pp.

Maynard, D. 1979. Terrain Capability for Residential Settlements, R.A.B. Working Rept., B.C. Min. Environment, Victoria, B.C., 152pp.

Rowe, J.S. 1959. Forest Regions of Canada. Dept. of Northern Affairs and National Resources, Forestry Branch, Ottawa, Bull. 123, 71pp.

TERA Environmental Consultants (B.C.) Ltd. and T.M. Thomson and Associates Ltd. 1984. Salteau Reserve Capability Mapping Study. I.N.A.C., Fort St. John, B.C., 32pp and 2 Appendices.

Walmsley, M., Utzig, G., Vold, T., Moon, D., and van Barnevald, J. 1980. Describing Ecosystems in the Field. RAB Technical Paper No. 2 and Land Management Rept. No. 7, Ministries of Environment and Forests, Victoria, B.C.

APPENDIX 1 DESCRIPTION OF SOIL AREAS

The characteristics of each soil area are described here. Part 1 is a Key. It defines all the characteristics briefly, then lists classes of them with numbers that signify each class. Part 2 lists all Soil Areas and describes them by numbers to signify the class of each characteristic. Thus in Part 2, for Soil Area 03, the key number for the flattest slope is 1 and the key number for the texture of the upper 50 cm of soil is 8. The Key in Part 1 shows that 1 means that the flattest slope is less than 2%, and 8 means that the texture of the upper 50 cm is clay loam.

The first three lines of each Soil Area description show how many times the area was inspected, and, if there were two types of soil, what their proportions were (in tenths). The Areas with two types of soil have two columns of numbers. The first, headed "1", describes the more common soil. The second, headed "2", describes the less common soil.

Further definitions of terms such as moisture regime and drainage class, or what is meant by frequent flooding or severe erosion may be found in the publications of Kenk (1983), Walmsley et al (1980) or Day (1983).

PART 1: KEY TO CLASSES OF SOIL AND LAND CHARACTERISTICS

Characteristic and Definition	Key #	Class Description
1 Slope The steepest or flattest slope in %	1	<3
	2	3-5
	3	6-10
	4	11-15
	5	16-20
	6	21-30
	7	>30
2 Soil Texture	1	Sand
	2	Loamy sand
	3	Sandy loam
	4	Fine sandy loam
	5	Loam
	6	Silt loam
	7	Silty clay loam
	8	Clay Loam
	9	Clay
	0	Organic
3 Total Coarse Fragments Mineral particles larger than 2 mm in diameter (%)	0	0-9
	1	10-19
	2	20-29
	3	30-39
	4	40-49
	5	50-59
	6	60-69
	7	70-79
	8	80-89
	9	90-100
4 Stones Mineral soil particles larger than 2.5 cm in diameter (%)	Same numbers and class descriptions as Total Coarse Fragments	
5 Cobbles Mineral soil particles larger than 7.5 cm in diameter (%)	Same numbers and class descriptions as Total Coarse Fragments	
6 Structure Shape and size of stable soil aggregates	1	Structure-less
	2	Blocky
	3	Platy
	4	Prismatic
7 Fertility General fertility estimated from nutrient content, pH, carbonates, or toxic compounds (other than salts)	1	Fertile
	2	Minor problems
	3	Moderate
	4	Major problmes
	5	Severe problems (improveable)
	6	Severe problems (unimproveable)
	7	Infertile
8 Moisture Regime Soil moisture content and seasonal variation	1	Semiarid
	2	Subhumid
	3	Humid
	4	Perhumid
	5	Subaquic
	6	aquic
	7	Peraquic
9 Drainage Class Rate at which water is removed from the soil, and the seasonal variation in water content	1	Rapidly
	2	Well
	3	Moderately well
	4	Imperfectly
	5	Poorly
	6	Very poorly
10 Permeability Class Rate at which water can move through the soil	1	Rapid
	2	Moderate
	3	Slow
	4	Very slow
11 Depth of Groundwater Depth when closest to the surface	1	Deeper than 99 cm
	2	Shallower than 100 cm

Characteristic and Definition	Key #	Class Description
12 Excess Soil Water High watertables, seepage or runoff that cause crop damage	1	None
	2	Occasional
	3	Occasional, minor damage
	4	Frequent
	5	Frequent, forage only
	6	Continuous
	7	Submerged
13 Root Restriction Depth in cm of any layer that restricts roots; hardpan, rock, watertable etc.	1	deeper than 75
	2	75-50
	3	49-25
	4	shallower than 25
14 Soil Erosion Damage from past erosion that limits agriculture	1	None
	2	Slight
	3	Moderate
	4	Severe
	5	Very Severe
	6	Extremely severe
	7	Eroded
15 Stream Flooding Inundation caused by overbank flow from streams or lakes	1	None
	2	Occasional
	3	Frequent
	4	Frequent, flooded
	5	Frequent, extended
	6	Extended
	7	Flooded
16 Organic Soil Depth Depth in cm to underlying rock or mineral soil	1	Deeper than 180
	2	150-180
	3	120-149
	4	Shallower than 120
17 Organic Soil Decomposition Degree to which plant tissue has broken down	1	Mesic
	2	Mesic and mineral
	3	Humic or Fibric
	4	Aquatic muck

PART 2. CHARACTERISTICS OF EACH SOIL AREA

SOIL AREA NUMBER	01		02		03		04		05		06		07	
Times Area inspected	4		6		1		2		4		3		7	
Major soil (1), Minor soil (2)	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Proportions (tenths)	7	3	8	2			8	2	6	4			7	3
CHARACTERISTICS														
Slope, flattest	7	6	1	2	1		1	2	1	2	3		6	1
Slope, steepest	7	6	2	3	2		2	3	1	5	5		7	1
Texture, 0-50 cm	6	6	8	8	8		8	8	0	8	8		8	0
Texture, 50-100 cm	9	9	9	9	9		9	9	9	9	9		9	9
Total Coarse Fragments, 0-50 cm	0	0	0	0	0		0	0	0	0	0		0	0
Total Coarse Fragments, 50-100 cm	0	0	0	0	0		0	0	0	0	0		0	0
Stones, 0-50 cm	0	0	0	0	0		0	0	0	0	0		0	0
Cobbles, 0-50 cm	0	0	0	0	0		0	0	0	0	0		0	0
Structure	2	2	2	2	2		2	2	1	2	2		2	1
Fertility	3	3	3	3	3		3	3	3	3	3		3	3
Moisture Regime	3	3	3	4	3		3	4	7	4	4		3	6
Drainage Class	2	2	3	4	3		3	4	6	4	4		2	6
Permeability	3	3	3	4	3		3	4	3	3	3		3	3
Depth to Groundwater	1	1	1	2	1		1	2	2	1	1		1	2
Excess Soil Water	1	1	4	5	4		4	5	6	3	4		1	7
Root Restriction	1	1	1	3	1		1	3	5	3	3		3	5
Soil Erosion	7	1	1	1	1		1	1	1	1	1		1	1
Stream Flooding	1	1	1	1	1		1	1	1	1	1		1	1
Organic Soil Depth	-	-	-	-	-		-	-	4	-	-		-	4
Organic Soil Decomposition	-	-	-	-	-		-	-	3	-	-		-	2

SOIL AREA NUMBER	08	09	10	11	12	13	14
Times Area inspected	3	2	5	1	2	0	3
Major soil (1), Minor soil (2)	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Proportions (tenths)					7 3	8 2	
CHARACTERISTICS							
Slope, flattest	3	1	1	1	7 6	1 1	5
Slope, steepest	5	2	3	3	7 6	3 1	6
Texture, 0-50 cm	8	8	3	3	6 6	2 0	7
Texture, 50-100 cm	9	9	1	1	9 9	1 9	9
Total Coarse Fragments, 0-50 cm	0	0	0	0	0 0	0 0	0
Total Coarse Fragments, 50-100 cm	0	0	0	0	0 0	0 0	0
Stones, 0-50 cm	0	0	0	0	0 0	0 0	0
Cobbles, 0-50 cm	0	0	0	0	0 0	0 0	0
Structure	2	2	1	1	2 2	2 1	2
Fertility	3	3	2	2	3 3	2 3	3
Moisture Regime	4	3	2	2	3 3	3 6	3
Drainage Class	4	3	2	2	2 2	2 6	3
Permeability	3	3	1	1	3 3	1 3	3
Depth to Groundwater	1	1	1	1	1 1	1 2	1
Excess Soil Water	4	4	1	1	1 1	1 6	1
Root Restriction	3	1	3	3	1 1	2 5	1
Soil Erosion	1	1	1	1	7 1	1 1	5
Stream Flooding	1	1	1	1	1 1	1 1	1
Organic Soil Depth	-	-	-	-	- -	- -	-
Organic Soil Decomposition	-	-	-	-	- -	- -	-

SOIL AREA NUMBER	15		16		17		18		19		20		21	
Times Area inspected	3		5		3		6		3		2		2	
Major soil (1), Minor soil (2)	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Proportions (tenths)					7	3	7	3			8	2		
CHARACTERISTICS														
Slope, flattest	1		1		1	1	7	6	1		1	1	3	
Slope, steepest	3		3		1	1	7	6	2		1	2	3	
Texture, 0-50 cm	3		2		0	0	6	6	8		8	0	8	
Texture, 50-100 cm	1		1		0	9	9	9	9		9	0	9	
Total Coarse Fragments, 0-50 cm	0		0		0	0	0	0	0		0	0	0	
Total Coarse Fragments, 50-100 cm	0		0		0	0	0	0	0		0	0	0	
Stones, 0-50 cm	0		0		0	0	0	0	0		0	0	0	
Cobbles, 0-50 cm	0		0		0	0	0	0	0		0	0	0	
Structure	2		2		1	2	2	2	2		2	1	2	
Fertility	2		2		4	3	3	3	3		3	3	3	
Moisture Regime	3		3		7	6	3	3	5		5	7	3	
Drainage Class	2		2		6	6	2	2	5		5	6	3	
Permeability	1		1		3	3	3	3	4		4	4	3	
Depth to Groundwater	1		1		2	2	1	1	2		2	2	1	
Excess Soil Water	1		1		6	6	1	1	5		5	7	4	
Root Restriction	2		2		5	5	1	1	4		4	5	4	
Soil Erosion	1		1		1	1	7	1	1		1	1	1	
Stream Flooding	1		1		1	1	1	1	1		1	1	1	
Organic Soil Depth	-		-		2	-	-	-	-		-	-	-	
Organic Soil Decomposition	-		-		1	-	-	-	-		-	-	-	

SOIL AREA NUMBER	22		23		24		25		26		27		28	
Times Area inspected	1		0		6		3		0		0		0	
Major soil (1), Minor soil (2)	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Proportions (tenths)														
CHARACTERISTICS														
Slope, flattest	3		1		1		1		1		1		1	
Slope, steepest	5		3		3		3		3		3		2	
Texture, 0-50 cm	8		2		2		2		2		2		8	
Texture, 50-100 cm	9		1		1		1		1		1		9	
Total Coarse Fragments, 0-50 cm	0		0		0		0		0		0		0	
Total Coarse Fragments, 50-100 cm	0		0		0		0		0		0		0	
Stones, 0-50 cm	0		0		0		0		0		0		0	
Cobbles, 0-50 cm	0		0		0		0		0		0		0	
Structure	2		2		2		2		2		2		2	
Fertility	3		2		2		2		2		2		3	
Moisture Regime	4		3		3		3		3		3		5	
Drainage Class	4		2		2		2		2		2		5	
Permeability	3		1		1		1		1		1		4	
Depth to Groundwater	1		1		1		1		1		1		2	
Excess Soil Water	4		1		1		1		1		1		5	
Root Restriction	3		2		2		2		2		2		4	
Soil Erosion	1		1		1		1		1		1		1	
Stream Flooding	1		1		1		1		1		1		1	
Organic Soil Depth	-		-		-		-		-		-		-	
Organic Soil Decomposition	-		-		-		-		-		-		-	

SOIL AREA NUMBER	29	30	31	32	33	34	35
Times Area inspected	4	2	0	0	0	0	8
Major soil (1), Minor soil (2)	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Proportions (tenths)				7 3	7 3	7 3	
CHARACTERISTICS							
Slope, flattest	2	1	1	3 2	3 2	3 2	1
Slope, steepest	5	1	1	5 3	5 3	5 3	2
Texture, 0-50 cm	6	0	0	8 8	8 8	8 8	3
Texture, 50-100 cm	1	0	0	9 9	9 9	9 9	1
Total Coarse Fragments, 0-50 cm	0	0	0	0 0	0 0	0 0	0
Total Coarse Fragments, 50-100 cm	0	0	0	0 0	0 0	0 0	0
Stones, 0-50 cm	0	0	0	0 0	0 0	0 0	0
Cobbles, 0-50 cm	0	0	0	0 0	0 0	0 0	0
Structure	1	1	1	2 2	2 2	2 2	1
Fertility	2	4	4	3 3	3 3	3 3	2
Moisture Regime	3	7	7	4 5	4 5	4 5	3
Drainage Class	2	6	6	4 5	4 5	4 5	2
Permeability	2	2	2	3 3	3 3	3 3	1
Depth to Groundwater	1	2	2	2 2	2 2	2 2	1
Excess Soil Water	1	7	7	4 6	4 6	4 6	1
Root Restriction	1	5	5	3 4	3 4	3 4	1
Soil Erosion	1	1	1	1 1	1 1	1 1	1
Stream Flooding	1	1	1	1 1	1 1	1 1	1
Organic Soil Depth	-	2	2	- -	- -	- -	-
Organic Soil Decomposition	-	1	1	- -	- -	- -	-

SOIL AREA NUMBER	36		37		38		39		40		41		42	
Times Area inspected	0		5		0		5		0		1		5	
Major soil (1), Minor soil (2)	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Proportions (tenths)											8	2		
CHARACTERISTICS														
Slope, flattest	1		2		2		1		2		3		2	
Slope, steepest	2		3		3		2		3		4		3	
Texture, 0-50 cm	3		2		3		8		2		3		3	
Texture, 50-100 cm	1		1		1		9		1		1		2	
Total Coarse Fragments, 0-50 cm	0		0		0		0		0		0		0	
Total Coarse Fragments, 50-100 cm	0		0		0		0		0		0		0	
Stones, 0-50 cm	0		0		0		0		0		0		0	
Cobbles, 0-50 cm	0		0		0		0		0		0		0	
Structure	1		1		1		2		1		1		1	
Fertility	2		2		2		3		2		2		2	
Moisture Regime	3		2		2		4		2		3		3	
Drainage Class	2		1		1		3		1		2		2	
Permeability	1		1		1		3		1		1		2	
Depth to Groundwater	1		1		1		2		1		1		1	
Excess Soil Water	1		1		1		4		1		1		1	
Root Restriction	1		1		1		3		1		1		1	
Soil Erosion	1		1		1		1		1		1		1	
Stream Flooding	1		1		1		1		1		1		1	
Organic Soil Depth	-		-		-		-		-		-		-	
Organic Soil Decomposition	-		-		-		-		-		-		-	

SOIL AREA NUMBER	43		44		45		46		47		48		49	
Times Area inspected	0		1		6		5		0		5		4	
Major soil (1), Minor soil (2)	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Proportions (tenths)					6	4								
CHARACTERISTICS														
Slope, flattest	2		1		6	7	1		1		1		1	
Slope, steepest	3		4		7	7	1		1		3		2	
Texture, 0-50 cm	3		8		8	8	0		0		3		8	
Texture, 50-100 cm	2		9		9	9	0		0		2		9	
Total Coarse Fragments, 0-50 cm	0		0		0	0	0		0		0		0	
Total Coarse Fragments, 50-100 cm	0		0		0	0	0		0		0		0	
Stones, 0-50 cm	0		0		0	0	0		0		0		0	
Cobbles, 0-50 cm	0		0		0	0	0		0		0		0	
Structure	1		2		2	2	1		1		1		2	
Fertility	2		3		3	3	4		4		2		3	
Moisture Regime	3		3		3	3	7		7		3		4	
Drainage Class	2		3		4	3	6		6		2		4	
Permeability	2		2		3	3	2		2		2		4	
Depth to Groundwater	1		2		1	1	2		2		1		2	
Excess Soil Water	1		3		2	1	7		7		1		4	
Root Restriction	1		1		1	1	5		5		1		3	
Soil Erosion	1		1		6	7	1		1		1		1	
Stream Flooding	1		1		1	1	1		1		1		1	
Organic Soil Depth	-		-		-	-	2		2		-		-	
Organic Soil Decomposition	-		-		-	-	1		1		-		-	

SOIL AREA NUMBER	50		51		52		53		54		55		56	
Times Area inspected	4		2		4		0		3		0		3	
Major soil (1), Minor soil (2)	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Proportions (tenths)														
CHARACTERISTICS														
Slope, flattest	1		1		2		2		2		1		1	
Slope, steepest	2		2		3		3		1		1		1	
Texture, 0-50 cm	8		8		3		3		8		0		8	
Texture, 50-100 cm	9		9		2		2		9		0		9	
Total Coarse Fragments, 0-50 cm	0		0		0		0		0		0		0	
Total Coarse Fragments, 50-100 cm	0		0		0		0		0		0		0	
Stones, 0-50 cm	0		0		0		0		0		0		0	
Cobbles, 0-50 cm	0		0		0		0		0		0		0	
Structure	2		2		1		1		2		1		2	
Fertility	3		3		2		2		3		4		3	
Moisture Regime	5		3		3		3		5		7		6	
Drainage Class	5		3		2		2		5		6		6	
Permeability	4		2		2		2		4		2		4	
Depth to Groundwater	2		2		1		1		2		2		2	
Excess Soil Water	5		4		1		1		5		7		6	
Root Restriction	5		1		1		1		5		5		5	
Soil Erosion	1		1		1		1		1		1		1	
Stream Flooding	1		1		1		1		1		1		1	
Organic Soil Depth	-		-		-		-		-		2		-	
Organic Soil Decomposition	-		-		-		-		-		1		-	

SOIL AREA NUMBER	59		58		59		60		61		62		63	
Times Area inspected	11		0		0		0		2		2		4	
Major soil (1), Minor soil (2)	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Proportions (tenths)	6	4									6	4	6	4
CHARACTERISTICS														
Slope, flattest	1	1	1		1		1		1		1	1	1	1
Slope, steepest	3	3	1		3		3		3		2	2	2	2
Texture, 0-50 cm	8	8	0		3		3		3		8	8	8	8
Texture, 50-100 cm	9	9	0		1		1		1		9	9	9	9
Total Coarse Fragments, 0-50 cm	0	0	0		0		0		0		0	0	0	0
Total Coarse Fragments, 50-100 cm	0	0	0		0		0		0		0	0	0	0
Stones, 0-50 cm	0	0	0		0		0		0		0	0	0	0
Cobbles, 0-50 cm	0	0	0		0		0		0		0	0	0	0
Structure	2	2	1		1		1		1		2	2	2	2
Fertility	3	3	4		2		2		2		3	3	3	3
Moisture Regime	4	5	7		3		3		3		4	5	4	5
Drainage Class	3	5	6		2		2		2		3	5	3	5
Permeability	3	4	2		1		1		1		3	4	3	4
Depth to Groundwater	2	2	2		1		1		1		2	2	2	2
Excess Soil Water	4	5	7		1		1		1		4	5	4	5
Root Restriction	3	4	5		1		1		1		3	4	3	4
Soil Erosion	1	1	1		1		1		1		1	1	1	1
Stream Flooding	1	1	1		1		1		1		1	1	1	1
Organic Soil Depth	-	-	2		-		-		-		-	-	-	-
Organic Soil Decomposition	-	-	1		-		-		-		-	-	-	-

SOIL AREA NUMBER	64		65		66		67		68		69	
Times Area inspected		3		3		4		5		5		0
Major soil (1), Minor soil (2)	1	2	1	2	1	2	1	2	1	2	1	2
Proportions (tenths)			6	4	6	4	6	4	7	3		
CHARACTERISTICS												
Slope, flattest	1		6	7	1	1	1	1	1	1	1	
Slope, steepest	1		7	7	2	2	2	2	2	2	4	
Texture, 0-50 cm	0		8	8	8	8	8	8	8	8	3	
Texture, 50-100 cm	9		9	9	9	9	9	9	9	9	1	
Total Coarse Fragments, 0-50 cm	0		0	0	0	0	0	0	0	0	0	
Total Coarse Fragments, 50-100 cm	0		0	0	0	0	0	0	0	0	0	
Stones, 0-50 cm	0		0	0	0	0	0	0	0	0	0	
Cobbles, 0-50 cm	0		0	0	0	0	0	0	0	0	0	
Structure	1		2	2	2	2	2	2	2	2	1	
Fertility	3		3	3	3	3	3	3	3	3	2	
Moisture Regime	7		3	3	4	5	4	5	6	7	3	
Drainage Class	6		4	3	3	5	3	5	6	6	2	
Permeability	2		3	3	3	4	3	4	4	4	2	
Depth to Groundwater	2		1	1	2	2	2	2	2	2	1	
Excess Soil Water	7		2	1	4	5	4	5	6	7	1	
Root Restriction	5		1	1	3	4	3	4	4	5	1	
Soil Erosion	1		6	7	1	1	1	1	1	1	1	
Stream Flooding	1		1	1	1	1	1	1	1	1	1	
Organic Soil Depth	-		-	-	-	-	-	-	-	-	-	
Organic Soil Decomposition	-		-	-	-	-	-	-	-	-	-	

SOIL AREA NUMBER	70		71	
Times Area inspected	3		4	
Major soil (1), Minor soil (2) Proportions (tenths)	1	2	1	2
CHARACTERISTICS				
Slope, flattest	1		4	
Slope, steepest	4		2	
Texture, 0-50 cm	3		8	
Texture, 50-100 cm	1		9	
Total Coarse Fragments, 0-50 cm	0		0	
Total Coarse Fragments, 50-100 cm	0		0	
Stones, 0-50 cm	0		0	
Cobbles, 0-50 cm	0		0	
Structure	1		2	
Fertility	2		3	
Moisture Regime	3		4	
Drainage Class	2		3	
Permeability	2		4	
Depth to Groundwater	1		1	
Excess Soil Water	1		4	
Root Restriction	1		3	
Soil Erosion	1		1	
Stream Flooding	1		1	
Organic Soil Depth	-		-	
Organic Soil Decomposition	-		-	