Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Rural Municipality of Lakeview

Information Bulletin 99-35

Soils and Terrain

An introduction
to the land resource

Land Resource Unit
Brandon Research Centre

Canada

Rural Municipality of Lakeview

Information Bulletin 99-35

Prepared by:

Land Resource Unit,
Brandon Research Centre, Research Branch,
Agriculture and Agri-Food Canada.

Department of Soil Science, University of Manitoba.

Manitoba Soil Resource Section,
Soils and Crops Branch, Manitoba Agriculture.

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PREFACE

This is one of a new series of information bulletins for individual rural municipalities of Manitoba. They serve to introduce the newly developed digital soil databases and illustrate several typical derived and interpretive map products for agricultural land use planning applications. The bulletins will also be available in diskette format for each rural municipality.

Information contained in this bulletin may be quoted and utilized with appropriate reference to the originating agencies. The authors and originating agencies assume no responsibility for the misuse, alteration, re-packaging, or re-interpretation of the information.

This information bulletin serves as an introduction to the land resource information available for the municipality. More detailed information, including copies of the primary soil and terrain maps at larger scales, may be obtained by contacting

Land Resource Unit
Room 360 Ellis Bldg, University of Manitoba
Winnipeg, Manitoba R3T 2N2
Phone: 204-474-6118 FAX: 204-474-7633

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Managerial and administrative support was provided by:

R.G. Eilers, Head, Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada.
G.J. Racz, Head, Department of Soil Science, University of Manitoba.

Technical support was provided by:

G.W. Lelyk, and P. Cyr, Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada.
J. Fitzmaurice, and A. Waddell, Department of Soil Science, University of Manitoba.
G.F. Mills, P. Ag, Winnipeg, Manitoba
J. Griffiths, and C. Aglugub, Soil Resource Section, Soils and Crops Branch, Manitoba Agriculture.
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P. Haluschak and G. Podolsky, Soil Resource Section, Soils and Crops Branch, Manitoba Agriculture.

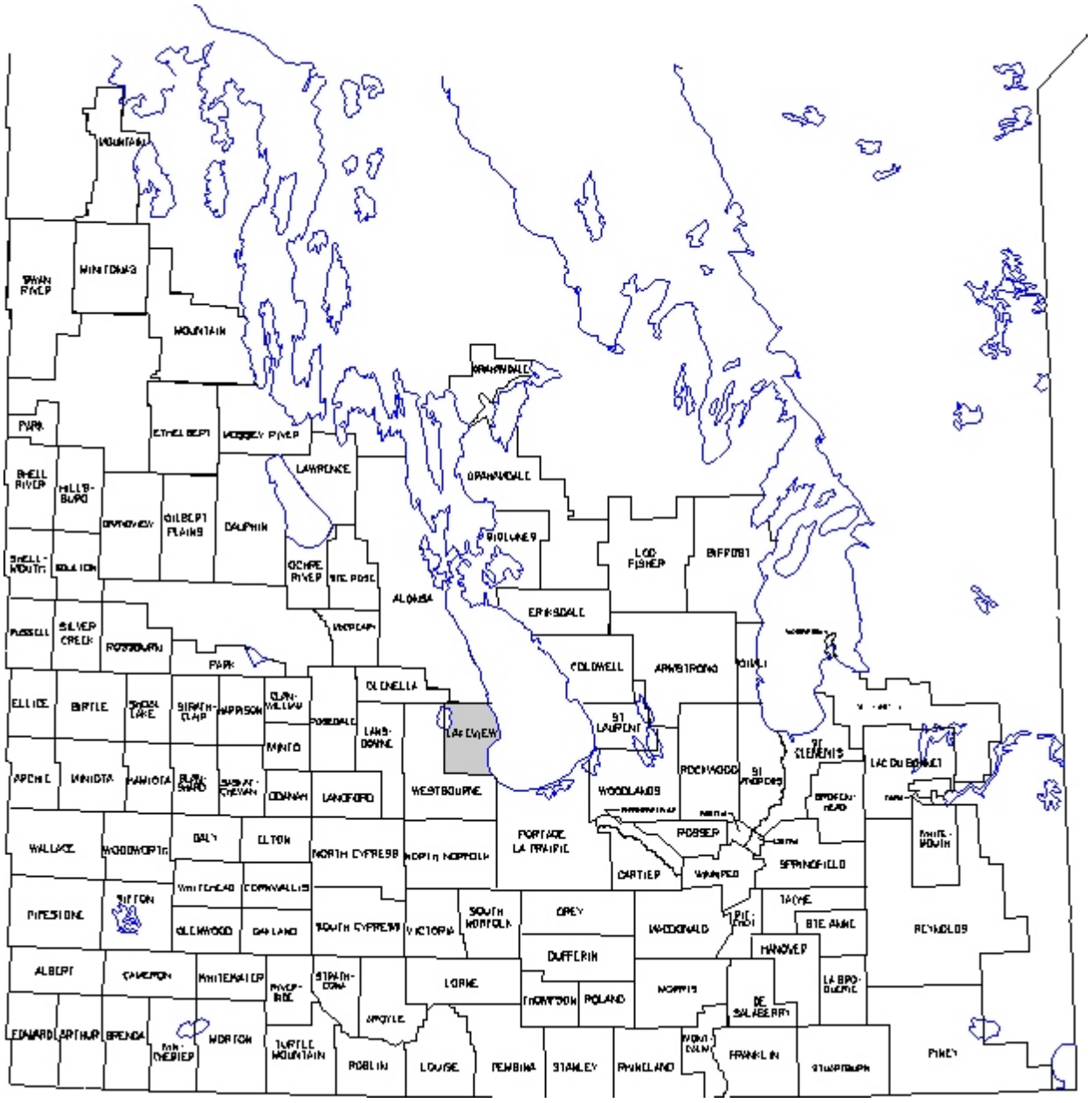


Figure 1. Rural municipalities of southern Manitoba.

INTRODUCTION

The location of the Rural Municipality of Lakeview is shown in Figure 1. A brief overview of the database information, and general environmental conditions for the municipality are presented. A set of maps derived from the data for typical agricultural land use and planning applications are also included.

The soil map and database were compiled and registered using the Geographic Information System (PAMAP GIS) facilities of the Land Resource Unit. These databases were used in the GIS to create the generalized, derived and interpretive maps and statistics in this report. The final maps were compiled and printed using Coreldraw.

This bulletin is available in printed or digital format. The digital bulletin is a Windows based executable file which offers additional display options, including the capability to print any portion of the bulletin.

LAND RESOURCE DATA

The soil and terrain information presented in this bulletin was compiled as part of a larger project to provide a uniform level of land resource information for agricultural and regional planning purposes throughout Agro-Manitoba. This information was compiled and analysed in two distinct layers as shown in Figure 2.

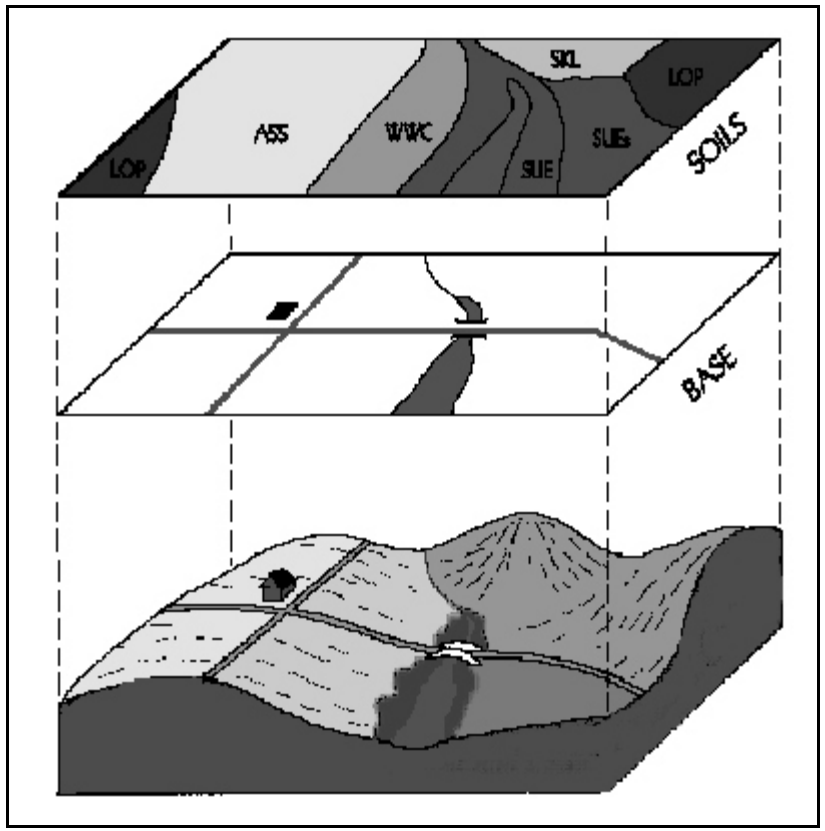


Figure 2. Soil and Base Map data.

Base Layer

Digital base map information includes the municipality and township boundaries, along with major streams, roads and highways. Major rivers and lakes from the base layer were also used as common boundaries for the soil map layer. Water bodies larger than 25 ha in size were digitized as separate polygons.

Soil Layer

The most detailed soil information currently available was selected as the data source for the digital soil layer for each rural municipality.

Comprehensive detailed soil maps (1:20 000 to 1:50 000 scale) have been published for many rural municipalities. Where they were available, the individual soil map sheets were digitized and compiled as a single georeferenced layer to match the digital RM base. Map polygons have one or more soil series components, as well as slope and stoniness classes. Soil database information was produced for each polygon, to meet national standards (MacDonald and Valentine, 1992). Slope length classes were also added.

Older, reconnaissance scale soil maps (1:126 720 scale) represented the only available soil data source for many rural municipalities. These maps were compiled on a **soil association** basis, in which soil landscape patterns were identified with unique surficial geological deposits and textures. Each soil association consists of a range of different soils ("associates") each of which occurs in a repetitive position in the landscape. Modern soil series that best represent the soil association were identified for each soil polygon. The soil and modifier codes provide a link to additional databases of soil properties. In this way, both detailed and reconnaissance soil map polygons were related to soil drainage, surface texture, and other soil properties to produce various interpretive maps. Slope length classes were also added.

SOIL AND TERRAIN OVERVIEW

The Rural Municipality (RM) of Lakeview extends over an area of 62 073 ha (approximately 6.8 townships) along the western shore of Lake Manitoba. It is located in the southern portion of the Westlake district in southern Manitoba (page 3). Langruth is the main population and service centre.

The climate in the area can be related to weather data from Langruth in the centre of the municipality. The mean annual temperature is 2.3˚C and the mean annual precipitation is 532 mm (Environment Canada, 1993). The average frost-free period is 121 days and degree-days above 5˚C accumulated from May to September average 1609 (Ash, 1991). An evaluation of growing conditions in this region of Manitoba can be related to estimates of seasonal moisture deficit and effective growing degree-days (EGDD) above 5˚C. The seasonal moisture deficit calculated between May and September averages about 250 mm. The estimated effective growing degree-days accumulated from May to September range from 1400 in the north to 1500 in the southwest corner (Agronomic Interpretations Working Group, 1995). These parameters provide an indication of moisture and heat energy available for crop growth and are generally adequate to support a wide range of crops adapted to western Canada.

The area adjacent to Lake Manitoba is in the Red River Valley physiographic section of the Manitoba Plain while the remainder of the municipality is in the Westlake Till Plain (Canada-Manitoba Soil Survey, 1980). A narrow, north-south trending gravel beach ridge separates the two areas. Elevation ranges from 263 metres above sea level (m asl) in the southwest corner of the municipality to 213 m on Lake Manitoba. The land surface is level to very gently undulating, sloping gradually to the east at a rate of 1 metre per kilometre (5 ft per mile). Local relief is generally under 3 metres and slopes vary from 2 to 5 percent throughout the central portion of the municipality and less than 2 percent in the lower-lying lands to the east and west (page 9). Surface drainage is poorly developed with many undrained swales and sloughs.. The municipality is characterized by high groundwater levels, particularly in the Big Grass Marsh and near the Lake Manitoba shore. The Big Grass River provides drainage into the Big Grass Marsh, the Whitemud River cuts across the southern portion of the area and a network of ditches assists in removal of surface waters for agricultural purposes in portions of the municipality.

Soil materials in the municipality were deposited during the last glaciation and during the time of glacial Lake Agassiz. The Red River Valley section is characterized by loamy textured lacustrine deposits whereas the Westlake Till Plain consists of gently undulating and ridged deposits of extremely calcareous, waterworked, loamy glacial till (page 11). The central ridged portion is dominantly well to imperfectly drained whereas the level to depressional area throughout the eastern and western portions results in a dominance of imperfectly to poorly drained soils (page 13).

Soils in the municipality have been mapped at a reconnaissance level (1:126 720 scale) and published in the soil survey report for the West-Lake map sheet area (Ehrlich et al.,1958). According to the Canadian System of Soil Classification (Soil Classification Working Group, 1998), Black Chernozemic soils of the Isafold association are dominant in well to imperfectly drained sites on stony loam textured glacial till while Humic Gleysol soils, often with thin peaty surface layers occur in poorly drained sites. Imperfectly drained Black Chernozem and poorly drained Humic Gleysol soils of the Lakeland association occur on loamy textured lacustrine deposits. Shallow to deep organic soils developed on fen peat occupy level to depressional areas adjacent to the Lake Manitoba shore and in the Big Grass Marsh in the western part of the municipality.

Major management considerations are related to wetness and organic soil materials (page 15). Seasonal high water tables (at 1 to 2 metres) and saturated soils are common. Surface water ponds in poorly drained depressional areas and organic terrain throughout the area. Moderately to excessively stony conditions are associated with the till soils and beach deposits throughout the area. Imperfectly drained sandy loam surface soils are subject to periodic droughtiness

and potential wind erosion. Soils throughout the municipality are non-saline.

Nearly nine percent of the soils are rated in **Class 2** for agricultural capability and 2 percent are in **Class 3** due to soil structure, stoniness and wetness. Nearly 7 percent of the soils are placed in **Class 5**, primarily due to wetness, and 2.3 percent are rated in **Class 6** due to excess wetness. Organic soils which have very limited capability for agriculture in their native state cover 5.2 percent of the area (page 17). The irrigation suitability of the soils is dominantly **Fair** (62 percent) and **Poor** (22 percent) while the area of organic soils (10 percent) is not rated for irrigation (page 19).

One of the issues currently receiving considerable attention is the sustainability of agricultural practices and their potential impact on the soil and groundwater environment. To assist in highlighting this concern to land planners and agricultural producers, an assessment of potential environmental impact (EI) under irrigation is shown on page 21. The potential for adverse impact is dominantly **Low** on the loamy textured glacial till with low permeability, to **Minimal** on clay loam textured lacustrine deposits. **Moderate** potential impacts occur on the sandy loam lacustrine deposits, while the sand & gravel glacio-fluvial deposits have a **High** potential impact. This EI map is intended to be used in association with the irrigation suitability map.

Another issue of concern to producers, soil conservationists and land use specialists is soil erosion caused by agricultural cropping and tillage practices. Areas with potential for water erosion are shown on page 23. About 80 percent of the land in the municipality is at a **Negligible** risk of degradation due to water erosion. However, areas of loamy lacustrine soils are estimated to have **Moderate** risk and local areas of sandy loam surface soils are rated as a **High** risk and also have a greater risk of erosion by wind. Current management practices focus on maintaining adequate crop residues to provide sufficient surface cover to adequately protect the soils from both wind and water erosion.

The dominant land use in the RM of Lakeview is agriculture consisting mainly of annual crop production and ranching and feedlot operations for raising cattle. An assessment of the status of land use in 1994, obtained through an analysis of satellite imagery, showed annual crop production taking place on 23 percent of the land base, (mainly on the stone-free lacustrine soils located between the stonier till soils in the central part of the area and Lake Manitoba to the east). Production of forage crops occurs on 2 percent of the land while grasslands cover 52 percent and trees cover 7 percent. The grassland and treed areas provide forage and grazing capacity as well as wildlife habitat. Wetlands occupying about 10 percent of the area (much of which consists of shallow organic soils) also provide wildlife habitat. Various non-agricultural uses such as infrastructure for urban areas, transportation and recreation occupy about 2 percent of the municipality (page 25).

The majority of soils in the RM of Lakeview have moderate to moderately severe limitations for arable agriculture. However, loamy textured soils require management practices which maintain adequate surface drainage, soil structure and tilth and require protection against wind erosion. This includes leaving adequate crop residues on the surface during the early spring period, provision of shelter belts and use of minimum tillage practices and crop rotations which include forages. The till soils require periodic stone clearing if cultivated on an annual basis. Extensive areas adjacent to Lake Manitoba and near the Big Grass Marsh have low relief and high water tables. These soils are frequently saturated and subject to surface ponding, particularly during spring runoff or following heavy rains. In addition, the subdued ridge and swale topography associated with the till soils in the central part of the municipality impedes drainage improvement. Where the land pattern permits, improvement and maintenance of water management infrastructure is required to reduce surface ponding while maintaining adequate soil moisture for crop growth.

DERIVED AND INTERPRETIVE MAPS

A large variety of computer derived and interpretive maps can be generated from the digital soil and landscape databases. These maps are based on selected combinations of database values and assumptions.

Derived maps show information that is given in one or more columns in the computer map legend (such as soil drainage or slope class).

Interpretive maps portray more complex land evaluations based on a combination of soil and landscape information. Interpretations are based on soil and landscape conditions in each polygon. Interpretative maps typically show land capabilities, suitabilities, or risks related to sustainability.

Several examples of derived and interpretive maps are included in this information bulletin:

Derived Maps
Slope
Generalized Soil
Drainage
Management Considerations

Interpretative Maps
Agricultural Capability
Irrigation Suitability
Potential Environmental Impact
Water Erosion Risk
Land Use

The maps have all been reduced in size and generalized (simplified) in order to portray conditions for an entire rural municipality on one page. These generalized maps provide a useful overview of conditions within a municipality, but are not intended to apply to site specific land parcels. On-site evaluations are recommended for localized site specific land use suitability requirements.

Digital databases derived from recent detailed soil inventories contain additional detailed information about significant inclusions of differing soil and slope conditions in each map polygon. This information can be portrayed at larger map scale than shown in this bulletin.

Information concerning particular interpretive maps, and the primary soil and terrain map data, can be obtained by contacting the Manitoba Soil Resource Section of Manitoba Agriculture, the local PFRA office, or the Land Resource Unit.

Slope Map.

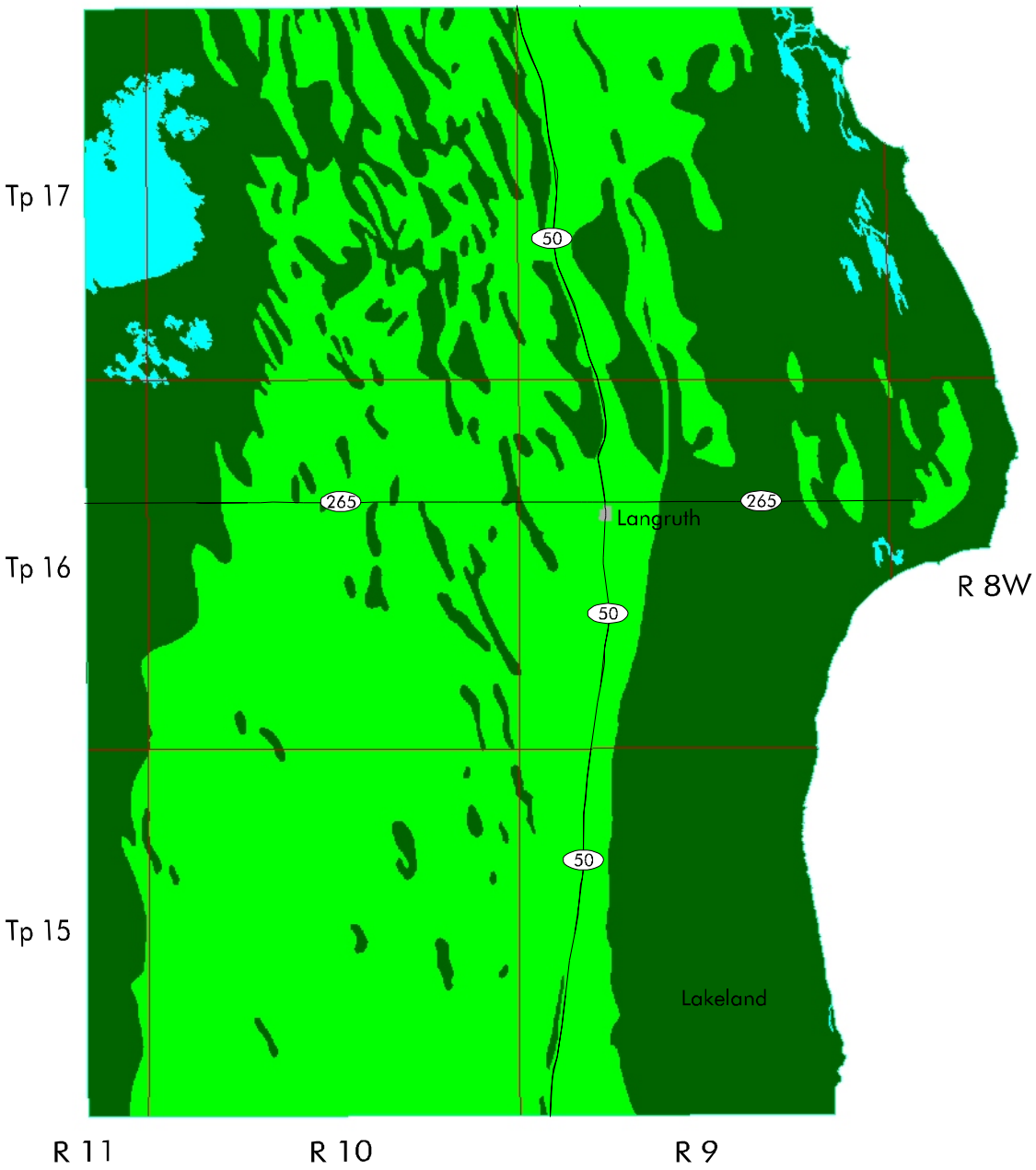
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil and terrain layer database. Specific colours are used to indicate the dominant slope class for each polygon in the RM. Additional slope classes may occur in each polygon area, but cannot be portrayed at this reduced map scale.

Table 1. Slope Classes[1]

Slope Class	Area (ha)	Percent of RM
0 - 2 %	29805	47.5
2 - 5 %	31222	49.8
5 - 9 %	0	0.0
9 - 15 %	0	0.0
15 - 30 %	0	0.0
> 30 %	0	0.0
Unclassified	13	0.0
Water	1662	2.7
Total	62702	100.0

[1] Area has been assigned to the dominant slope in each soil polygon.

Slope Map



Slope Classes

- 0 - 2 %
- 2 - 5 %
- 5 - 9 %
- 9 - 15 %
- 15 - 30 %
- > 30 %
- Water
- Unclassified

Scale

0 1 2 3 4 5 6 7 8

(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Brandon Research Centre
February 2000

Generalized Soil Map.

The most recently available soil maps were digitized to produce the new digital soil map. For older reconnaissance soil maps, areas of overprinted symbols or significant differences in topography have been delineated as new polygons. All soil polygons have been digitized and translated into modern soil series equivalents.

The general soil groups provide a very simplified overview of the soil information contained in the digital soil map. The hundreds of individual soil polygons have been simplified into broad groups of soils with similar parent material origins, textures, and drainage classes. The dominant soil in each polygon determines the soil group, area, and colour for the generalized soil map. Gleysolic soils groups have poor to very poor drainage, while other mineral soil groups typically have a range of rapid, well, or imperfectly drained soils.

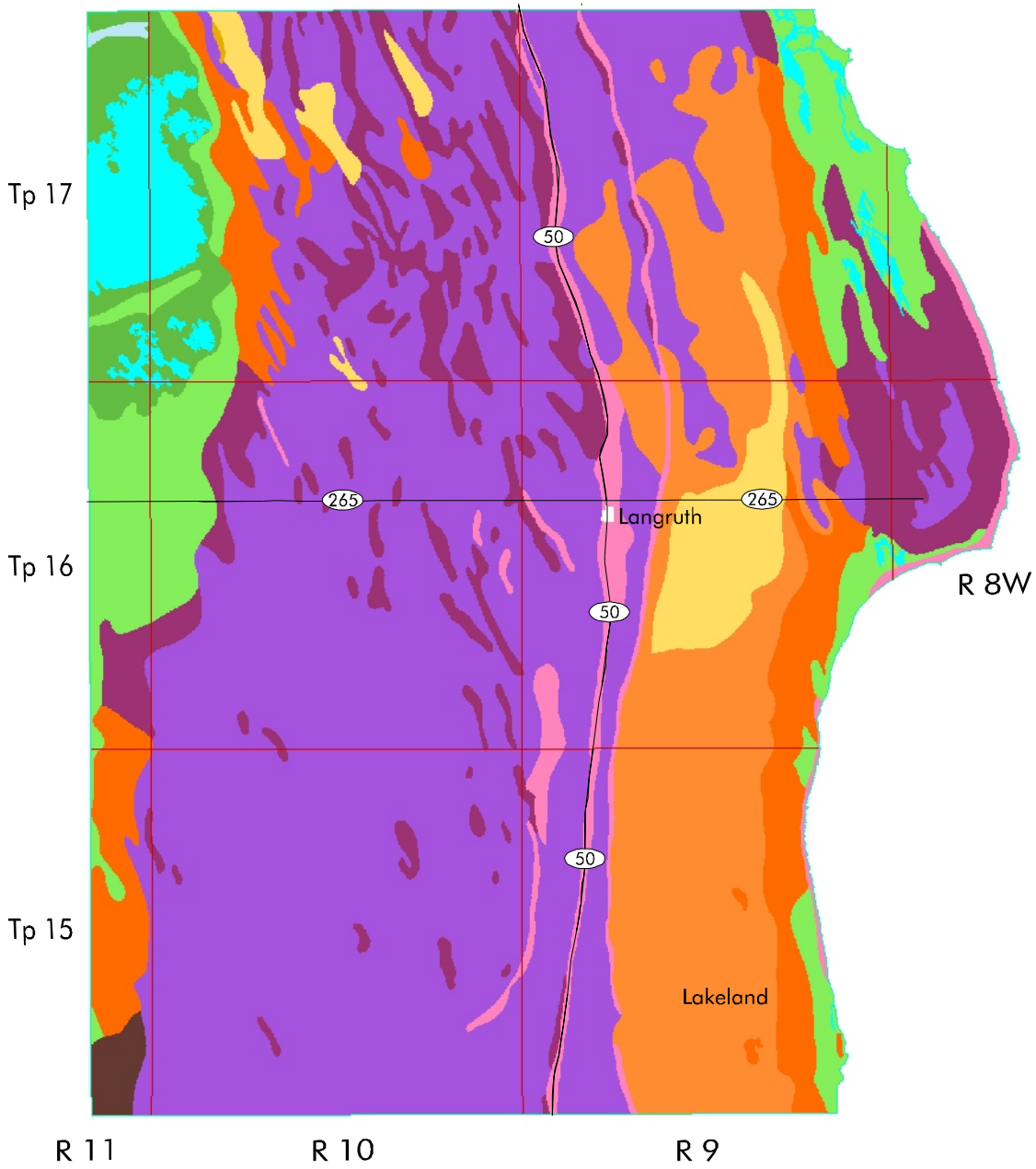
More detailed maps showing the dominant and subdominant soils in each polygon can also be produced at larger map scales.

Table 2. Generalized Soil Groups[1]

Soil Groups	Area (ha)	Percent of RM
Highly Calcareous Loamy Till (Gleysols)	**6841**	**10.9**
Extremely Calcareous Loamy Till (Black Chernozems)	**29465**	**47.0**
Clayey Lacustrine (Gleysols)	**297**	**0.5**
Loamy Lacustrine (Gleysols)	**4735**	**7.6**
Sandy Loam Lacustrine (Gleysols)	**17**	**0.0**
Deep Organic Fen Peat	**1649**	**2.6**
Shallow Organic Fen Peat	**4817**	**7.7**
Loamy Lacustrine	**8911**	**14.2**
Sandy Loam Lacustrine	**2134**	**3.4**
Variable Textured Alluvium (Regosols)	**53**	**0.1**
Sand and Gravel	**2108**	**3.4**
Water	**1662**	**2.7**
Unclassified	**13**	**0.0**
Total	**62702**	**100.0**

[1] Based on the **dominant** soil series for each soil polygon.

Generalized Soil Map



Soil Associations

- Highly Calcareous Loamy Till (Gleysols)
- Extremely Calcareous Loamy Till (Black Chernozems)
- Clayey Lacustrine (Gleysols)
- Loamy Lacustrine (Gleysols)
- Sandy Loam Lacustrine (Gleysols)
- Deep Organic Fen Peat
- Shallow Organic Fen Peat
- Loamy Lacustrine
- Sandy Loam Lacustrine
- Variable Textured Alluvium (Regosols)
- Sand & Gravel
- Water
- Unclassified

Scale

0 1 2 3 4 5 6 7 8

(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Brandon Research Centre
February 2000

Soil Drainage Map.

Drainage is described on the basis of actual moisture content in excess of field capacity, and the length of the saturation period within the plant root zone. Five drainage classes plus three land classes are shown on this map.

Very Poor - Water is removed from the soil so slowly that the water table remains at or on the soil surface for the greater part of the time the soil is not frozen. Excess water is present in the soil throughout most of the year.

Poor - Water is removed so slowly in relation to supply that the soil remains wet for a large part of the time the soil is not frozen. Excess water is available within the soil for a large part of the time.

Poor, drained - Water is removed slowly in relation to supply and the soil remains wet for a significant portion of the growing season. Although these soils may retain characteristics of poor internal drainage, extensive surface drainage improvements enable these soils to be used for annual crop production.

Imperfect - Water is removed from the soil sufficiently slowly in relation to supply to keep the soil wet for a significant part of the growing season. Excess water moves slowly down the profile if precipitation is the major source.

Well - Water is removed from the soil readily but not rapidly. Excess water flows downward readily into underlying materials or laterally as subsurface flow.

Rapid - Water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is pervious. Subsurface flow may occur on steep slopes during heavy rainfall.

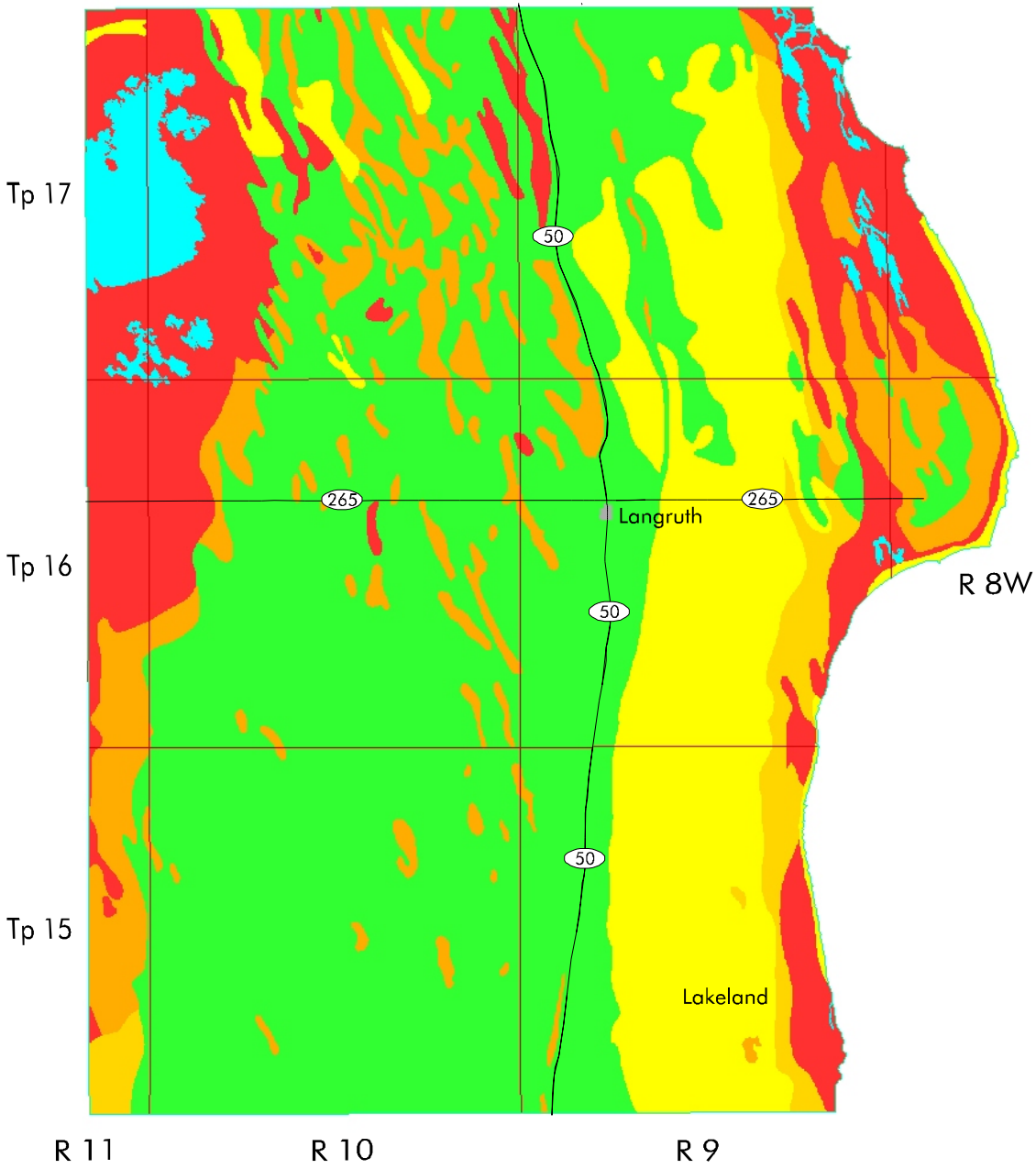
Drainage classification is based on the dominant soil series within each individual soil polygon.

Table 3. Drainage Classes[1]

Drainage Class	Area (ha)	Percent of RM
Very Poor	**9409**	**15.0**
Poor	**6718**	**10.7**
Poor, drained	**2230**	**3.6**
Imperfect	**11449**	**18.3**
Well	**31222**	**49.8**
Rapid	**0**	**0.0**
Rock	**0**	**0.0**
Marsh	**0**	**0.0**
Unclassified	**13**	**0.0**
Water	**1662**	**2.7**
Total	**62702**	**100.0**

[1] Area has been assigned to the dominant drainage class for each soil polygon.

Soil Drainage Map



Drainage Classes

- Rapid
- Well
- Imperfect
- Poor, drained
- Poor
- Very poor
- Rock
- Unclassified
- Marsh
- Water

Scale

0 1 2 3 4 5 6 7 8

(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Brandon Research Centre
February 2000

Management Considerations Map.

Management consideration maps are provided to focus on awareness of land resource characteristics important to land use. This map does not presume a specific land use. Rather it portrays the most common and wide spread attributes that apply to most soil landscapes in the province.

These maps **highlight attributes** of soil-landscapes that the land manager must consider for any intended land use.

- **Fine texture**
- **Medium texture**
- **Coarse texture**
- **Topography**
- **Wetness**
- **Organic**
- **Bedrock**

F = Fine texture - soil landscapes with **fine textured soils (clays and silty clays)**, and thus low infiltration and internal permeability rates. These require special considerations to mitigate surface ponding (water logging), runoff, and trafficability. Timing and type of tillage practices used may be restricted.

M = Medium texture - soil landscapes with medium to moderately fine textures **(loams to clay loams)**, and good water and nutrient retention properties. Good management and cropping practices are required to minimize leaching and the risk of erosion.

C = Coarse texture - soil landscapes with **coarse to very coarse textured soils (loamy sands, sands and gravels)**, have a high permeability throughout the profile, and require special management practices related to application of agricultural chemicals, animal wastes, and municipal effluent to protect and sustain the long term quality of the soil and water resources. The risk of soil erosion can be minimized through the use of shelterbelts and maintenance of crop residues.

T = Topography - soil landscapes with **slopes greater than 5 %** are steep enough to require special management practices to minimize the risk of erosion.

W = Wetness - soil landscapes that have **poorly drained soils and/or >50 % wetlands** (due to seasonal and annual flooding, surface ponding, permanent water bodies (sloughs), and/or high water tables), require special management practices to mitigate adverse impact on water quality, protect subsurface aquifers, and sustain crop production during periods of high risk of water logging.

O = Organic - soil landscapes with organic soils, requiring special management considerations of drainage, tillage, and cropping to sustain productivity and minimize subsidence and erosion.

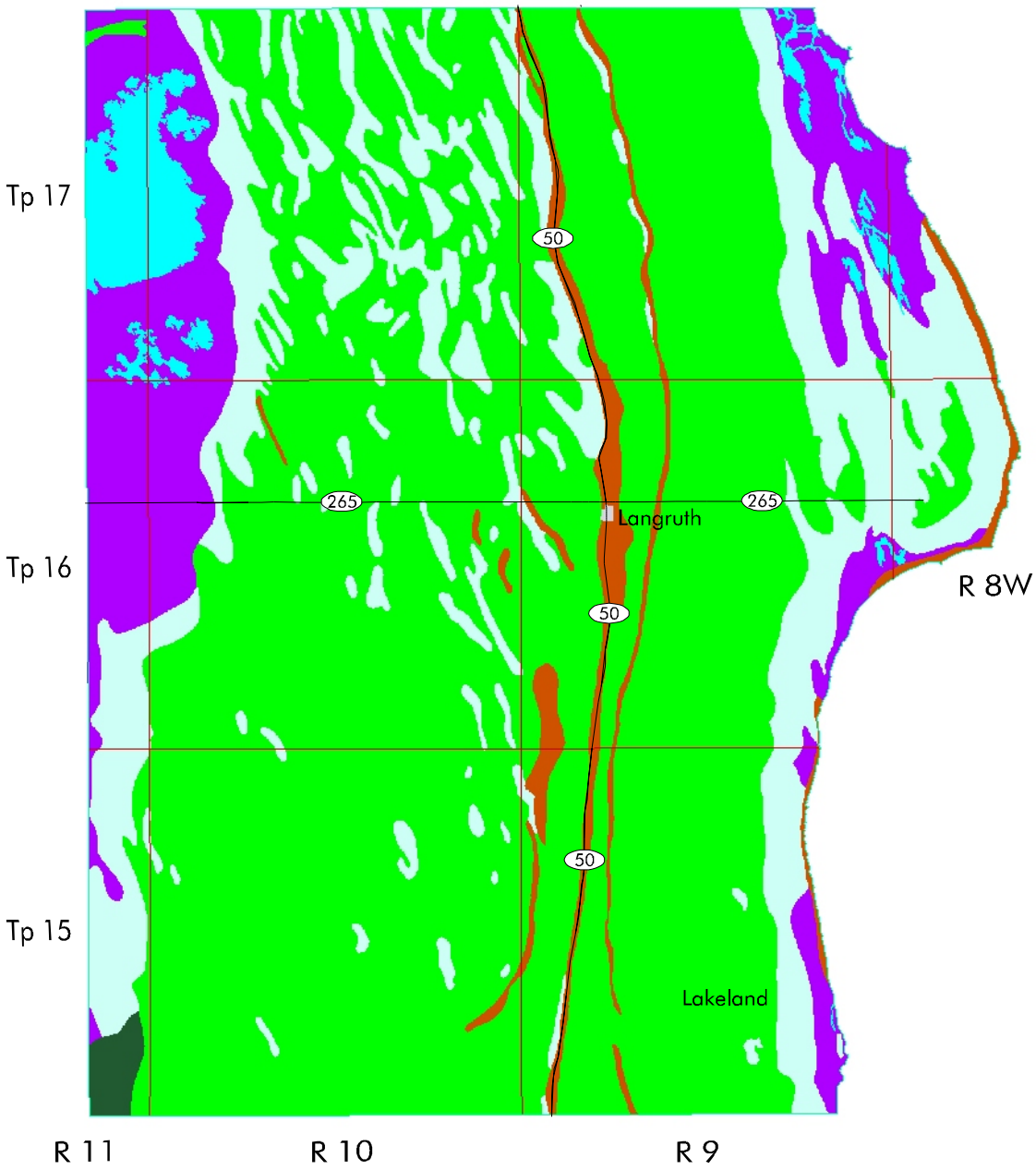
R = Bedrock - soil landscapes that have shallow depth to bedrock (≤ 50 cm) and/or exposed bedrock which may prevent the use of some or all tillage practices as well as the range of potential crops. They require special cropping and management practices to sustain agricultural production.

Table 4. Management Considerations[1]

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	**0**	**0.0**
Fine Texture and Wetness	**297**	**0.5**
Fine Texture and Topography	**0**	**0.0**
Medium Texture	**40562**	**64.7**
Coarse Texture	**2108**	**3.4**
Coarse Texture and Wetness	**0**	**0.0**
Coarse Texture and Topography	**0**	**0.0**
Topography	**0**	**0.0**
Bedrock	**0**	**0.0**
Wetness	**11593**	**18.5**
Organic	**6466**	**10.3**
Marsh	**0**	**0.0**
Unclassified	**13**	**0.0**
Water	**1662**	**2.7**
Total	**62702**	**100.0**

[1] Based on the **dominant** soil series and slope gradient within each polygon.

Management Considerations Map



Land Resource Characteristics

- Medium Texture
- Coarse Texture
- Coarse Texture and Topography
- Coarse Texture and Wetness
- Bedrock
- Topography
- Fine Texture and Topography
- Fine Texture
- Fine Texture and Wetness
- Organic
- Marsh
- Wetness
- Unclassified
- Water

Scale

0 1 2 3 4 5 6 7 8

(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Brandon Research Centre
February 2000

Agricultural Capability Map.

This evaluation utilizes the 7 class Canada Land Inventory system (CLI, 1965). Classes 1 to 3 represent the prime agricultural land, class 4 land is marginal for sustained cultivation, class 5 land is capable of perennial forages and improvement is feasible, class 6 land is capable of producing native forages and pasture but improvement is not feasible, and class 7 land is considered unsuitable for dryland agriculture. Subclass modifers include structure and/or permeability (D), erosion (E), inundation (I), moisture limitation (M), salinity (N), stoniness (P), consolidated bedrock (R), topography (T), excess water (W) and cumulative minor adverse characteristics (X).

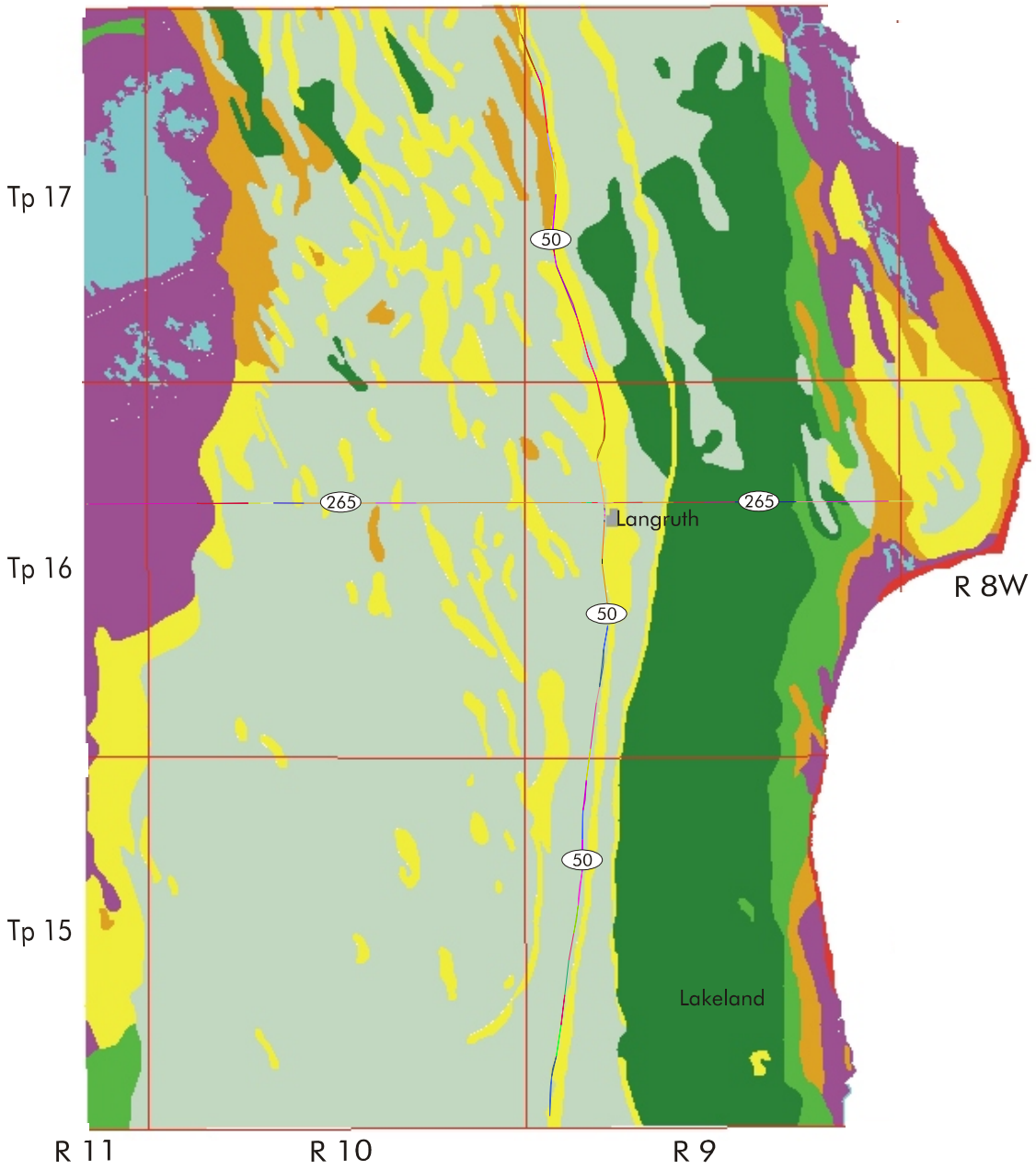
This generalized interpretive map is based on the dominant soil series and phases for each soil polygon. The CLI subclass limitations cannot be portrayed at this generalized map scale.

Table 5. Agricultural Capability[1]

Class Subclass	Area (ha)	Percent of RM
2	**11041**	**8.8**
2M	2125	1.7
2W	8916	7.1
3	**2286**	**1.8**
3I	54	0.0
3W	2232	1.8
4	**29473**	**23.5**
4DP	29473	23.5
5	**8475**	**6.8**
5M	1758	1.4
5W	6717	5.4
6	**2941**	**2.3**
6W	2941	2.3
7	**354**	**0.3**
7M	354	0.3
Unclassified	**12**	**0.0**
Water	**64387**	**51.3**
Organic	**6476**	**5.2**
Total	**125445**	**100.0**

[1] Based on the **dominant** soil series and slope gradient within each polygon.

Agriculture Capability Map



Canada Land Inventory Classes

Scale

0 1 2 3 4 5 6 7 8

(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Winnipeg Manitoba
June 2003

Irrigation Suitability Map.

Irrigation ratings are based on an assessment of the most limiting combination of soil and landscape conditions. Soils in the same class have a similar relative suitability or degree of limitation for irrigation use, although the specific limiting factors may differ. These limiting factors are described by subclass symbols at detailed map scales. The irrigation rating system does not consider water availability, method of application, water quality, or economics of irrigated land use.

Irrigation suitability is a four class rating system. Areas with no or slight soil and/or landscape limitations are rated **Excellent** to **Good** and can be considered irrigable. Areas with moderate soil and/or landscape limitations are rated as **Fair** and considered marginal for irrigation providing adequate management exists so that the soil and adjacent areas are not adversely affected by water application. Soil and landscape areas rated as **Poor** have severe limitations for irrigation.

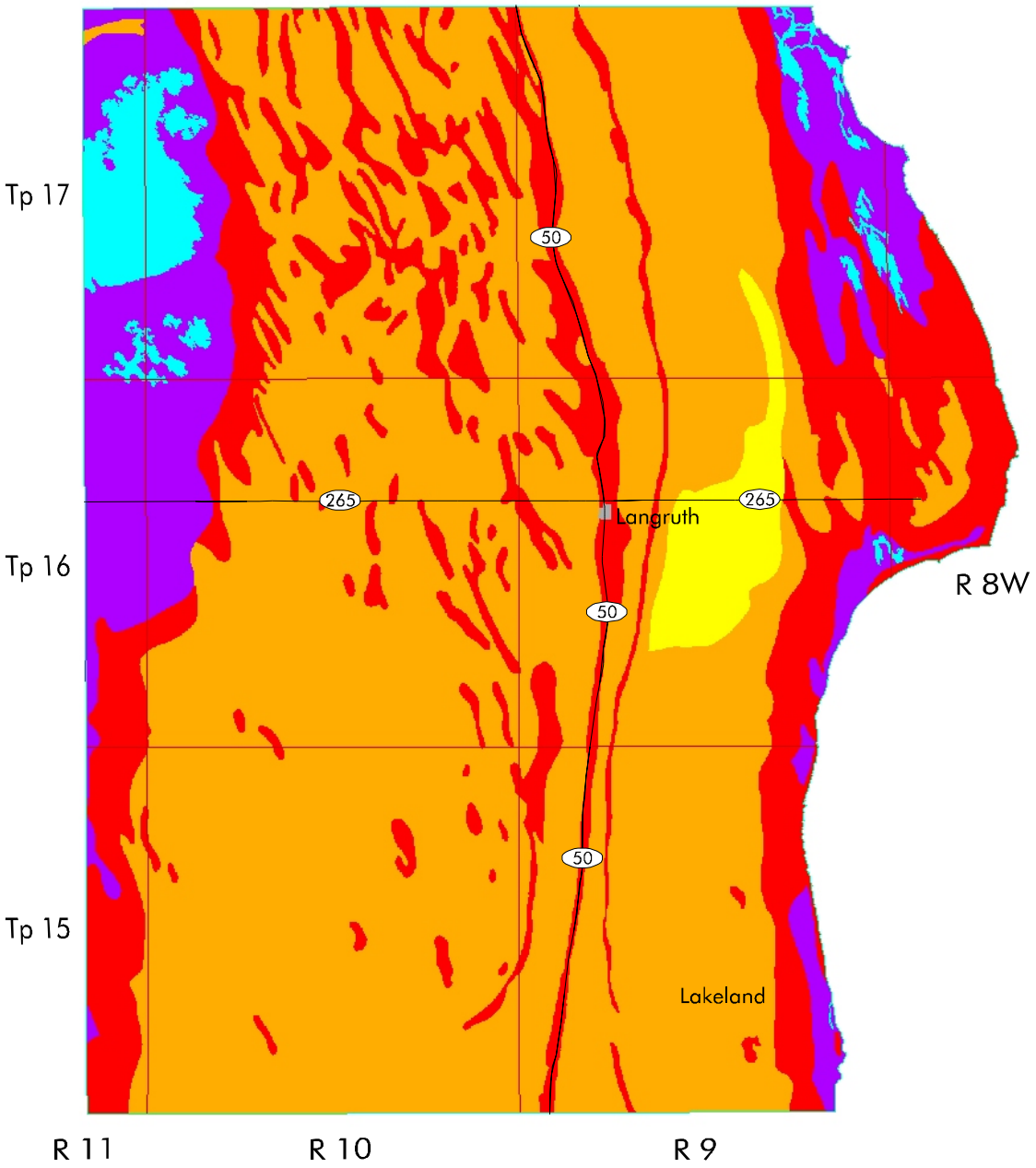
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

Table 6. Irrigation Suitability[1]

Class	Area (ha)	Percent of RM
Excellent	**0**	**0.0**
Good	**1522**	**2.4**
Fair	**39040**	**62.3**
Poor	**13999**	**22.3**
Organic	**6466**	**10.3**
Unclassified	**13**	**0.0**
Water	**1662**	**2.7**
Total	**62702**	**100.0**

[1] Based on the **dominant** soil series and slope gradient within each polygon.

Irrigation Suitability Map



Irrigation Suitability Classes

- Excellent
- Good
- Fair
- Poor
- Organic
- Unclassified
- Water

Scale

0 1 2 3 4 5 6 7 8

(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Brandon Research Centre
February 2000

Potential Environmental Impact Under Irrigation Map.

A major environmental concern for land under irrigated crop production is the possibility that surface and/or ground water may be impacted. The potential environmental impact assessment provides a relative rating of land into 4 classes (minimal, low, moderate and high) based on an evaluation of specific soil factors and landscape conditions that determine the impact potential.

Soil factors considered are those properties that determine water retention and movement through the soil; topographic features are those that affect runoff and redistribution of moisture in the landscape. Several factors are specifically considered: soil texture, hydraulic conductivity, salinity, geological uniformity, depth to water table and topography. The risk of altering surface and subsurface soil drainage regimes, soil salinity, potential for runoff, erosion and flooding is determined by specific criteria for each property.

Use of this rating is intended to serve as a warning of potential environmental concern. It may be possible to design and/or give special consideration to soil-water-crop management practices that will mitigate any adverse impact.

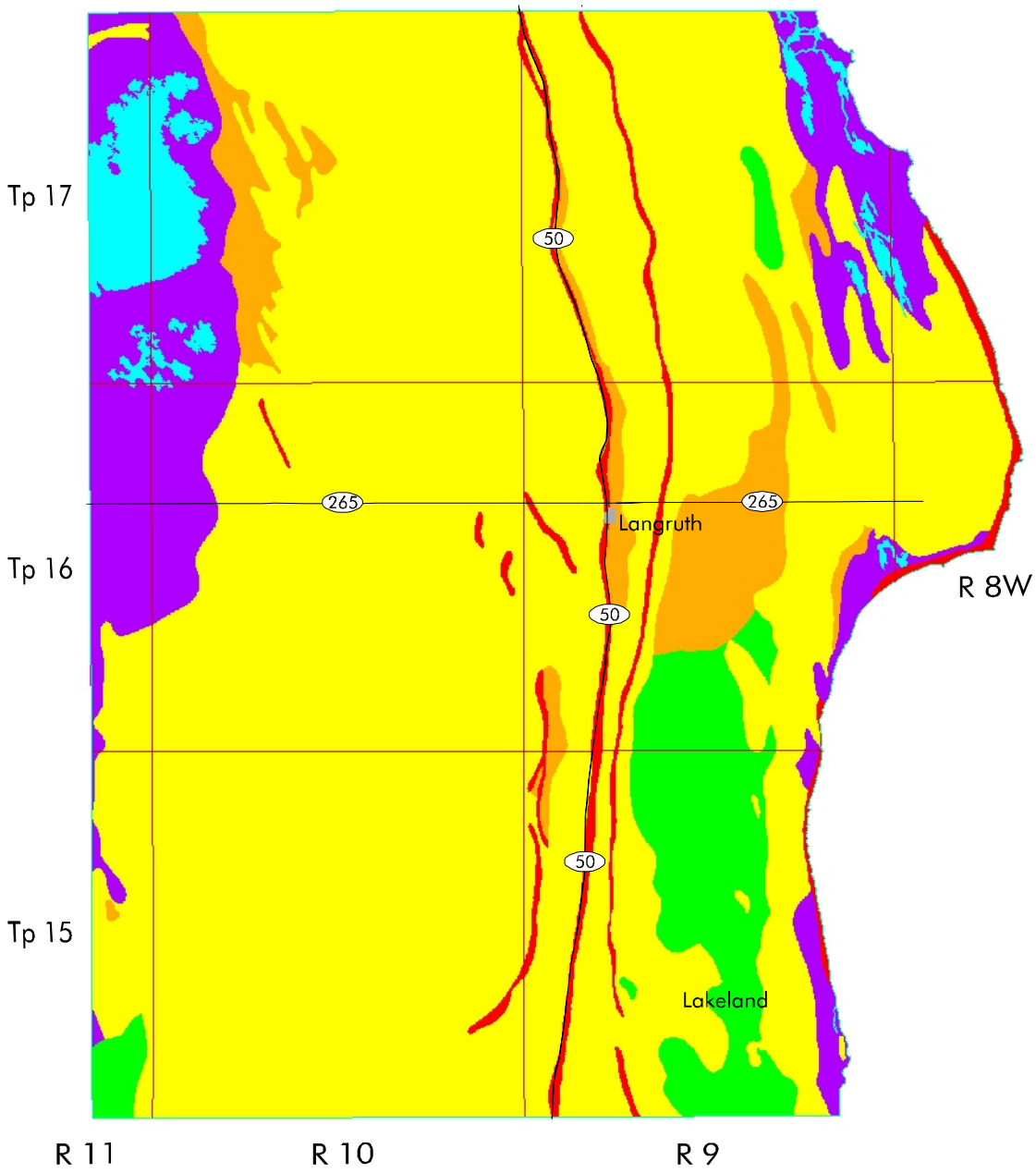
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 7. Potential Environmental Impact Under Irrigation[1]

Class	Area (ha)	Percent of RM
Minimal	**3822**	**6.1**
Low	**45845**	**73.1**
Moderate	**3338**	**5.3**
High	**1556**	**2.5**
Organic	**6466**	**10.3**
Unclassified	**13**	**0.0**
Water	**1662**	**2.7**
Total	**62702**	**100.0**

[1] Based on the **dominant** soil series and slope gradient within each polygon.

Potential Environmental Impact Under Irrigation



Potential Impact Classes

- Minimal
- Low
- Moderate
- High
- Organic
- Unclassified
- Water

Scale

0 1 2 3 4 5 6 7 8

(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
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Water Erosion Risk Map.

The risk of water erosion was estimated using the universal soil loss equation (USLE) developed by Wischmeier and Smith (1965). The USLE predicted soil loss (tons/hectare/year) is calculated for each soil component in each soil map polygon. Erosion risk classes are assigned based on the weighted average soil loss for each map polygon. Water erosion risk factors include mean annual rainfall, average and maximum rainfall intensity, slope length, slope gradient, vegetation cover, management practices, and soil erodibility. The map shows 5 classes of soil erosion risk based on bare unprotected soil:

negligible
low
moderate
high
severe

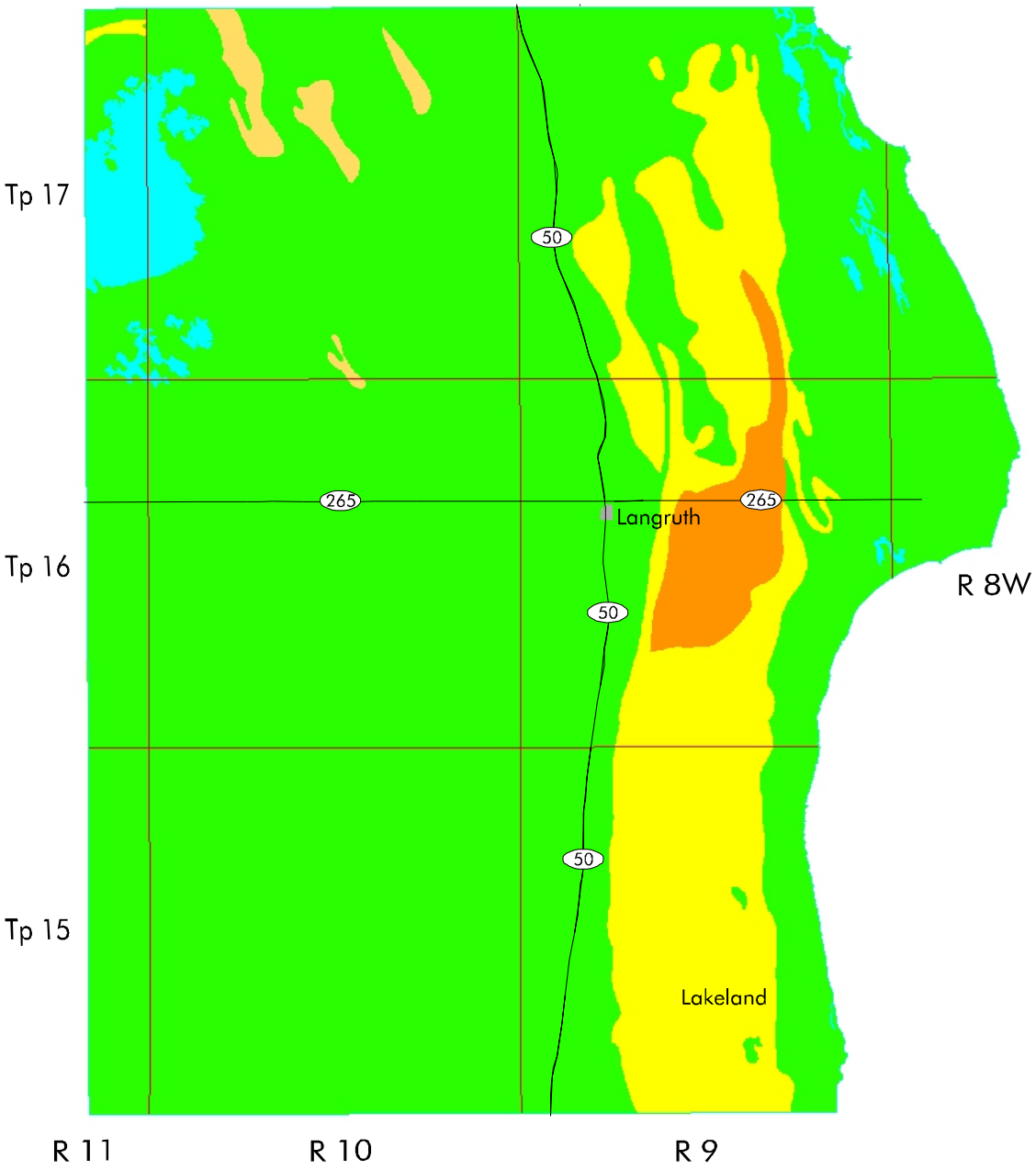
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

Table 8. Water Erosion Risk[1]

Class	Area (ha)	Percent of RM
Negligible	**49929**	**79.6**
Low	**612**	**1.0**
Moderate	**8964**	**14.3**
High	**1522**	**2.4**
Severe	**0**	**0.0**
Unclassified	**13**	**0.0**
Water	**1662**	**2.7**
Total	**62702**	**100.0**

[1] Based on the **weighted average** USLE predicted soil loss within each polygon, assuming a bare unprotected soil.

Water Erosion Risk Map



Mean Risk Values

- Negligible
- Low
- Moderate
- High
- Severe
- Water
- Unclassified

Scale

0 1 2 3 4 5 6 7 8

(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Brandon Research Centre
February 2000

Land Use Map.

The land use classification of the RM has been interpreted from LANDSAT satellite imagery, using supervised computer classification techniques. Many individual spectral signatures were classified and grouped into the seven general land use classes shown here. Although land use changes over time, and some land use practices on individual parcels may occasionally result in similar spectral signatures, this map provides a general representation of the current land use in the RM.

The following is a brief description of the land use classes:

Annual Crop Land - land that is normally cultivated on an annual basis.

Forage - perennial forages, generally alfalfa or clover with blends of tame grasses.

Grasslands - areas of native or tame grasses, may contain scattered stands of shrubs.

Trees - lands that are primarily in tree cover.

Wetlands - areas that are wet, often with sedges, cattails, and rushes.

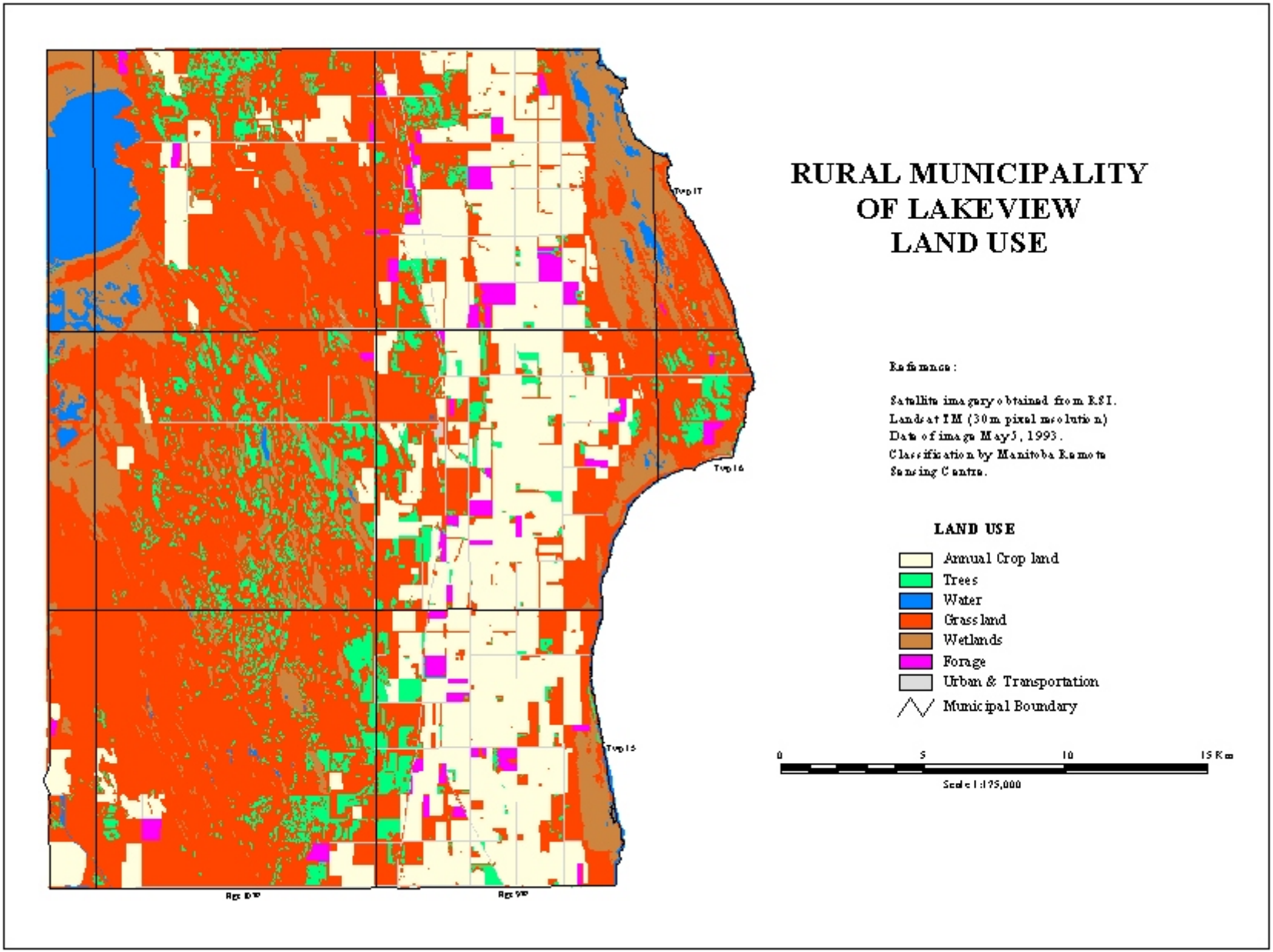
Water - open water - lakes, rivers streams, ponds, and lagoons.

Urban and Transportation - towns, roads, railways, quarries.

Table 9. Land Use[1]

Class	Area (ha)	Percent of RM
Annual Crop Land	**14498**	**22.9**
Forage	**1180**	**1.9**
Grasslands	**32728**	**51.7**
Trees	**4625**	**7.3**
Wetlands	**6573**	**10.4**
Water	**2484**	**3.9**
Urban and transportation	**1170**	**1.8**
Undifferentiated	**0**	**0.0**
Total	**63258**	**100.0**

[1] Land use information (1994) and map supplied by Prairie Farm Rehabilitation Administration. Areas may vary from previous maps due to differences in analytical procedures.


RURAL MUNICIPALITY
OF LAKEVIEW
LAND USE
Reference:
Satellite imagery obtained from RSI.
Landsat TM (30m pixel resolution)
Date of image May 5, 1993.
Classification by Manitoba Remote
Sensing Centre.
LAND USE
Annual Crop land
Trees
Water
Grassland
Wetlands
Forage
Urban & Transportation
Municipal Boundary
0
5
10
15 Km
Scale 1:175,000
Twp 17
Twp 16
Twp 15

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