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Rural Municipality of Boulton


Information Bulletin 97-25

Soils and Terrain

An introduction
to the land resource

Land Resource Unit
Brandon Research Centre



Canada 

Rural Municipality of Boulton

Information Bulletin 97-25

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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

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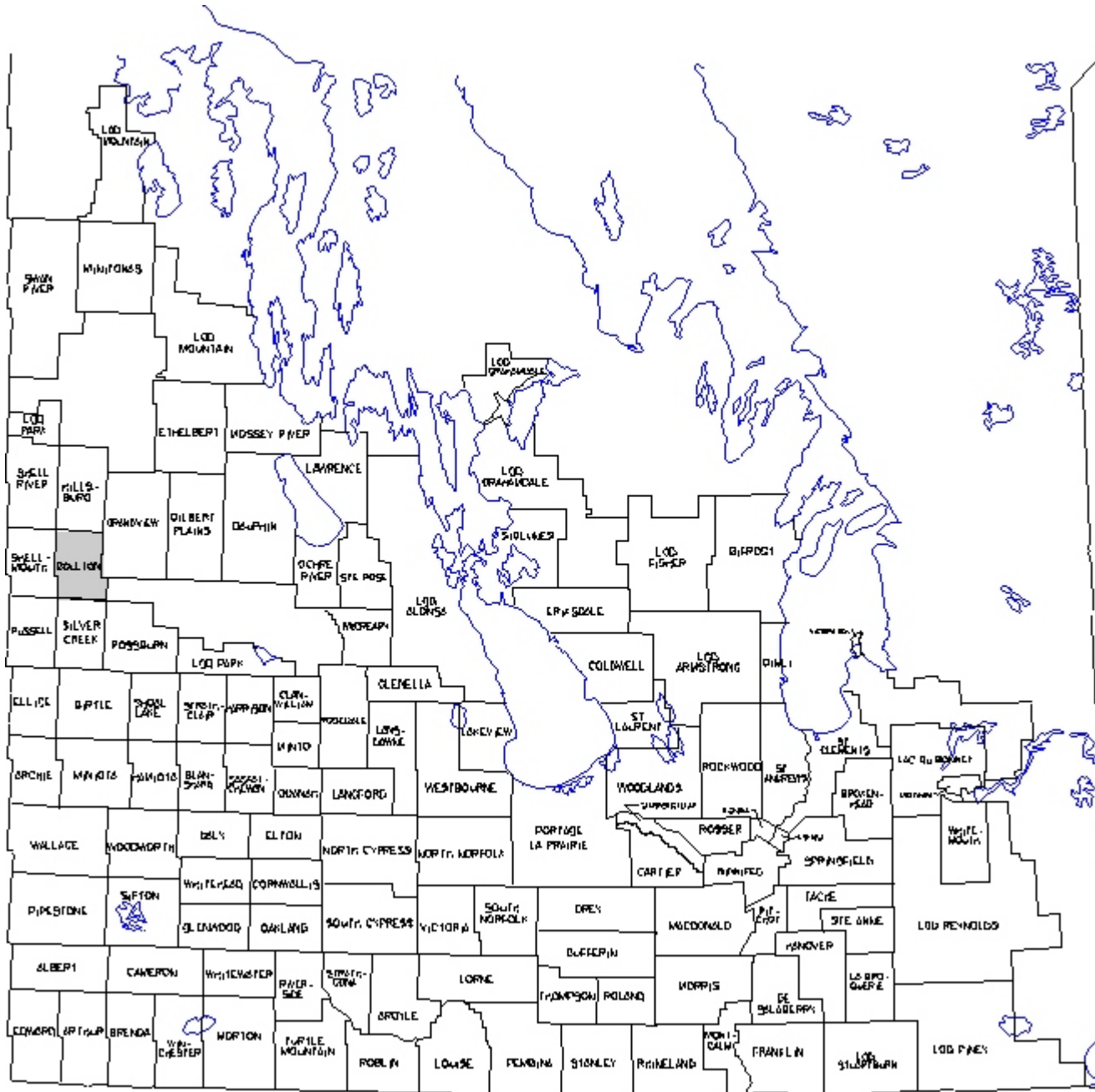


Figure 1. Rural municipalities in southern Manitoba.

INTRODUCTION

The location of the Rural Municipality of Boulton is shown in Figure 1. A brief overview of the database information assembled, 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 computerized Geographic Information System (PAMAP GIS) facilities of the Manitoba Land Resource Unit. These databases were used in GIS to create the generalized, derived and interpretive maps and statistics contained 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 addition 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.

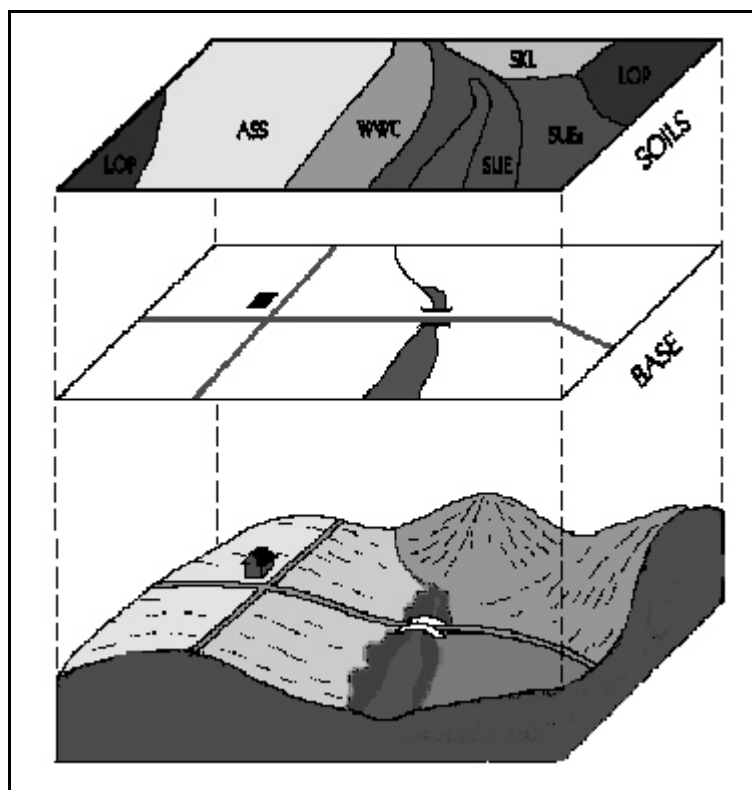


Figure 2. Soil and Base Map data.

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, based on photo-interpretation.

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, based on photo-interpretation.

SOIL AND TERRAIN OVERVIEW

The Rural Municipality (RM) of Boulton covers an area of 6 townships (approximately 58 163 hectares) of land in western Manitoba (page 3). Approximately 20 percent of this land area is in the Riding Mountain National Park. There are no major population centres in the municipality and agriculture services generally are provided from larger towns in the surrounding region.

The climate in the municipality can be related to the weather data from Russell. The mean annual temperature is 1.1°C and the mean annual precipitation is 484 mm (Environment Canada, 1993). The average frost-free period is 104 days and degree-days above 5°C average 1450 (Ash, 1991). The calculated seasonal moisture deficit for the period between May and September is 200 to 250 mm. The estimated effective growing degree days (EGDD) above 5°C accumulated from date of seeding to the date of the first fall frost is 1200 to 1400 (Agronomic Interpretations Working Group, 1995). These parameters provide an indication of moisture and heat energy available for crop growth. As most of the land in the RM occurs at higher elevations, the growing season available for crop growth is somewhat cooler and shorter than that indicated for Russell.

Physiographically, the RM of Boulton is located in the Saskatchewan Plain (Canada-Manitoba Soil Survey, 1980). The majority of the RM occurs in the Riding Mountain Upland whereas the southwest portion is at a slightly lower elevation in the Newdale Plain. Elevations range from 570 m asl in the southwest to 630 m in the Riding Mountain Upland. A steep sided glacial meltwater channel entrenched some 30 m into the land surface drains northwesterly to the Valley River. Birdtail Creek flows to the east and south in a similar valley. The land surface in the RM is generally hummocky with local relief of 3 to 9 m and slopes of 5 to 9 percent. Local areas of higher relief in excess of 9 m and slopes of 9 to 15 percent also occur. An undulating to hummocky area with lower relief and slopes of 2 to 5 percent occurs in the southwest portion of the RM and along the northeast boundary of the municipality (page 9).

The soil materials in this RM consist primarily of loamy textured glacial till (morainal) deposits. Local areas of thin, loamy lacustrine sediments underlain by stratified sand and gravel which in turn are underlain by water-worked loamy glacial till occur near the glacial meltwater valleys (page 11).

Soils in the municipality have been mapped at a reconnaissance level (1:126 720 scale) and published in the soil survey reports for the Rossburn and Virden map sheet areas (Ehrlich et al., 1956) and the Grandview map sheet area (Ehrlich et al., 1959). The soils in the municipality are classified as dominantly Gray Luvisols (Waitville Association) and Dark Gray Chernozems (Erickson Association) with significant areas of Black Chernozems (Newdale Association) in the southwest part of the RM (Expert Committee on Soil Survey, 1987). Local areas of poorly drained soils (Gleysols) and shallow organic (peat) soils are common in depressional areas of the landscape. Regosolic soils occur on stratified minor stream deposits in the valleys and on steeply sloping areas of eroded slopes (page 11). A more detailed and complete description of the type, distribution and textural variability of soils in the municipality is provided in the published reconnaissance soil surveys (Ehrlich et al., 1956, 1959).

External drainage of the municipality is facilitated via tributaries to the Valley River to the north, Shell River to the west and Birdtail Creek to the south. Drainage of hummocky terrain in the municipality is generally poorly developed and characterized by numerous enclosed poorly drained depressions and potholes containing shallow ponds and small lakes. The majority of soils in the RM are well drained with minor areas of imperfect drainage on lower slopes. Areas of poorly drained and peaty soils are common in the depressional areas throughout this landscape (page 13).

Salinity is a minor concern in the RM (page 15), occurring at only a few locations, usually in association with imperfectly drained soils on lower slopes in the landscape. Other management considerations are primarily related to topography and drainage

(page 17). There are no significant soil textural considerations (sandy or clayey soils) or bedrock outcrops to contend with in this RM. Most of the soils are variably stony. Within some areas bordering the meltwater channels, the soils have been modified by stream erosion and as a result, are coarse textured and frequently very stony.

Nearly 48 percent of the land in the RM rated as **Class 3** for agriculture capability (page 19) and about 47 percent of the area is rated Fair for irrigation suitability (page 21). Topography is the main limitation. Well drained soils of the Newdale association in gently sloping landscapes are rated in **Class 2** for agriculture and **Good** for irrigation. Very poorly drained soils, Organic (peaty) soils and steeply sloping soils are rated in **Class 6** for agriculture. These soils are rated **Poor** for irrigation. Poor drainage affects some 11 percent of the soils in the RM, which are rated as **Class 5 and 6** for agriculture capability and **Poor** for irrigation.

A major issue 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 has been included in this bulletin (page 23). The majority of the RM is at **Moderate** risk of degradation. However, steeply sloping soils and waterworked areas with sandy and gravelly subsoils are rated as having a **High** potential for impact on the environment under irrigation. These conditions increase the risk for deep leaching of potential contaminants on the soil surface and the potential for rapid runoff from the soil surface into adjacent wetlands or water bodies. 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. To highlight areas with potential for water erosion, a risk map has been included to show where special practices should be adopted to mitigate this risk (page 25). Nearly 50 percent of the land in the RM is at **Severe** risk of degradation and 15 percent is

considered to have a **High** risk for degradation from water erosion. Management practices focus primarily on maintaining adequate crop residues to provide sufficient surface cover. However, provision of adequate protection of the steeper sloping lands most at risk may require a shift in land use away from annual cultivation to production of perennial forages and pasture or permanent tree cover.

Land use in the RM of Boulton is primarily agricultural although about 30 percent of the land remains in woodland and 21 percent is in grassland. An assessment of the status of land use in 1995 was obtained through an analysis of satellite imagery. It showed that annual crops occupied about 34% of the land in the RM, while the remaining areas were in forest (30%), grassland (21.3%), and forage production (3.3%). Wetlands and small water bodies occupy 9.3% of the RM. Much of the woodland and grassland area provides native pasture for livestock. Various non-agricultural uses such as recreation and infrastructure for urban areas and transportation occupy about 2 percent of the RM (page 27).

While the majority of the soils in the RM of Boulton have moderate to moderately severe limitations for arable agriculture, careful choice of crops and maintenance of adequate surface cover is essential for the management of sensitive lands with steeper slopes. This includes leaving adequate crop residues on the surface to provide sufficient trash cover during the early spring period. The provision of minimum tillage practices, and crop rotations including forage will help to reduce the risk of soil degradation and maintain productivity.

Probably the most important conditions affecting the long-term agricultural use of land in this municipality are soil and landscape limitations such as topographic pattern and steeply sloping lands. Implementation of appropriate conservation practices to deal with these conditions on a site by site basis will help to insure that agriculture land-use is sustainable over the long-term.

DERIVED AND INTERPRETIVE MAPS

A large variety of computer derived maps can be generated from the digital and landscape datadases are stored in digital format. 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, salinity, or slope class).

Interpretive maps portray more complex land evaluations based on a combination of soil and landscape information. 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 Classes

Generalized Soil

Drainage

Salinity

Management Consideration

Interpretative Maps

Agricultural Capabilities

Irrigation Suitability

Potential Environmental Impact

Water Erosion Risk

Land Use.

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 Manitoba Land Resource Unit.

The maps have all been reduced in size and generalized (simplified) in order to portray conditions for an entire rural municipality on one

Slope Map.

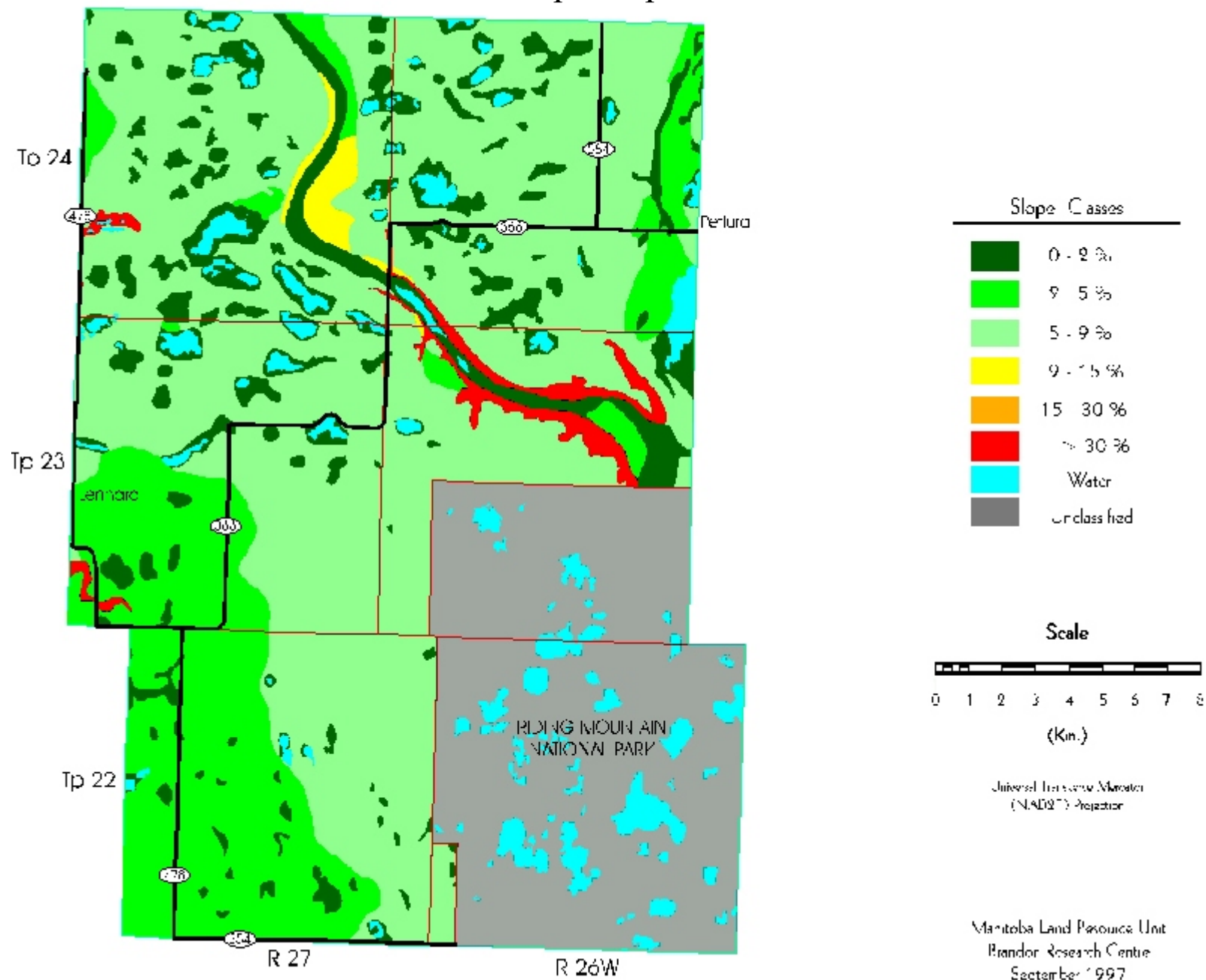
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil layer database. Specific colours are used to indicate the dominant slope class for each soil polygon in the RM. Additional slope classes may occur in each polygon area, but cannot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

Table 1. Slope Classes¹

Slope Class	Area (ha)	Percent of RM
0 - 2 %	5342	9.2
2 - 5 %	9787	16.8
5 - 9 %	26686	45.9
9 - 15 %	497	0.9
15 - 30 %	0	0.0
> 30 %	972	1.7
Unclassified	12037	20.7
Water	2842	4.9
Total	58163	100.0

¹ Area has been assigned to the most significant limiting slope for each terrain polygon. Significant areas of lesser slope, and smaller areas of greater slope may occur in each terrain polygon.

Slope Map



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.

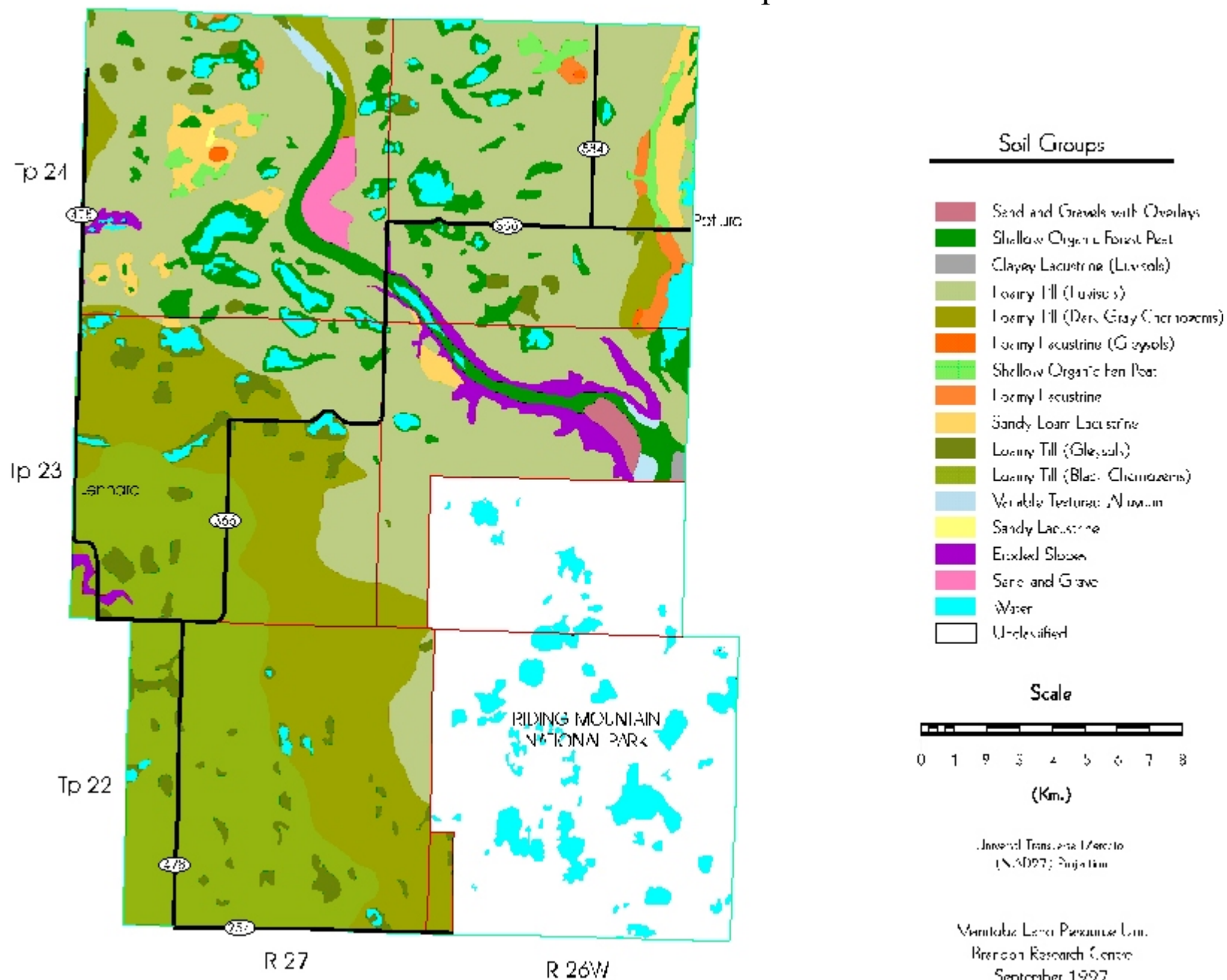
More detailed maps showing the dominant and subdominant soils in each polygon can also be produced at larger map scales.

Table 2. Generalized Soil Groups¹

Soil Group	Area (ha)	Percent of RM
Sand and Gravels with Overlays	181	0.3
Shallow Organic Forest Peat	2949	5.1
Clayey Lacustrine (Luvisols)	43	0.1
Loamy Till (Luvisols)	18639	32.0
Loamy Till (Dark Gray Chernozems)	8453	14.5
Loamy Lacustrine (Gleysols)	48	0.1
Shallow Organic Fen Peat	430	0.7
Loamy Lacustrine	298	0.5
Sandy Loam Lacustrine	1121	1.9
Loamy Till (Gleysol)	1584	2.7
Loamy Till (Black Chernozems)	8005	13.8
Variable Textured Alluvium	185	0.3
Sandy Lacustrine	13	0.0
Eroded Slopes	972	1.7
Sand and Gravel	362	0.6
Water	2842	4.9
Unclassified	12037	20.7
Total	58163	100.0

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

Generalized Soil Map



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. Six drainage classes plus four 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.

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.

Moderately Well - Water is removed from the soil somewhat slowly in relation to supply. Excess water is removed somewhat slowly due to low perviousness, shallow water table, lack of hydraulic gradient, or some combination of these.

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.

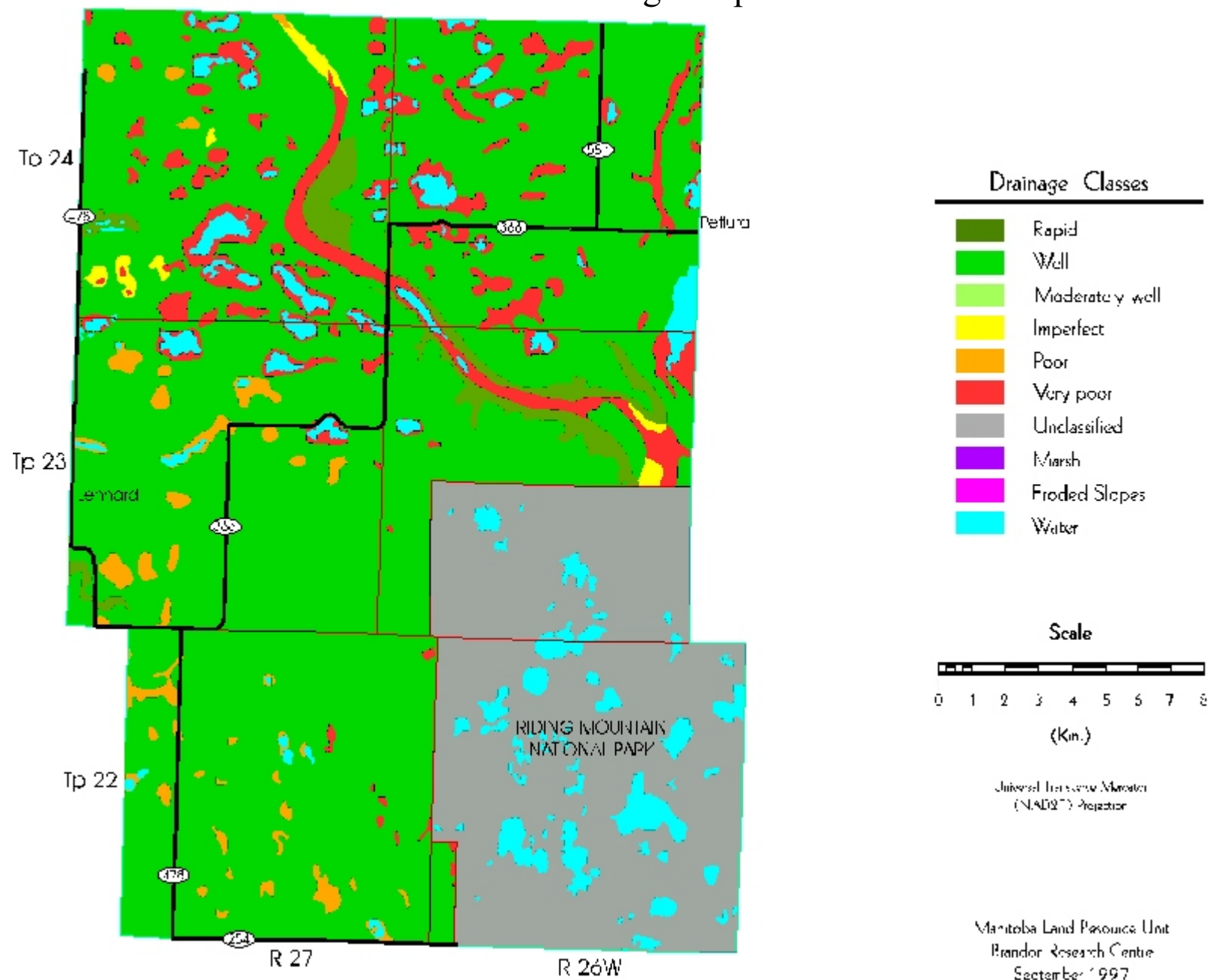
Drainage classification is based on the dominant soil series within each individual soil polygon.

Table 3. Drainage Classes¹

Drainage Class	Area (ha)	Percent of RM
Very Poor	3957	6.8
Poor	1054	1.8
Imperfect	310	0.5
Moderately Well	0	0.0
Well	36628	63.0
Rapid	1334	2.3
Marsh	0	0.0
Unclassified	12037	20.7
Water	2842	4.9
Total	58163	100.0

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

Soil Drainage Map



Soil Salinity Map.

A saline soil contains soluble salts in such quantities that they interfere with the growth of most crops. Soil salinity is determined by the electrical conductivity of the saturation extract in decisiemens per metre (dS/m). Approximate limits of salinity classes are:

non-saline	< 4 dS/m
slightly saline	4 to 8 dS/m
moderately saline	8 to 16 dS/m
strongly saline	> 16 dS/m.

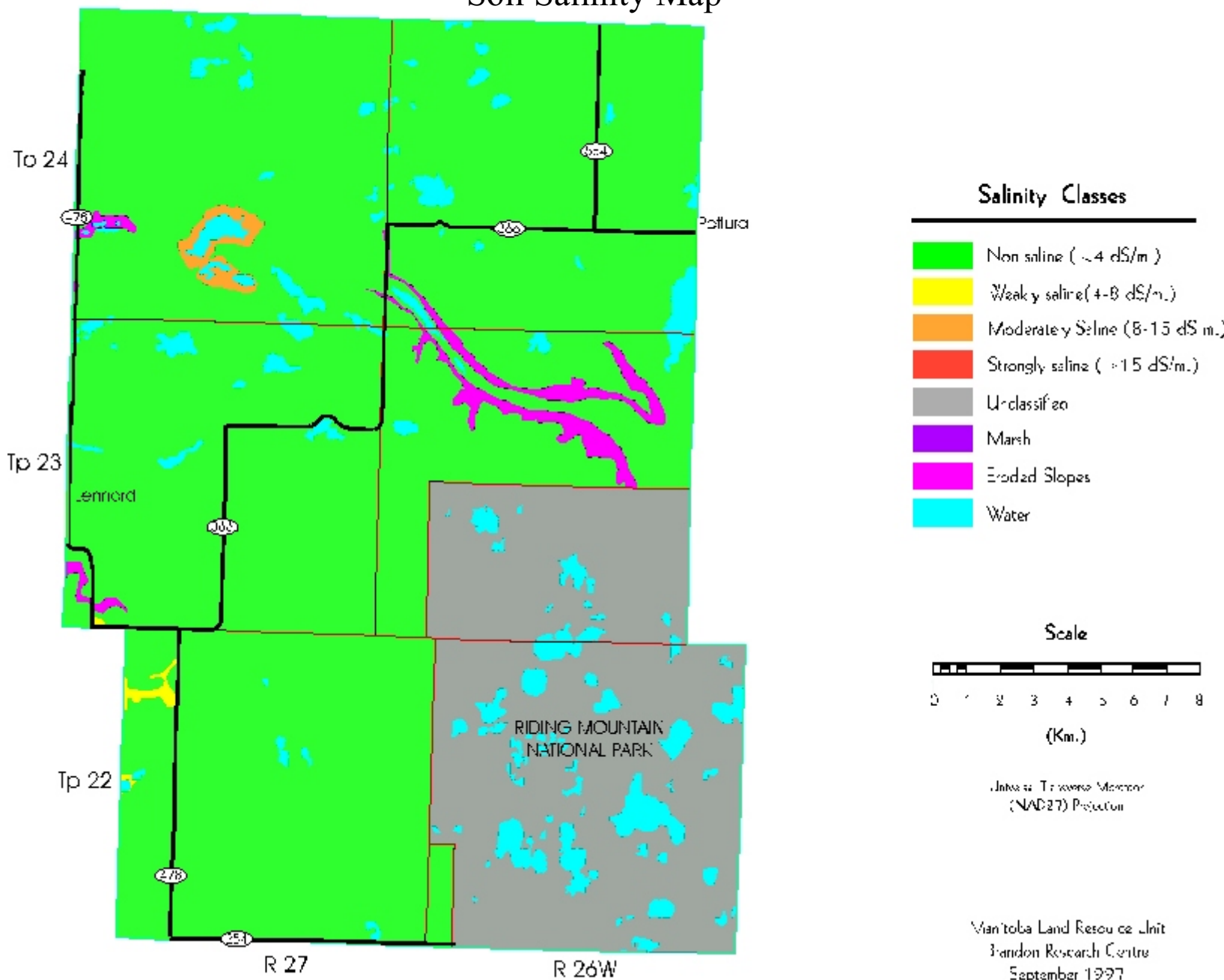
The salinity classification of each individual soil polygon was determined by the most severe salinity classification present within that polygon.

Table 4. Salinity Classes¹

Salinity Class	Area (ha)	Percent of RM
Non Saline	41912	72.1
Weakly Saline	118	0.2
Moderately Saline	281	0.5
Strongly Saline	0	0.0
Eroded Slopes	972	1.7
Marsh	0	0.0
Unclassified	12037	20.7
Water	2842	4.9
Total	58163	100.0

¹ Area has been assigned to the most severe salinity class for each soil polygon.

Soil Salinity Map



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.

- **Topography**
- **Wetness**
- **Coarse texture**
- **Medium texture**
- **Fine texture**
- **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.

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.

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

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.

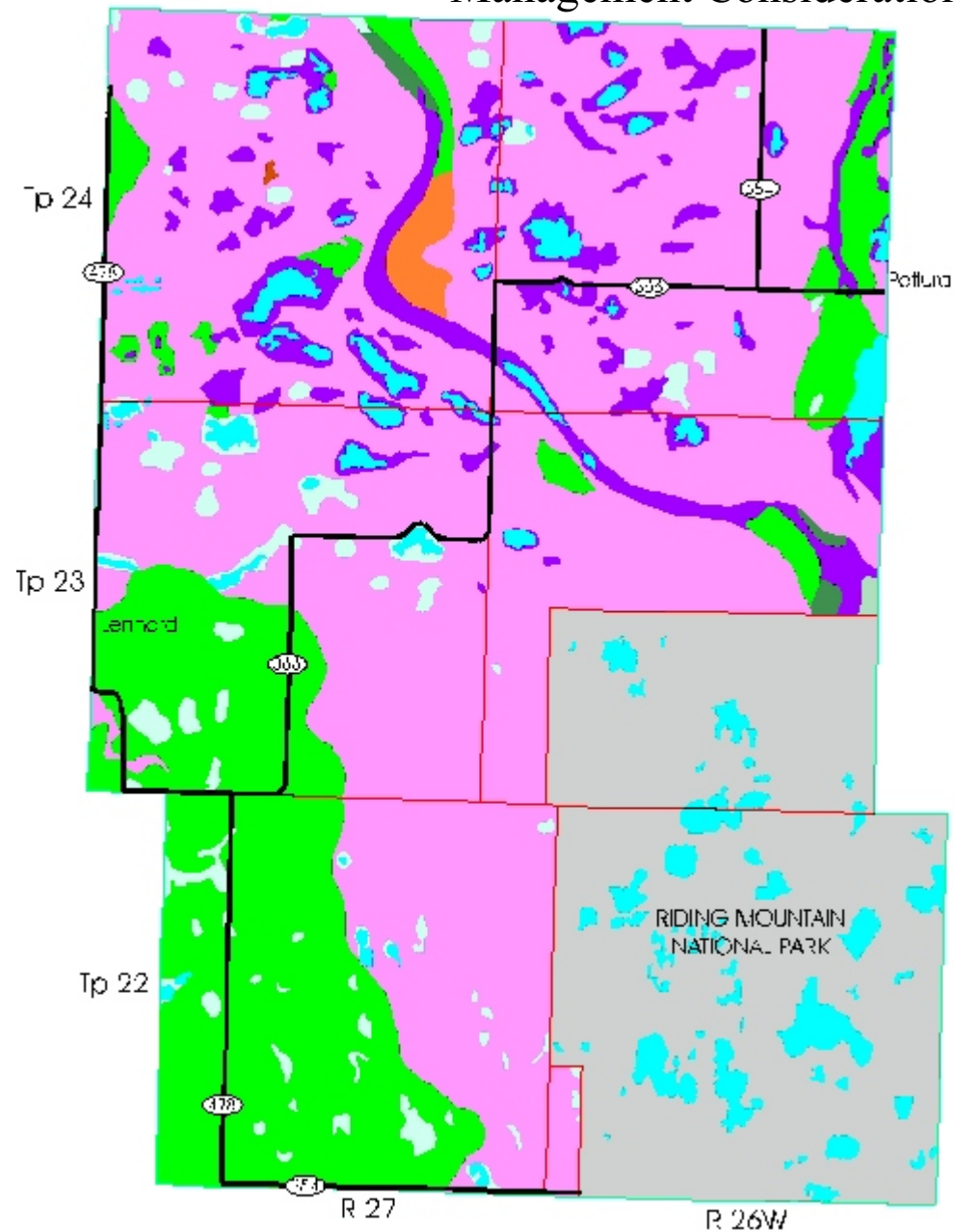
R = Bedrock - soil landscapes that have **shallow depth to bedrock (< 50 cm) and/or exposed bedrock** which may prevent the use of some or all tillage practices as well as the range of potential crops. They require special cropping and management practices to sustain agricultural production.

Table 5. Management Considerations¹

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	185	0.3
Fine Texture and Wetness	0	0.0
Fine Texture and Topography	43	0.1
Medium Texture	9919	17.1
Coarse Texture	13	0.0
Coarse Texture and Wetness	0	0.0
Coarse Texture and Topography	362	0.6
Topography	27750	47.7
Topography and Bedrock	0	0.0
Wetness	1632	2.8
Wetness and Topography	0	0.0
Bedrock	0	0.0
Organic	3379	5.8
Marsh	0	0.0
Unclassified	12037	20.7
Water	2842	4.9
Total	58163	100.0

¹ Based on **dominant** soil series for each soil polygon.

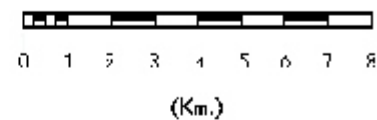
Management Considerations Map



Land Resource Characteristics

- Medium texture
- Coarse texture
- Coarse texture and Topography
- Coarse texture and Wetness
- Topography and Barrock
- Topography
- Fine texture
- Fine texture and Wetness
- Organic
- Marsh
- Wetness
- Unclassified
- Water

Scale



Universal Transverse Mercator
(UTM) Projection

Manitoba Land Resource Unit
Brandon Research Centre
September 1997

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 modifiers 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).

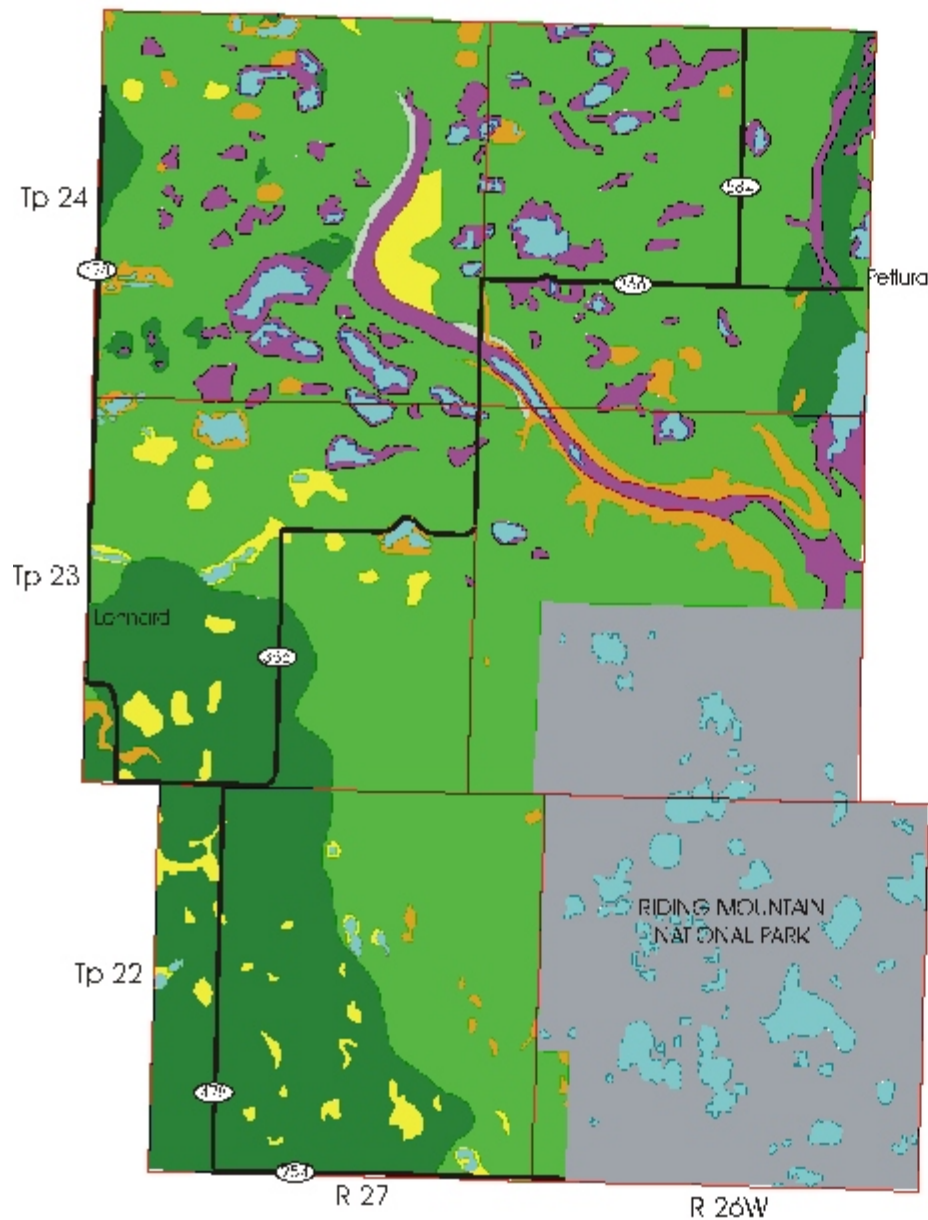
This generalized interpretive map is based on the dominant soil series and phases for each soil polygon. The CLI subclass limitations cannot be portrayed at this generalized map scale.

Table 6. Agricultural Capability¹

Class Subclass	Area (ha)	Percent of RM
2	9382	16.1
2M	13	0.0
2T	9237	15.9
2W	112	0.2
2X	21	0.0
3	27443	47.2
3I	186	0.3
3M	118	0.2
3MP	180	0.3
3P	216	0.4
3T	26702	45.9
3X	41	0.1
4	135	0.2
4T	135	0.2
5	1398	2.4
5M	362	0.6
5W	1036	1.8
6	1569	2.7
6T	970	1.7
6W	599	1.0
Organic	3381	5.8
Unclassified	12040	20.7
Water	2844	4.9
Total	58192	100.0

¹ Based on **dominant** soil, slope gradient, and slope length of each soil polygon.

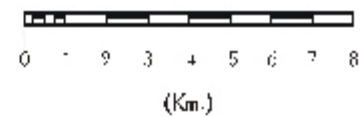
Agriculture Capability Map



Canada Land Inventory Classes

- Class 1
- Class 2
- Class 3
- Class 4
- Class 5
- Class 6
- Class 7
- Organic
- Unclassified
- Water

Scale



Universal Transverse Mercator
(NAD 1983) Projection

Land Resources 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 limitation 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.

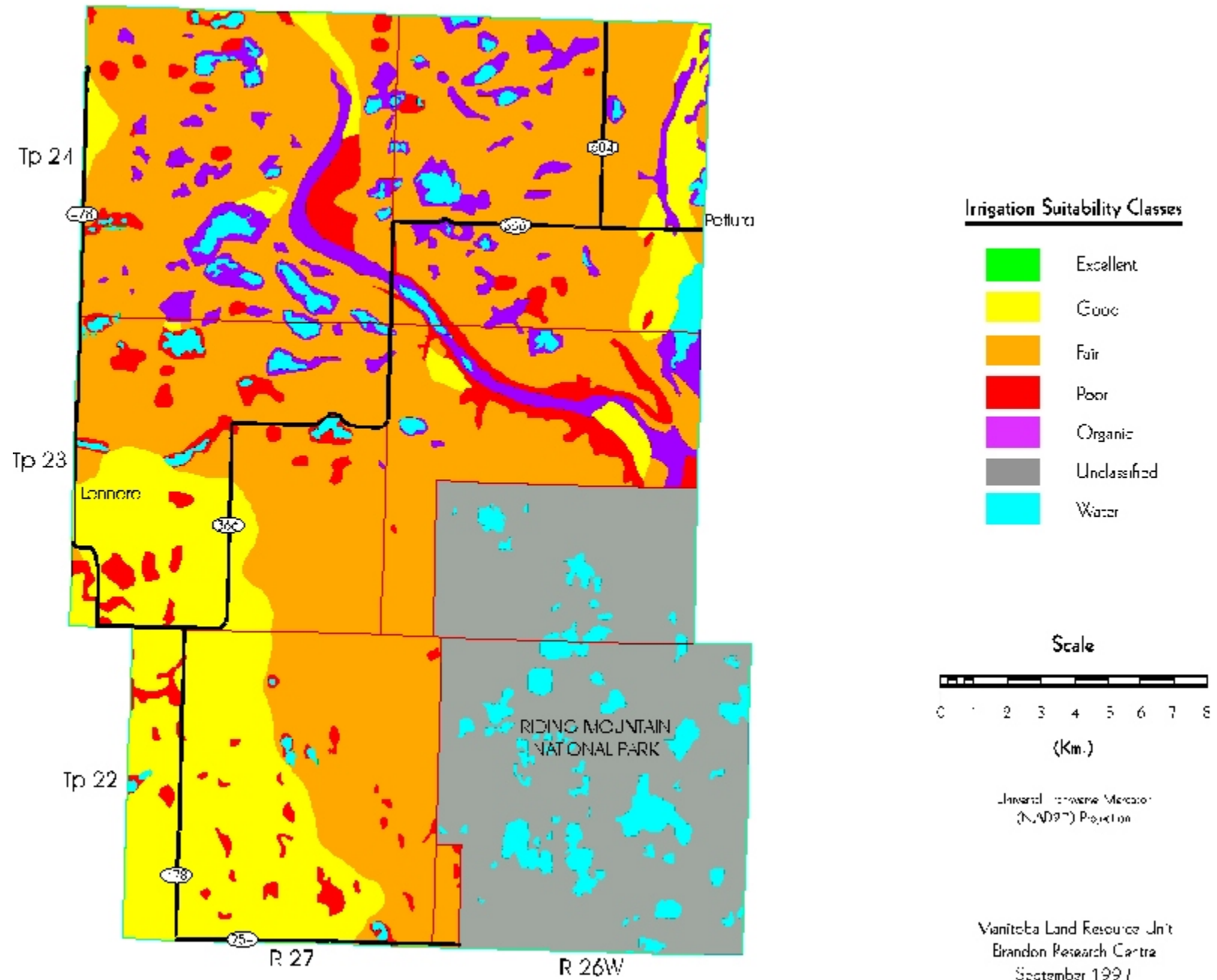
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

Table 7. Irrigation Suitability¹

Class	Area (ha)	Percent of RM
Excellent	0	0.0
Good	9807	16.9
Fair	27088	46.6
Poor	3010	5.2
Organic	3379	5.8
Unclassified	12037	20.7
Water	2842	4.9
Total	58163	100.0

¹ Based on **dominant** soil, slope gradient, and slope length of each soil polygon.

Irrigation Suitability Map



Potential Environmental Impact Under Irrigation Map.

A major 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.

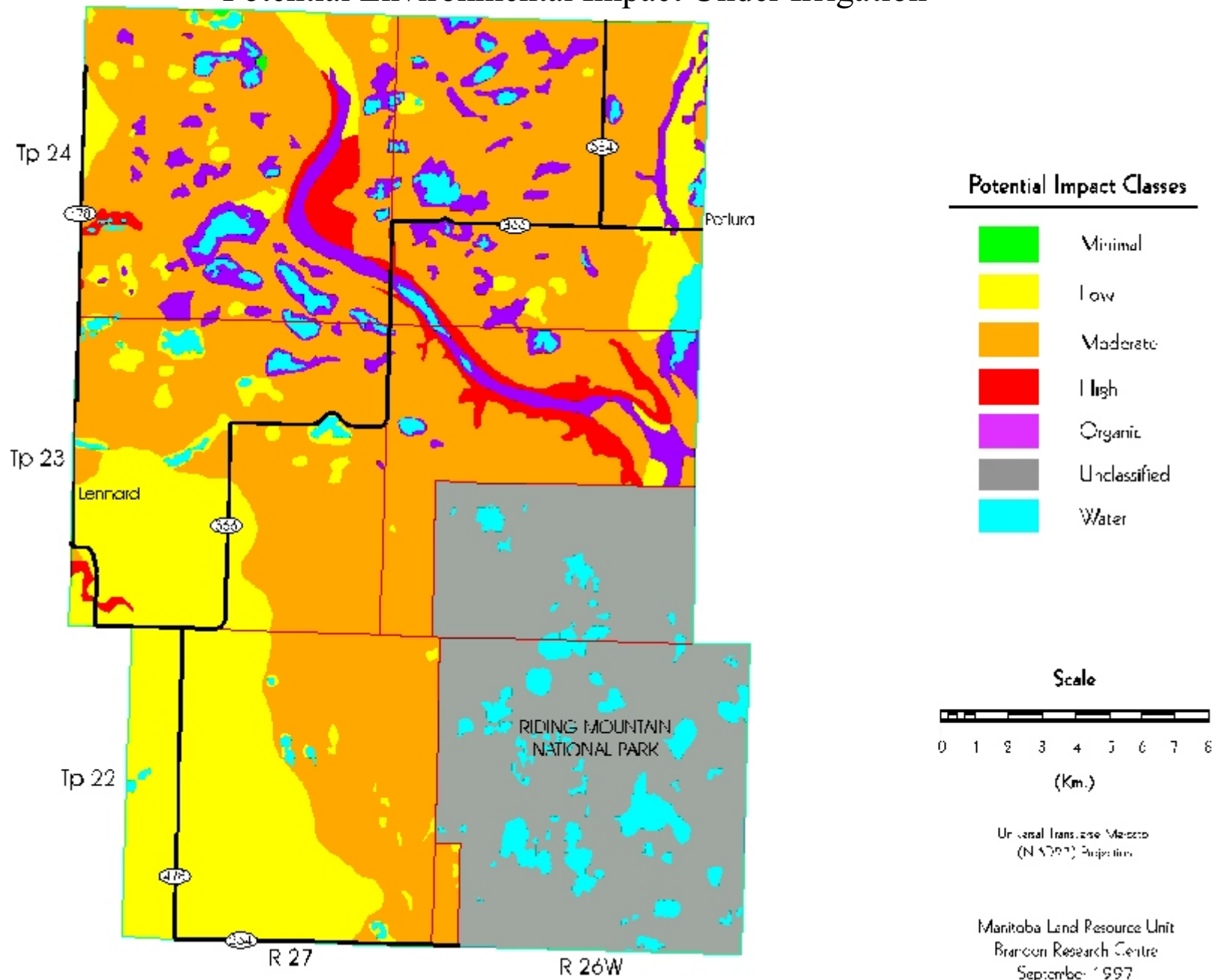
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 8. Potential Environmental Impact Under Irrigation¹

Class	Area (ha)	Percent of RM
Minimal	20	0.0
Low	11432	19.7
Moderate	26984	46.4
High	1470	2.5
Organic	3379	5.8
Unclassified	12037	20.7
Water	2842	4.9
Total	58163	100.0

¹ Based on the **dominant** soil, slope gradient, and slope length of each soil polygon.

Potential Environmental Impact Under Irrigation



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 map shows 5 classes of soil erosion risk based on bare unprotected soil:

negligible
low
moderate
high
severe.

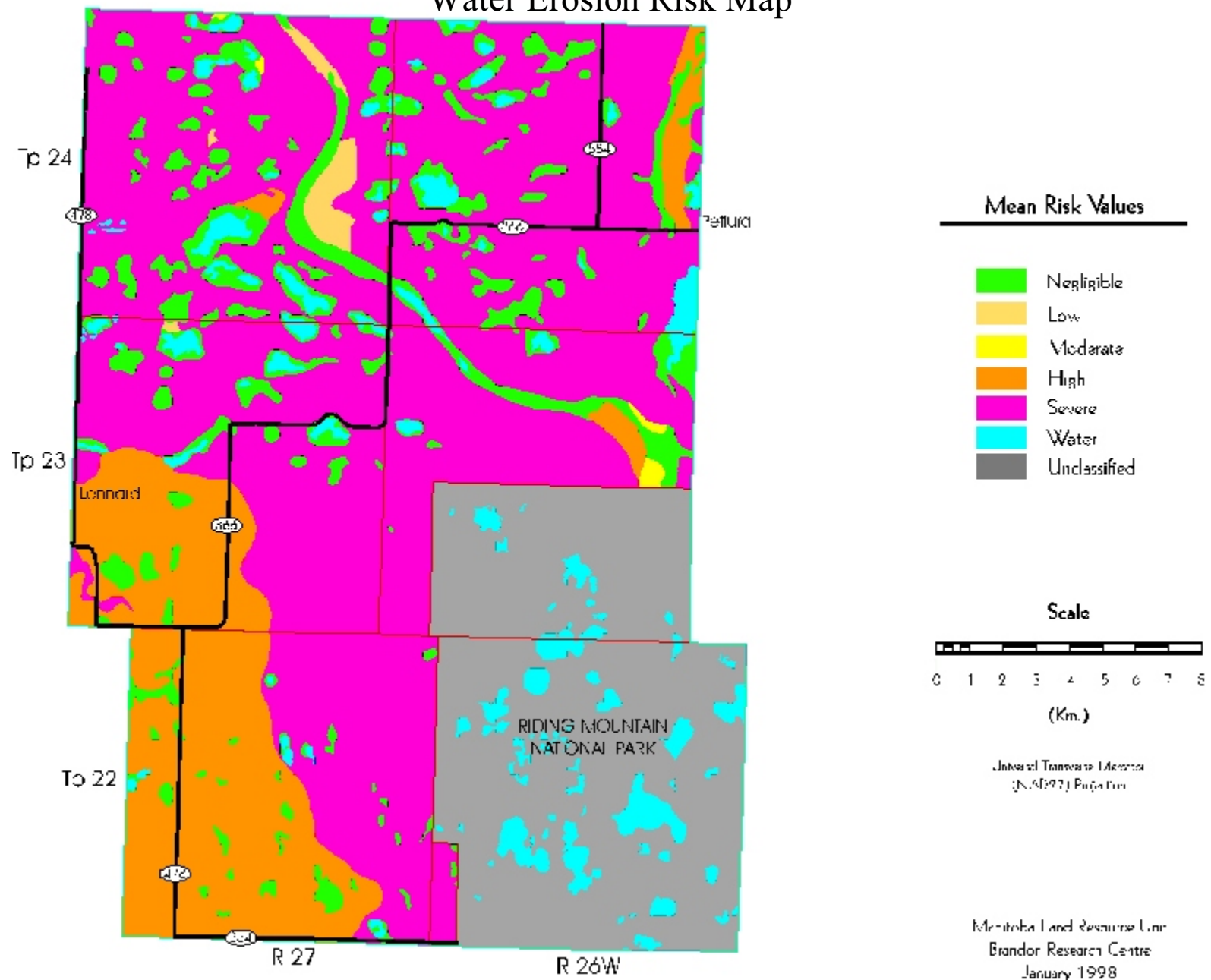
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

Table 9. Water Erosion Risk¹

Class	Area (ha)	Percent of RM
Negligible	5123	8.8
Low	488	0.8
Moderate	108	0.2
High	8706	15.0
Severe	28859	49.6
Unclassified	12037	20.7
Water	2842	4.9
Total	58163	100.0

¹ Based on the **dominant** soil, slope gradient, and slope length of each soil polygon.

Water Erosion Risk Map



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.

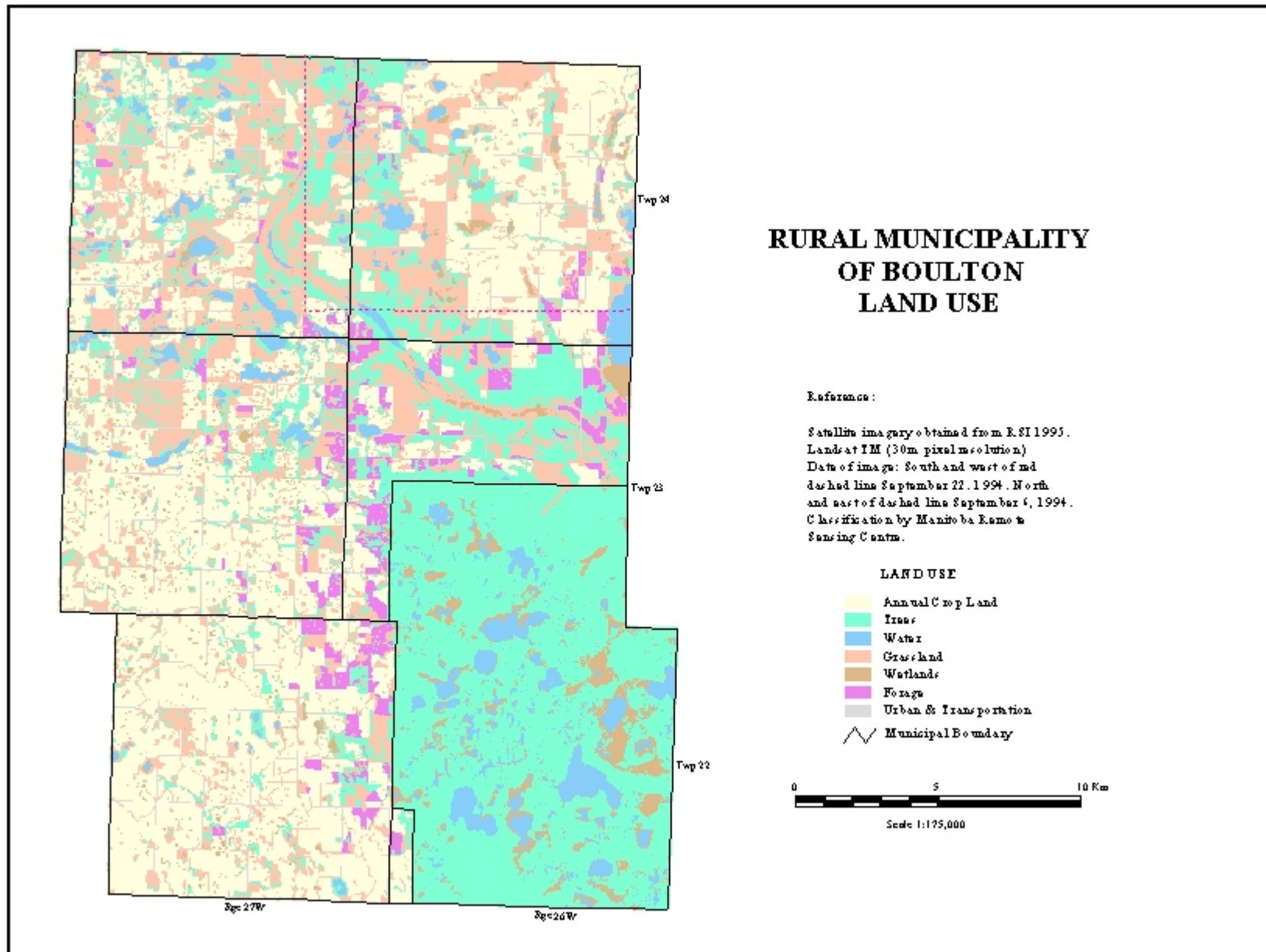
Water - open water - lakes, rivers streams, ponds, and lagoons.

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

Table 10. Land Use¹

Class	Area (ha)	Percent of RM
Annual Crop Land	20152	34.2
Forage	1953	3.3
Grasslands	12562	21.3
Trees	17718	30.0
Wetland	2158	3.7
Water	3293	5.6
Urban and Transportation	1156	2.0
Total	58992	100.0

¹ Land use information (1995) and map supplied by Prairie Farm Rehabilitation Administration. Areas may vary from previous maps due to differences in analytical procedures.



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