Agriculture and Agri-Food Canada
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Rural Municipality of Piney

Information Bulletin 99-22

Soils and Terrain

An introduction to the land resource

Land Resource Unit
Brandon Research Centre

Canada

Rural Municipality of Piney

Information Bulletin 99-22

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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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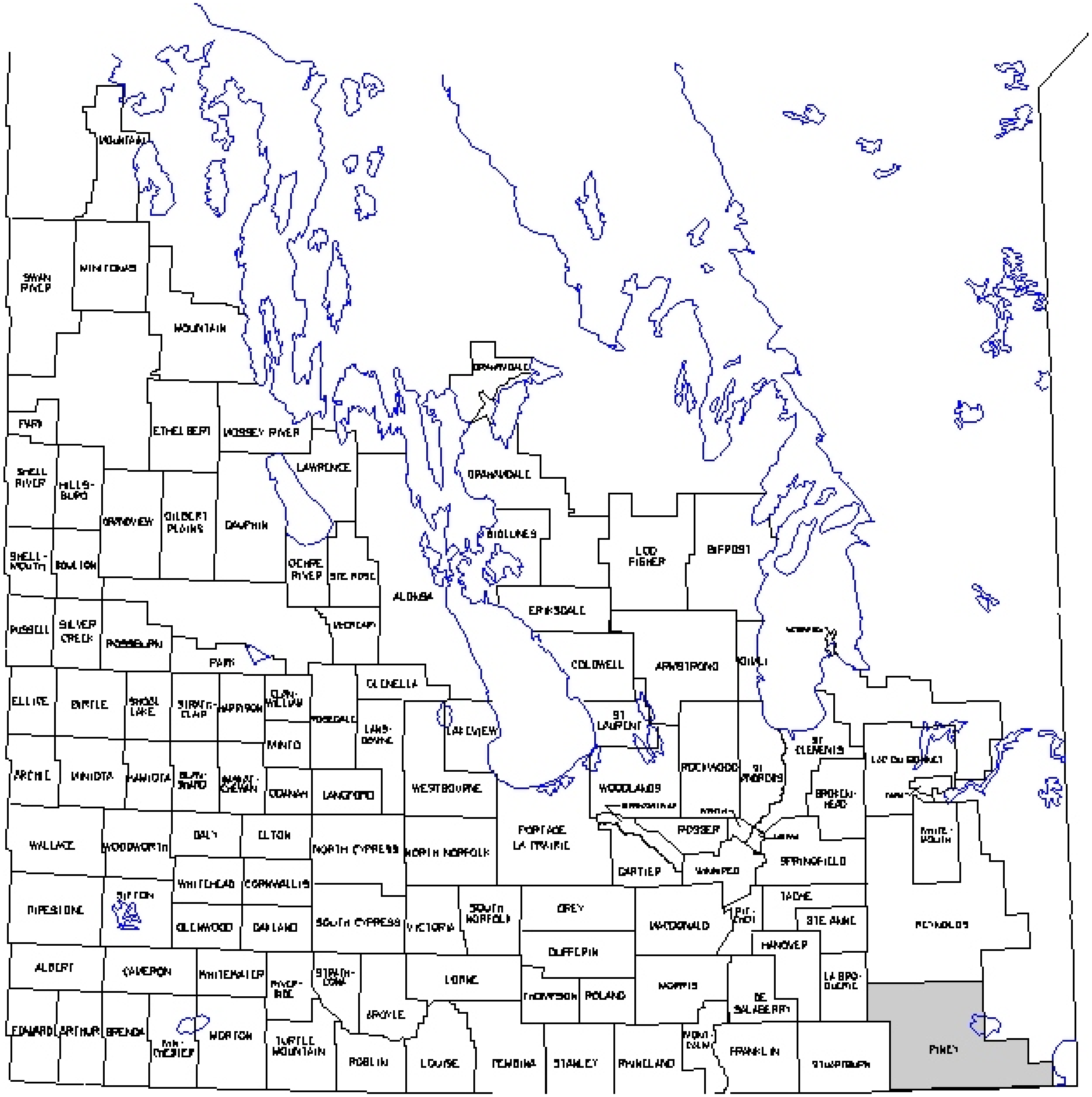


Figure 1. Rural municipalities of southern Manitoba.

INTRODUCTION

The location of the Rural Municipality of Piney 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.

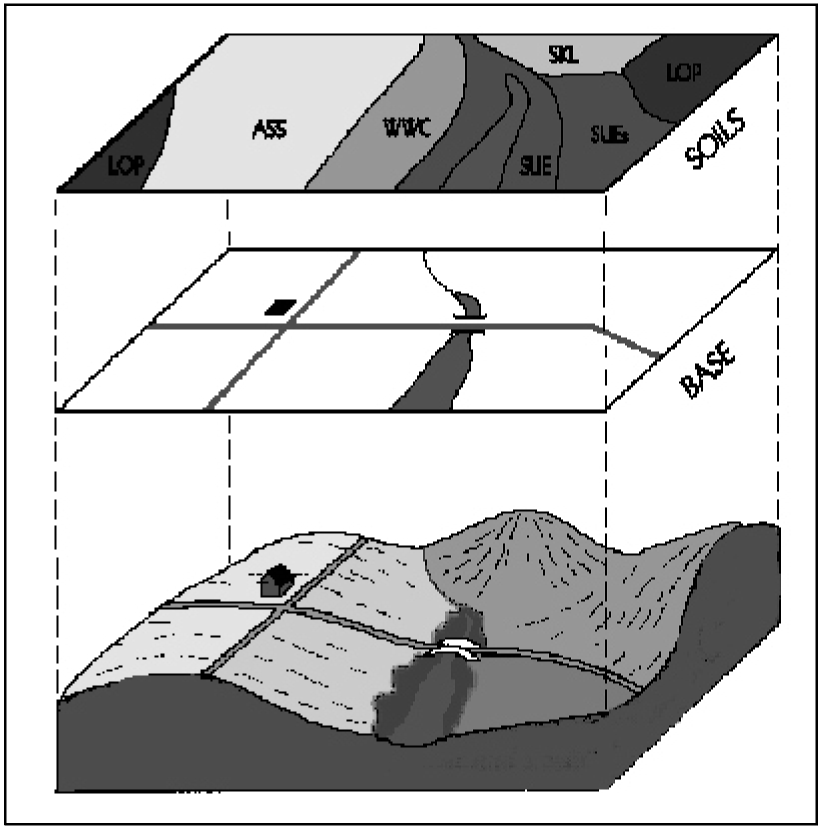


Figure 2. Soil and Base Map data.

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 Piney covers an area of 246 462 ha (approximately 26.7 townships) located immediately north of the Canada-United States border in southeastern Manitoba (page 3). The municipality is sparsely populated as much of the land area is reserved for use within the Sandilands, Cat Hills and Wampum Provincial Forests. Small centres of population are located in Sprague, Woodridge, Vassar, South Junction, Piney, Sandilands, St. Labre, Wampum and Middlebro.

Weather data from Steinbach represents conditions in the western portion of the area while the eastern part, which tends to be cooler and more humid, is related to data from Sprague. Mean annual temperatures decrease from 2.4˚C in the west to 2.1˚C in the east while mean annual precipitation increases from 510 mm in the west to 605 mm in the east (Environment Canada, 1993). The average frost-free period of 115 days in the west decreases to less than 100 days in the east and degree-days above 5˚C accumulated from May to September average 1644 in the west and 1551 days in the east (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 varies from near 250 mm in the west to just over 200 mm in the east. The estimated effective growing degree-days accumulated from May to September decrease from 1450 in the west to 1350 in the east (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.

Physiographically, the central portion of the municipality is dominated by an extensive area known as the Bedford Hills. This upland rises in elevation to 390 metres above sea level (m asl), some 90 metres above the lower-lying terrain of the Whitemouth Lake Lowland to the east and the Southeastern Plain to the west. The Bedford Hills is a gently sloping to hummocky area with local relief under 3 metres and slopes of 2 to 5 percent except in dissected areas along the edge of the upland with higher relief and slopes in excess of 5 percent (page 9). The Southeastern Plain and the Whitemouth Lake Lowland are level to very gently undulating with slopes under 2 percent (Canada-Manitoba Soil Survey, 1980). Surface gradients are low throughout these portions of the municipality, resulting in extensive areas of very poor drainage. Surface drainage is to Whitemouth Lake and then north through the Whitemouth River while Sprague Creek drains south to the Roseau River and the Rat River drains north to the Red River. Drainage for agricultural purposes has been improved in places by man-made drains constructed to enhance runoff and reduce the duration of surface ponding.

Soil materials in the municipality consist of sandy and gravelly outwash and beach deposits, local areas of stony calcareous loam textured glacial till overlain in places by sandy to coarse-loamy textured lacustrine deposits and extensive areas of shallow to deep organic deposits. Clayey lacustrine sediments are found in the Whitemouth Lake Lowland (page 11).

Soils in the municipality have been mapped at a reconnaissance level (1:126 720 scale) and published in the soil survey report for the South-Eastern map sheet area (Smith et al., 1964). The organic soils within the Roseau River Watershed have been mapped at a semi-detailed 1:63 360 scale (Mills et al., 1977). According to the Canadian System of Soil Classification (Soil Classification Working Group, 1998), the soils are classified as Eluviated Brunisols and Gray Luvisols developed on sandy to loamy textured materials and Dark Gray Chernozems or Luvisols developed on clayey lacustrine sediments. Poorly drained sites associated with these soils are classified as Humic Gleysols and peaty phases of Gleysolic soils. Organic soils developed on forest, sphagnum or fen peat are dominant in the low-lying terrain surrounding the Bedford Hills (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 soil surveys for the area.

Slightly more than 50 percent of the area is affected by very poor to poor drainage conditions associated with the flat topography and high watertable of the soils in the Whitemouth Lake Lowland and the Southeastern Plain. Imperfectly drained soils occupy 19 percent of the area and well to rapidly drained soils, mainly in the Bedford Hills, cover 30 percent (page 13).

Management considerations are primarily related to coarse texture, organic soils and wetness (page 15). Stony and cobbly surface conditions are common where the glacial till is close to the surface. Soils throughout the municipality are non-saline.

The mineral soils in the municipality are rated dominantly in **Class 3** (7 percent) and **Class 5** (25 percent) for agricultural capability with moderately severe to very severe limitations for agriculture (page 17). The organic soils cover 41 percent of the area and have no capability for agriculture in their natural undrained state. About 33 percent of the soils are rated as **Fair** for irrigation suitability, 7 percent are rated **Good**, and the remainder are rated as **Poor**, primarily due to poor drainage (page 19). The organic soils are not classified for irrigation suitability. The major problem limiting the agricultural use of soils is inadequate drainage. Surface stones and cobbles, peaty surface soils and potential degradation due to erosion by wind are other important limitations.

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 has been included in this bulletin (page 21). As shown, nearly 19 percent of the area is at **Low** risk of degradation due to the presence of less permeable till materials which reduce the potential for deep leaching of contaminants. In contrast, the risk for leaching is **High** on well drained sand and gravel soils and imperfectly to poorly drained sandy to loamy soils in which the watertable is close to the surface. 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 and where special practices should be adopted to mitigate this risk are shown on page 23. Eighty percent of the land in the municipality is at **Negligible** risk of degradation from water erosion, due primarily to low relief and sandy soil texture. The risk of water erosion increases to **Low**, **Moderate** or **High** on local soil areas with higher local relief and steeper (2 to 9 percent) slopes. However, the risk of erosion by wind is high on sandy soils throughout the area. Management practices focus primarily on maintaining adequate crop residues to provide sufficient surface cover.

Land use in the RM of Piney consists of forestry and agriculture. An assessment of the status of land use in 1994 was obtained through an analysis of satellite imagery showed that annual crops for agriculture covered 6 percent of the land area while forage production occurred on 1.4 percent and grassland covered 7 percent. Treed vegetation occupies over one-half of the area and wetlands consisting mainly of very poorly drained organic terrain cover 29 percent. Merchantable forest on well to poorly drained mineral soils and on many of the organic soils is utilized by the forest industry. These areas also provide habitat for wildlife and have potential for recreational uses. Non-agricultural uses such as infrastructure for urban areas, transportation and recreation occupy slightly over 1 percent of the municipality (page 27).

The majority of soils in the RM of Piney have moderately severe to very severe limitations for arable agriculture. Sandy soils require careful management to protect against the risk of wind erosion and to maintain productivity and soils with extremely stony and cobbly surface conditions require stone clearing to permit annual cultivation. A major portion of the municipality has low relief and a dominance of organic soils. Imperfectly to poorly drained soils with seasonal high water tables are subject to surface ponding in spring or following heavy rains. Consequently, improvement and maintenance of water management infrastructure is necessary to reduce surface ponding while maintaining adequate 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:

<u>Derived Maps</u>
Slope
Generalized Soil
Drainage
Management Considerations

<u>Interpretative Maps</u>
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.

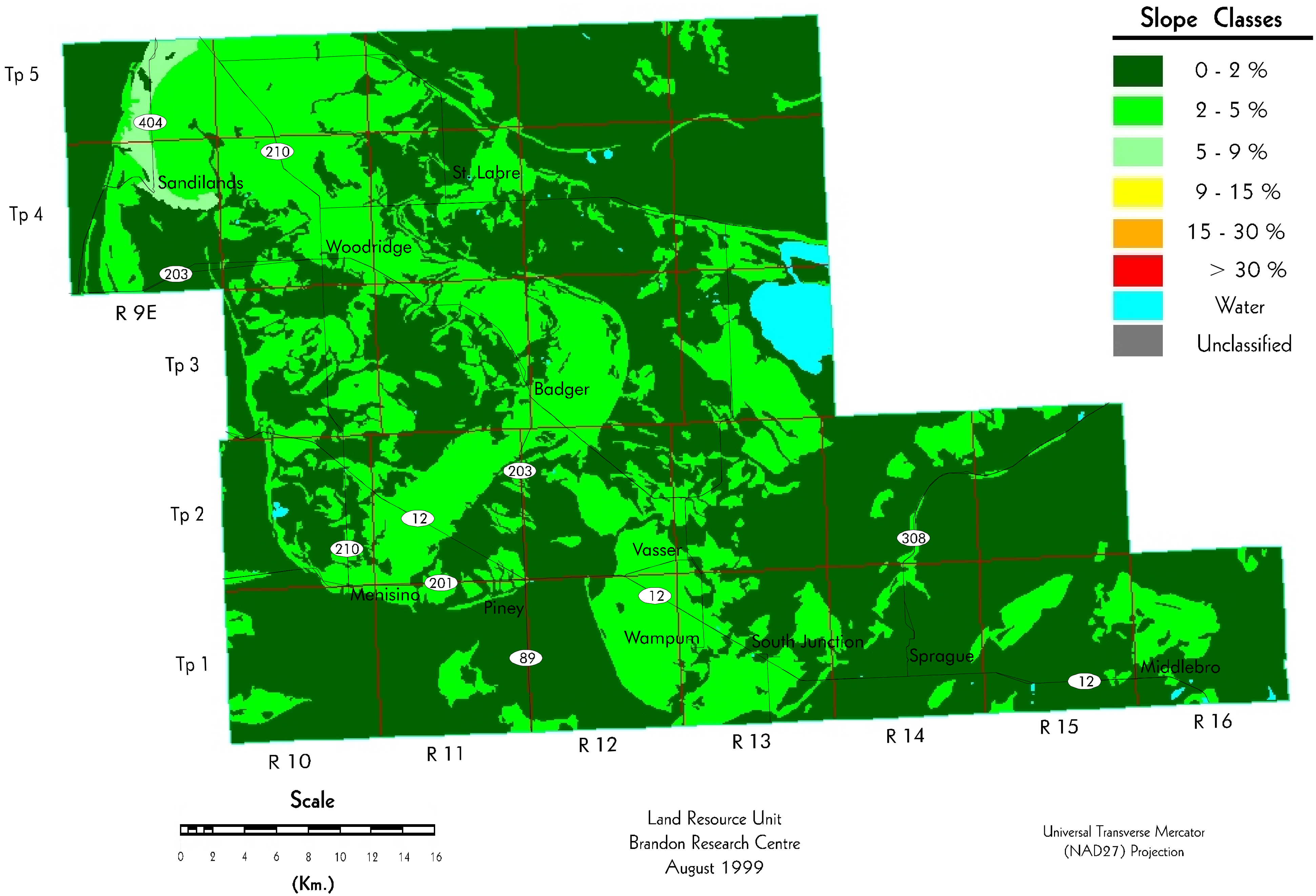
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil and terrain layer database. Specific colours are used to indicate the dominant slope class for each polygon in the RM. Additional slope classes may occur in each polygon area,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

Table 1. Slope Classes[1]

Slope Class	Area (ha)	Percent of RM
0 - 2 %	162065	65.8
2 - 5 %	79650	32.3
5 - 9 %	1923	0.8
9 - 15 %	0	0.0
15 - 30 %	0	0.0
> 30 %	0	0.0
Unclassified	6	0.0
Water	2818	1.1
Total	246462	100.0

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

Slope Map



Land Resource Unit
Brandon Research Centre
August 1999

Universal Transverse Mercator
(NAD27) Projection

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.

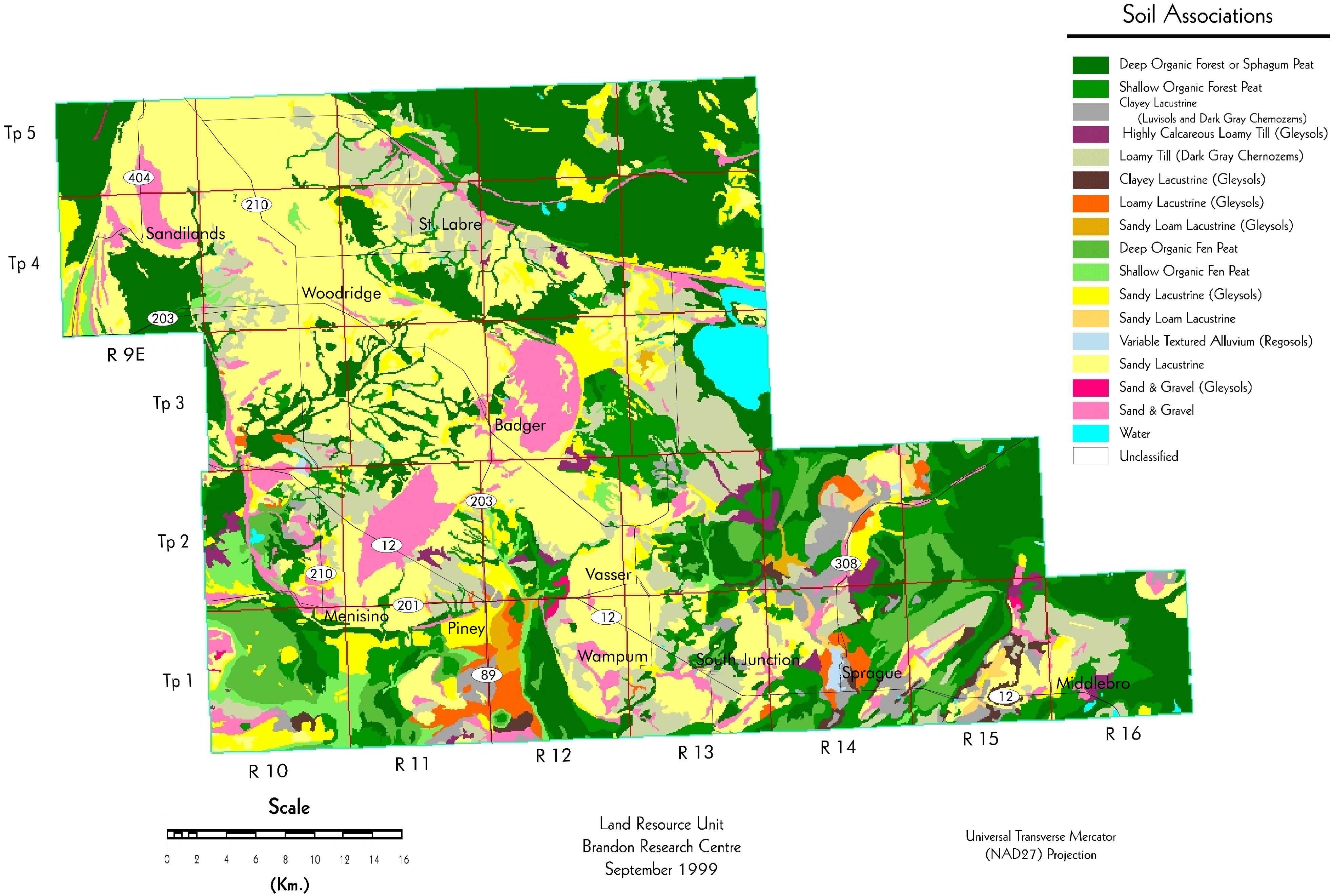
More detailed maps showing the dominant and subdominant soils in each polygon can also be produced at larger map scales.

Table 2. Generalized Soil Groups[1]

Soil Groups	Area (ha)	Percent of RM
Deep Organic Forest or Sphagnum Peat	59661	24.2
Shallow Organic Forest Peat	26493	10.7
Clayey Lacustrine (Luvisols and Dark Gray Chernozems)	5572	2.3
Highly Calcareous Loamy Till (Gleysols)	2494	1.0
Loamy Till (Luvisols)	26612	10.8
Clayey Lacustrine (Gleysols)	1859	0.8
Loamy Lacustrine (Gleysols)	3292	1.3
Sandy Loam Lacustrine (Gleysols)	1082	0.4
Deep Organic Fen Peat	9301	3.8
Shallow Organic Fen Peat	5399	2.2
Sandy Lacustrine (Gleysols)	14562	5.9
Sandy Loam Lacustrine	823	0.3
Variable Textured Alluvium (Regosols)	507	0.2
Sandy Lacustrine	68993	28.0
Sand and Gravel (Gleysols)	304	0.1
Sand and Gravel	16683	6.8
Water	2818	1.1
Unclassified	6	0.0
Total	246462	100.0

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

Generalized Soil Map



Land Resource Unit
Brandon Research Centre
September 1999

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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.

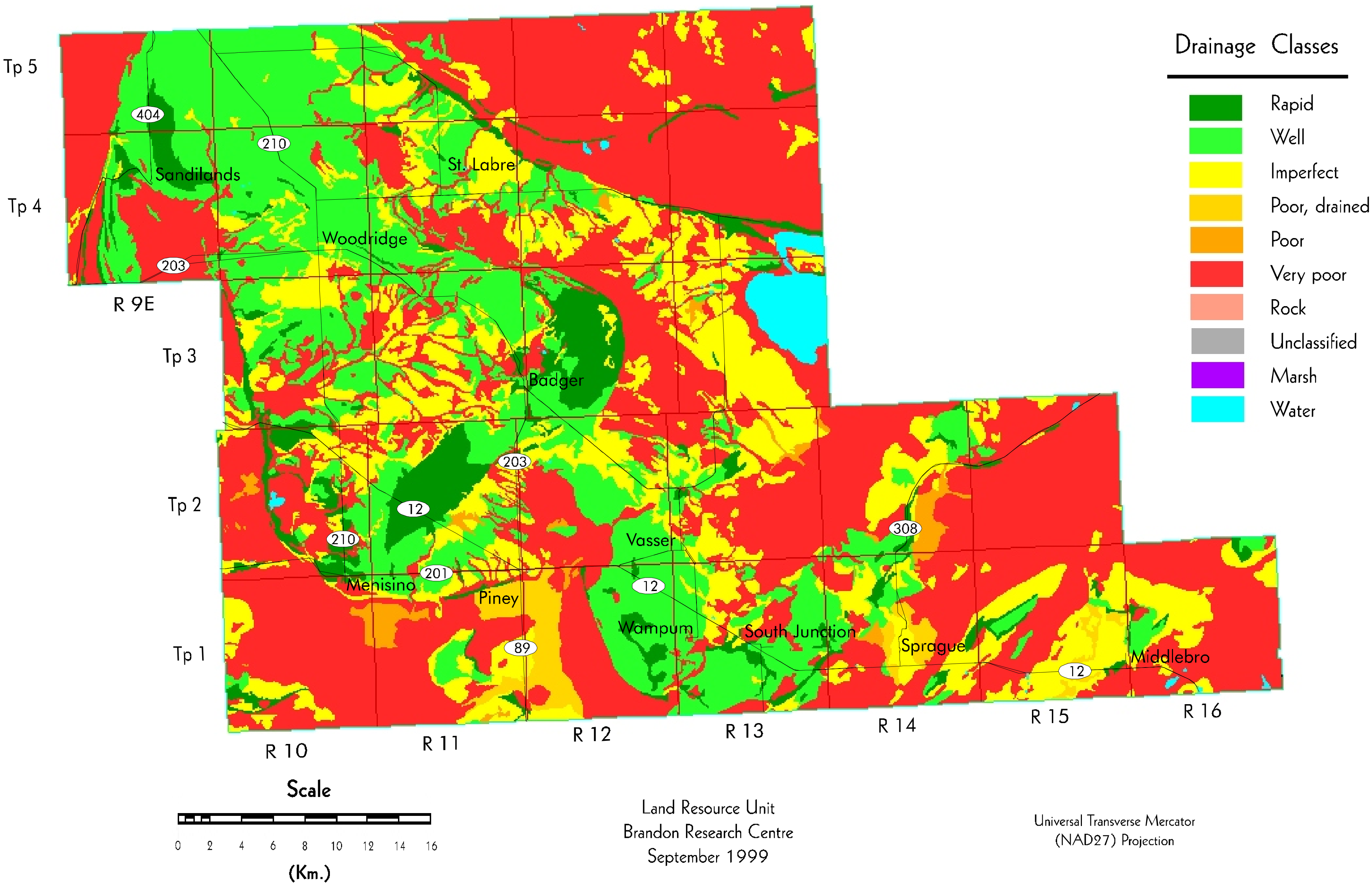
Drainage classification is based on the dominant soil series within each individual soil polygon.

Table 3. Drainage Classes[1]

Drainage Class	Area (ha)	Percent of RM
Very Poor	117655	47.7
Poor	2757	1.1
Poor, drained	4034	1.6
Imperfect	46006	18.7
Well	57854	23.5
Rapid	15330	6.2
Rock	0	0.0
Marsh	0	0.0
Unclassified	6	0.0
Water	2818	1.1
Total	246462	100.0

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

Soil Drainage Map



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September 1999

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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.

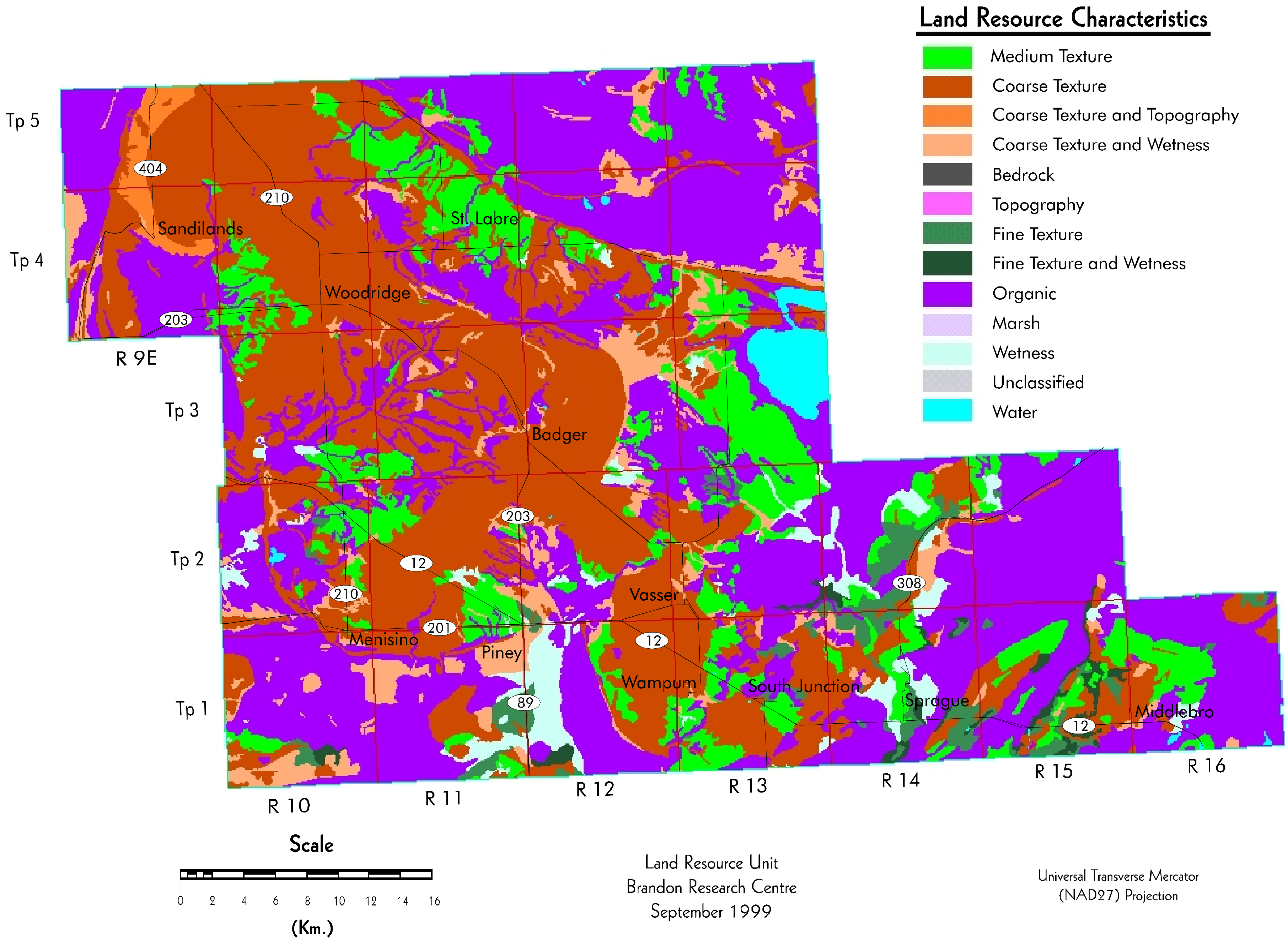
R = Bedrock - soil landscapes that have shallow depth to bedrock (< 50 cm) and/or exposed bedrock which may prevent the use of some or all tillage practices as well as the range of potential crops. They require special cropping and management practices to sustain agricultural production.

Table 4. Management Considerations[1]

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	5572	2.3
Fine Texture and Wetness	1859	0.8
Fine Texture and Topography	0	0.0
Medium Texture	27942	11.3
Coarse Texture	83753	34.0
Coarse Texture and Wetness	14866	6.0
Coarse Texture and Topography	1923	0.8
Topography	0	0.0
Bedrock	0	0.0
Wetness	6868	2.8
Organic	100854	40.9
Marsh	0	0.0
Unclassified	6	0.0
Water	2818	1.1
Total	246462	100.0

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

Management Considerations Map



Land Resource Unit
Brandon Research Centre
September 1999

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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]

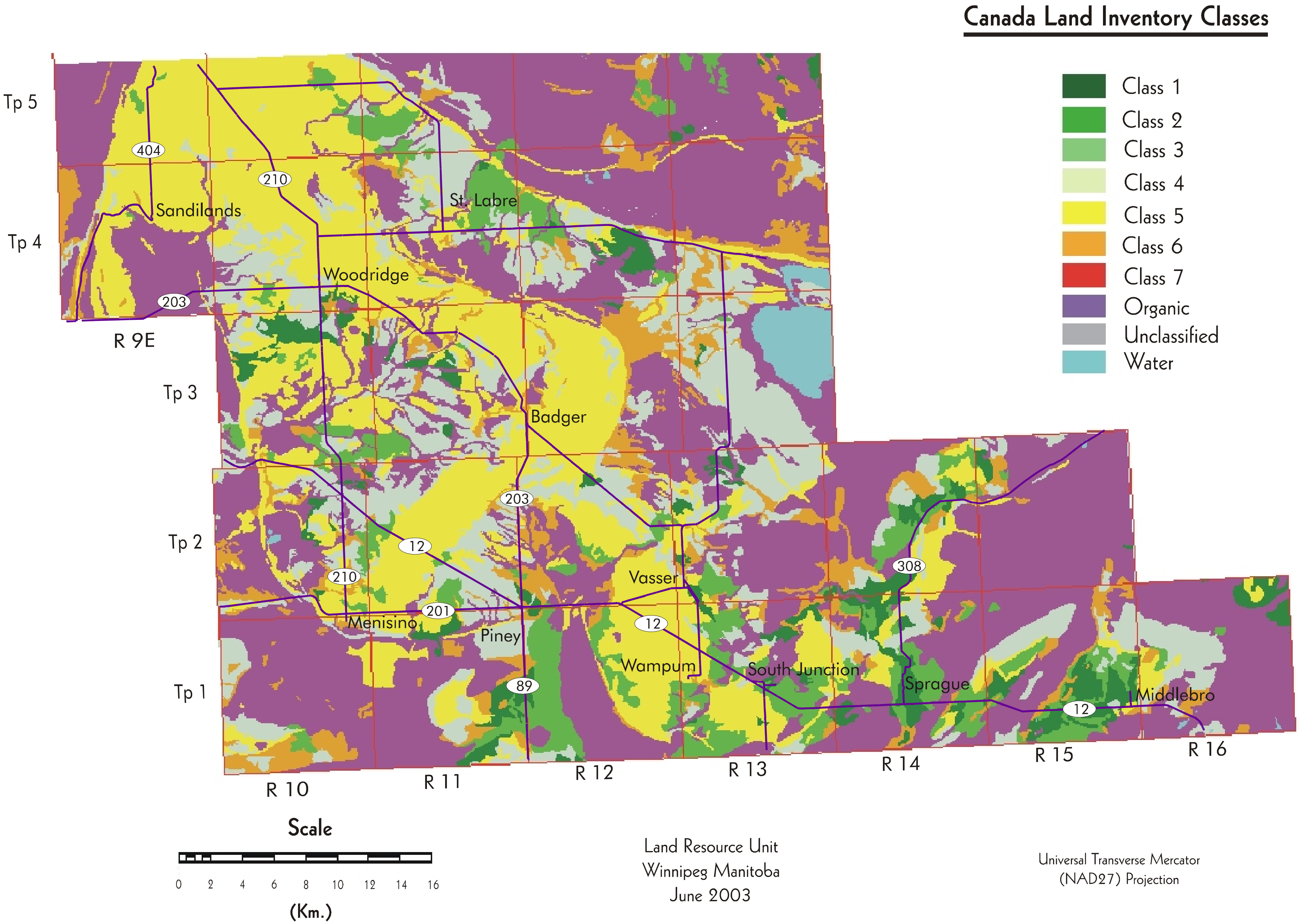
Class Subclass	Area (ha)	Percent of RM
2	**9722**	**3.9**
2D	1696	0.7
2IW	281	0.1
2M	1851	0.8
2MI	205	0.1
2MP	3763	1.5
2W	1926	0.8

Table 5. Agricultural Capability[1] (Cont.)

Class Subclass	Area (ha)	Percent of RM
3	**17169**	**7.0**
3D	8131	3.3
3DW	2235	0.9
3I	8	0.0
3M	3487	1.4
3W	3308	1.3
4	**37169**	**15.1**
4DP	18787	7.6
4M	17703	7.2
4W	705	0.3
5	**61678**	**25.0**
5M	59011	24.0
5W	2667	1.1
6	**16796**	**6.8**
6P	13	0.0
6W	16782	6.8
Unclassified	**7**	**0.0**
Water	**2797**	**1.1**
Organic	**100862**	**41.0**
Total	**246225**	**100.0**

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

Agriculture Capability Map



Land Resource Unit
Winnipeg Manitoba
June 2003

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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.

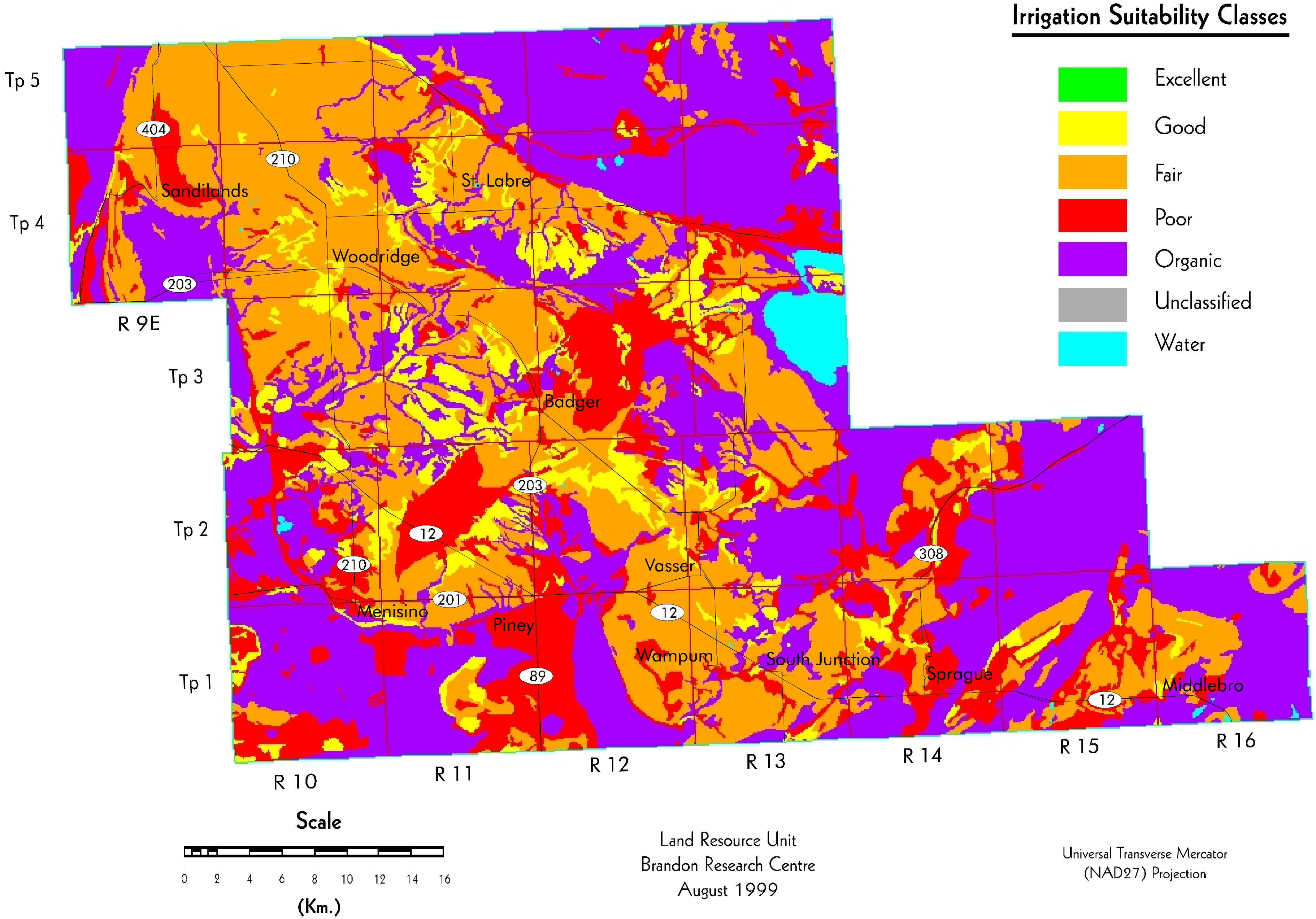
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

Table 6. Irrigation Suitability[1]

Class	Area (ha)	Percent of RM
Excellent	0	0.0
Good	17957	7.3
Fair	80941	32.8
Poor	43886	17.8
Organic	100854	40.9
Unclassified	6	0.0
Water	2818	1.1
Total	246462	100.0

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

Irrigation Suitability Map



Land Resource Unit
Brandon Research Centre
August 1999

Universal Transverse Mercator
(NAD27) Projection

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.

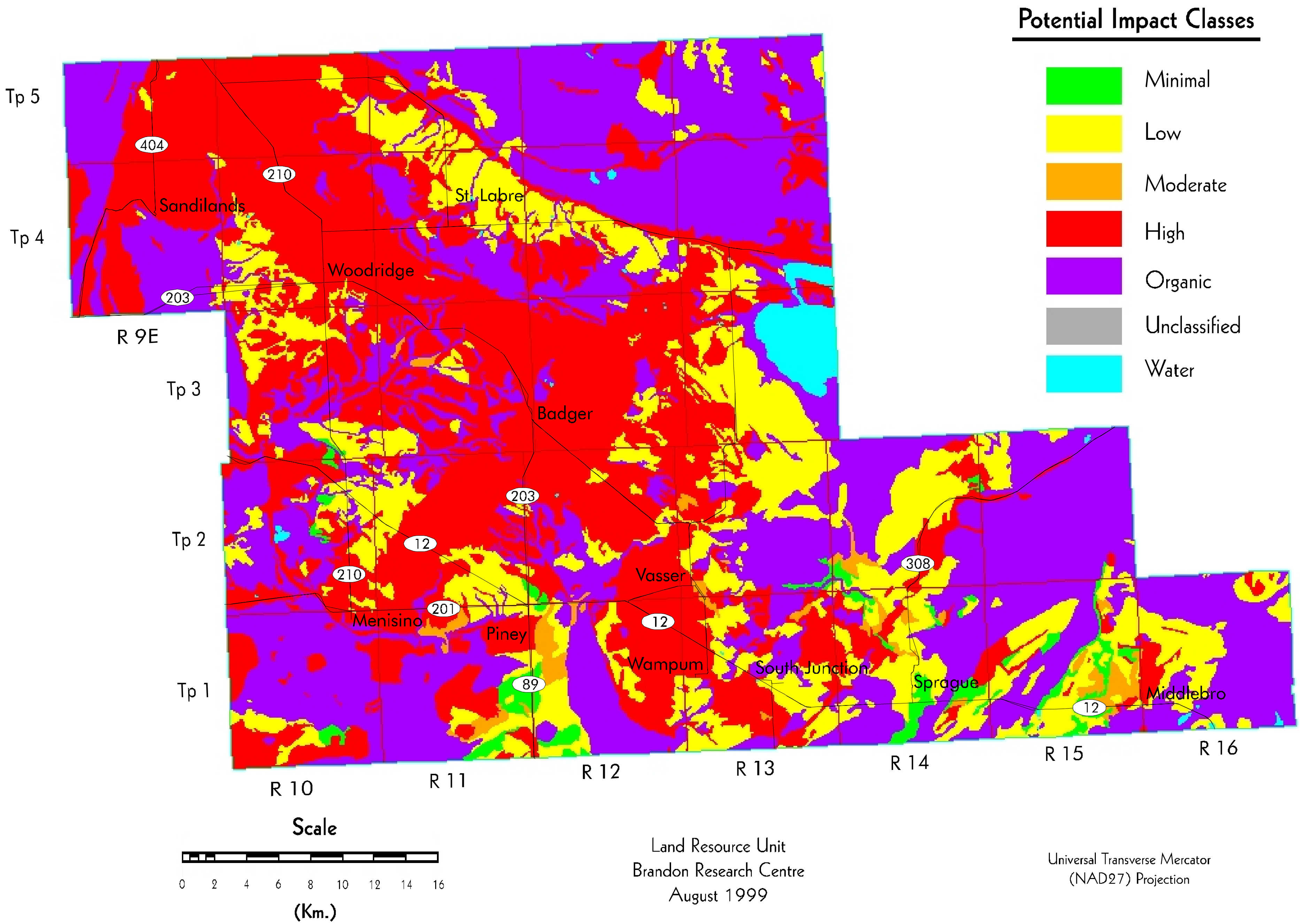
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 7. Potential Environmental Impact Under Irrigation[1]

Class	Area (ha)	Percent of RM
Minimal	3812	1.5
Low	45695	18.5
Moderate	3266	1.3
High	93215	37.8
Organic	97649	39.6
Unclassified	6	0.0
Water	2818	1.1
Total	246462	100.0

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

Potential Environmental Impact Under Irrigation



Land Resource Unit
Brandon Research Centre
August 1999

Universal Transverse Mercator
(NAD27) Projection

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

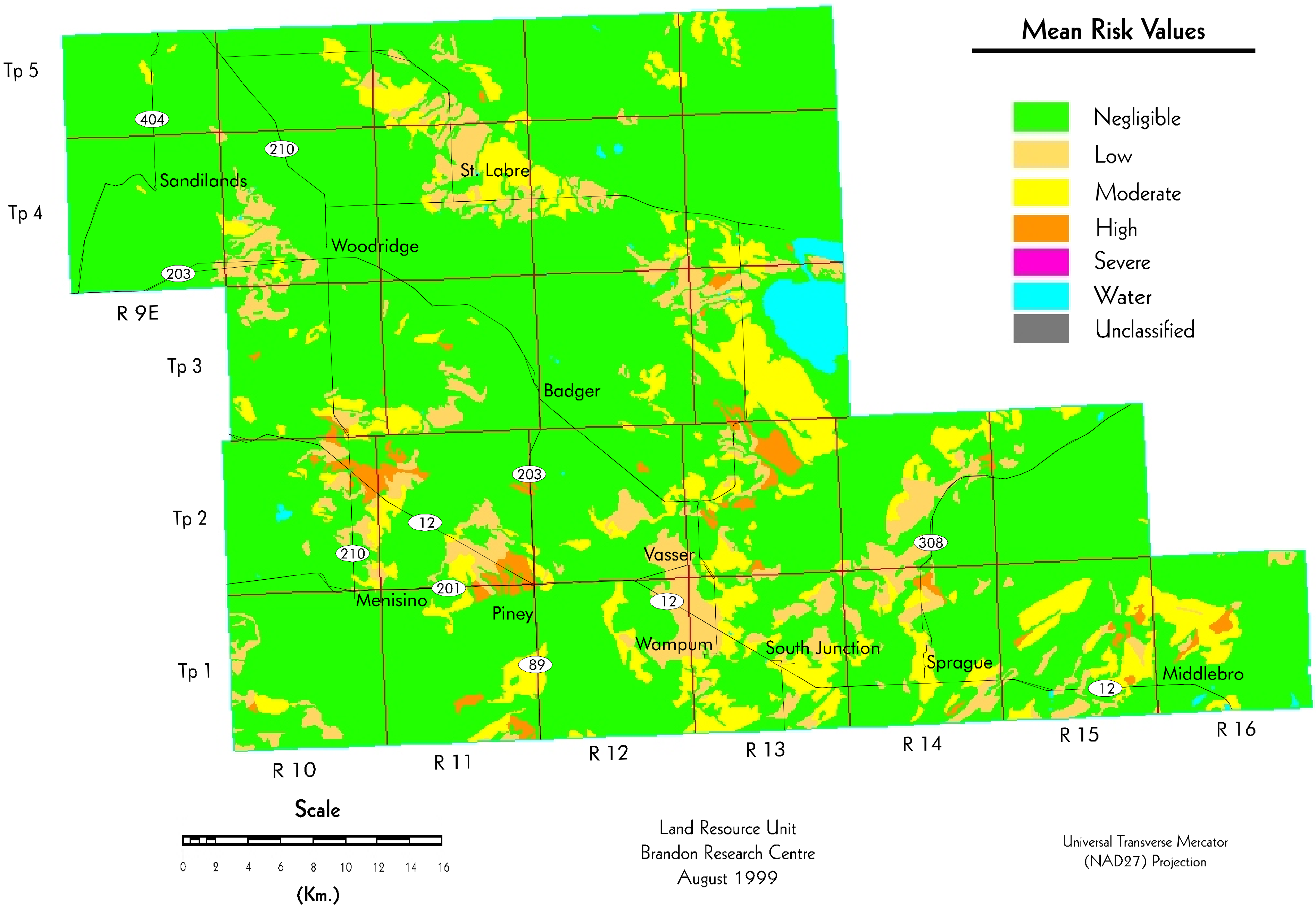
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

Table 8. Water Erosion Risk[1]

Class	Area (ha)	Percent of RM
Negligible	196977	79.9
Low	18707	7.6
Moderate	24283	9.9
High	3671	1.5
Severe	0	0.0
Unclassified	6	0.0
Water	2818	1.1
Total	246462	100.0

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

Water Erosion Risk Map



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(NAD27) Projection

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.

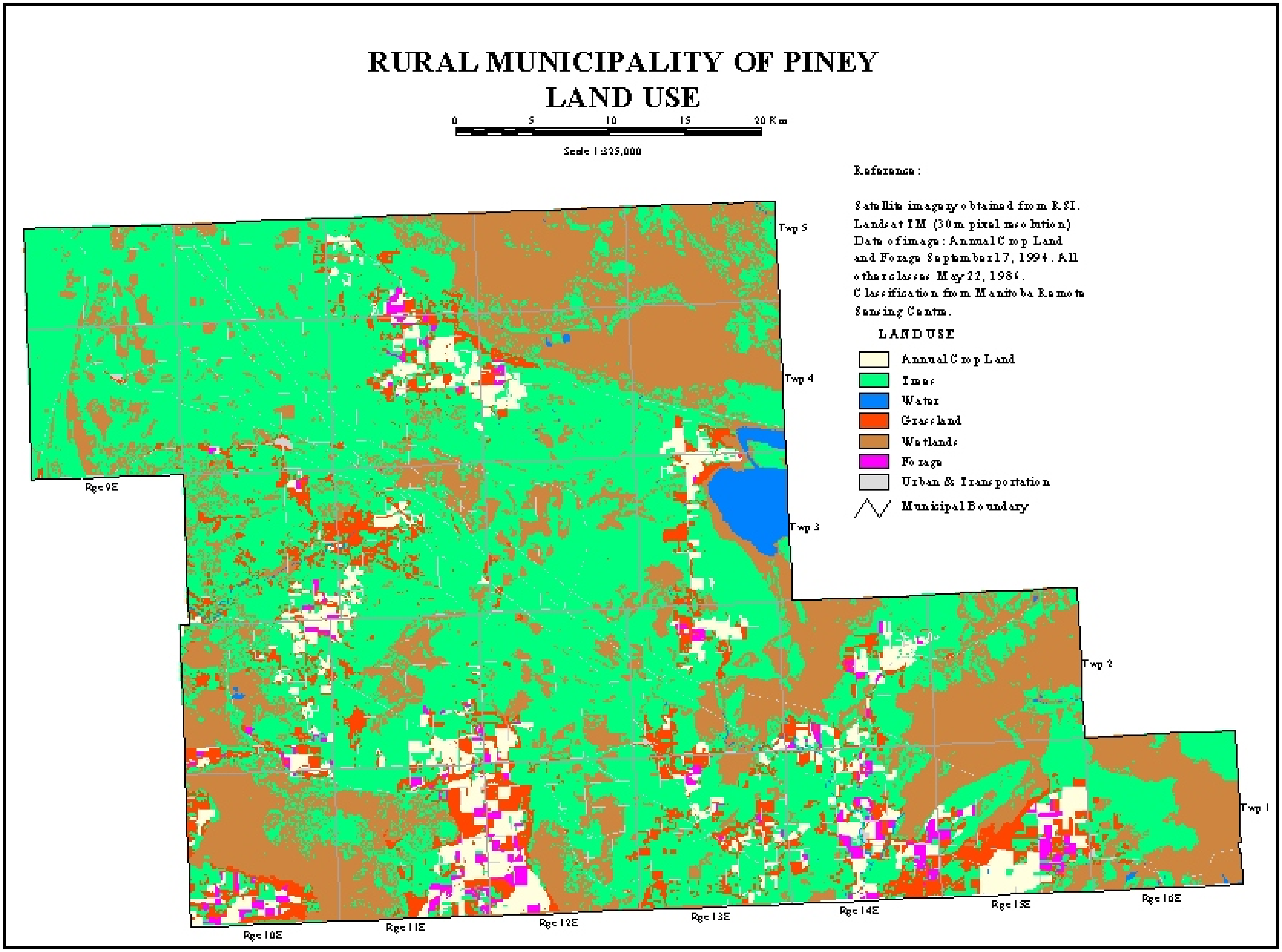
Water - open water - lakes, rivers streams, ponds, and lagoons.

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

Table 9. Land Use[1]

Class	Area (ha)	Percent of RM
Annual Crop Land	13410	5.7
Forage	3288	1.4
Grassland	17428	7.4
Trees	128215	54.2
Urban and transportation	3157	1.3
Water	1829	0.8
Wetlands	69416	29.3
Total	236743	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 PINEY
LAND USE
0 5 10 15 20 Km
Scale 1:325,000
Reference:
Satellite imagery obtained from RSI.
Landsat TM (30m pixel resolution)
Date of image: Annual Crop Land
and Forage September 17, 1994. All
other classes May 22, 1986.
Classification from Manitoba Remote
Sensing Centre.
LAND USE
Annual Crop Land
Trees
Water
Grassland
Wetlands
Forage
Urban & Transportation
Municipal Boundary
Twp 5
Twp 4
Twp 3
Twp 2
Twp 1
Rge 9E
Rge 10E
Rge 11E
Rge 12E
Rge 13E
Rge 14E
Rge 15E
Rge 16E

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