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Rural Municipality of Lac du Bonnet


Information Bulletin 99-26

Soils and Terrain

An introduction
to the land resource

Land Resource Unit
Brandon Research Centre



Canada 

Rural Municipality of Lac du Bonnet

Information Bulletin 99-26

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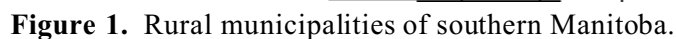
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This bulletin is available in printed or digital format. The digital bulletin is a Windows based executable file which offers additional display options, including the capability to print any portion of the bulletin.

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.

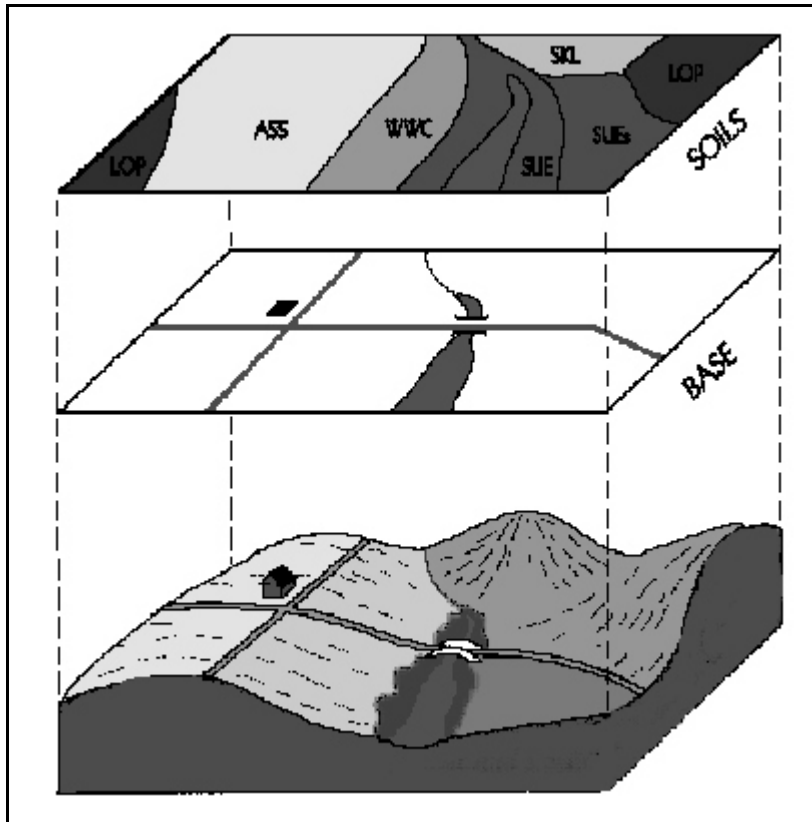


Figure 2. Soil and Base Map data.

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 Lac du Bonnet covers an area of 119 461 ha (approximately 13 townships) in southeastern Manitoba. It occupies land on both sides of the Winnipeg River and includes parts of the Agassiz and the Brightstone Sand Hills Provincial Forests (page 3). The Town of Lac du Bonnet is the main population and service centre in the area. The rural population is mainly farm-based as the extensive forested areas are largely uninhabited except for seasonal workers involved with the harvest of forest products. The population of the area increases during the summer months due to the influx of cottagers and vacationers attracted to the water-based recreation activities associated with the Winnipeg River, Lac du Bonnet and Lee River.

Climatic conditions in the municipality are characterized by weather data from Pinawa located immediately east of the area. The mean annual temperature is 1.9°C and mean annual precipitation is 559 mm (Environment Canada, 1993). The average frost-free period is 108 days and degree-days above 5°C accumulated from May to September average 1553 (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 is slightly greater than 200 mm. The estimated effective growing degree-days accumulated from May to September range from 1500 to 1400 (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 municipality is located mainly in the Lac du Bonnet Plain while a small area on the east side is in the Bloodvein River Plain. Both areas are in the Canadian Shield (Canada-Manitoba Soil Survey, 1980). The Lac du Bonnet Plain is generally level to very gently undulating with low local relief and slopes less than 2 percent except for two prominent upland areas, Milner Ridge and the Brightstone Sand Hills. These uplands have greater local relief with slopes up to 5 percent. Exposures of Precambrian bedrock increase to the east and the Bloodvein River Plain is

dominated by rock outcrops, hummocky and ridged topography, higher relief and slopes exceeding 9 percent. Elevation of the land surface falls gradually from 241 metres above sea level (m asl) in the south to 231 m asl in the northwest corner. The two uplands rise above 290 m asl and elevations increase to 273 m asl in the bedrock terrain to the east (page 9). The low gradient of the land surface (0.8 m/km or 4 ft/mi) results in poorly developed drainage and a dominance of very poorly drained organic terrain. Surface drainage has been improved in the agriculturally developed areas by ditches constructed to enhance runoff and reduce the duration of surface ponding

Soil materials in the municipality were deposited during the time of glacial Lake Agassiz and include extensive areas of shallow to deep organic deposits and loamy to clayey textured lacustrine sediments, some of which are underlain by loamy textured, stony glacial till. The upland areas are characterized by sand and gravel lacustrine and outwash deposits in association with stony, loam textured calcareous glacial till. Precambrian bedrock outcrops are extensive to the east of the Winnipeg River (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 Lac du Bonnet map sheet area (Smith et al., 1967). Selected shoreline areas at Bird River and the eastern end of Lac du Bonnet have been mapped at a detailed 1:20 000 scale (Fraser and Mills, 1979). According to the Canadian System of Soil Classification (Soil Classification Working Group, 1998), the soils are classified as Gray Luvisols (Lettonia, Lorteau, Whitemouth and Pine Valley series) and Dark Gray Chernozems (Thalberg, Framnes and Peguis series) on loamy to clayey materials. Eutric Brunisols and Gray Luvisols (Carrick, Piney, Pine Ridge, Woodridge, Wintergreen, St. Labre and Caliento series) are dominant on sandy to loamy textured materials. Poorly drained soils in these landscapes are classified as Humic Gleysols and peaty phases of Gleysolic soils. Organic soils developed on forest and sphagnum peat occur throughout the area (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.

The near level topography of much of the area and the high watertable associated with many of soils result in a dominance of poor and very poor drainage. Imperfectly drained soils occur adjacent to the Winnipeg River and well to rapidly drained soils are common on the sandy uplands (page 13).

Major management considerations are related to fine and coarse textures and wetness (page 15). Stony and cobbly surface soils are common where the glacial till is close to the surface. Large areas of organic soils occur throughout the municipality and Precambrian rock outcrops are common in the eastern portion. Soils throughout the municipality are non-saline.

Level, stone-free, imperfectly to well drained soils occupy 8.2 percent of the area and are rated **Class 2** for agriculture. Soils rated in **Class 3** (29 percent) have moderately severe limitations for agriculture due to topography, excess wetness and stoniness. Soils rated in **Class 5** (6 percent) have very severe limitations for agriculture due to droughtiness. Organic soils cover 35 percent of the area and have very limited capability for agriculture in their native undrained state. Bedrock areas are rated as **Class 7** with no capability for agriculture (page 17). About 42 percent of the soils are rated as **Poor** for irrigation suitability, primarily due to poor drainage and 14 percent are rated **Fair**. Organic soils occupying 35 percent of the area are not classified (page 19). The major problems limiting the agricultural use of soils is inadequate drainage although surface stone and cobbles, peaty surface soils, droughtiness 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, 38 percent of the area is at **Minimal to Low** risk of degradation as low soil permeability reduces the potential for deep leaching of contaminants. In contrast, the risk for leaching is **High** on freely drained, porous sands and gravels or in areas where 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. Sixty-three percent of the soils occur in near level landscapes and are at **Negligible** risk of degradation from water erosion. The risk of water erosion increases to **Low**, **Moderate** and **High** as slopes increase above 9 percent. Management practices focus primarily on maintaining adequate crop residues to provide sufficient surface cover.

Land use in the RM of Lac Du Bonnet consists of agriculture, forestry and recreation. An assessment of the status of land use in 1994 was obtained through an analysis of satellite imagery. It showed annual crops occupying about 22 percent of the land area, forage production taking place on 1 percent and urban and transportation requirements utilizing 2 percent. The land use classification for 75 percent of the municipality is undifferentiated but consists mainly of forest cover on better drained sandy and glacial till soils and very poorly drained organic soils. The productive forested land is harvested for pulp and paper and lumber. This land and the organic and bedrock terrain also provide wildlife habitat and a base for recreation activities (page 25).

The majority of soils in the RM of Lac Du Bonnet have moderately severe to very severe limitations for arable agriculture. A major portion of the municipality has low relief and seasonal high water tables. Consequently, improvement and maintenance of water management infrastructure is required to reduce surface ponding while maintaining adequate soil moisture for crop growth. All soils require protection against the risk of wind erosion during the early spring period. This includes leaving adequate crop residues on the surface and the provision of shelter belts, minimum tillage practices, and crop rotations including forages to help reduce the risk of soil degradation and maintain productivity. Soils with extremely stony and cobbly surface conditions require stone clearing to permit annual cultivation.

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

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.

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.

Slope Map.

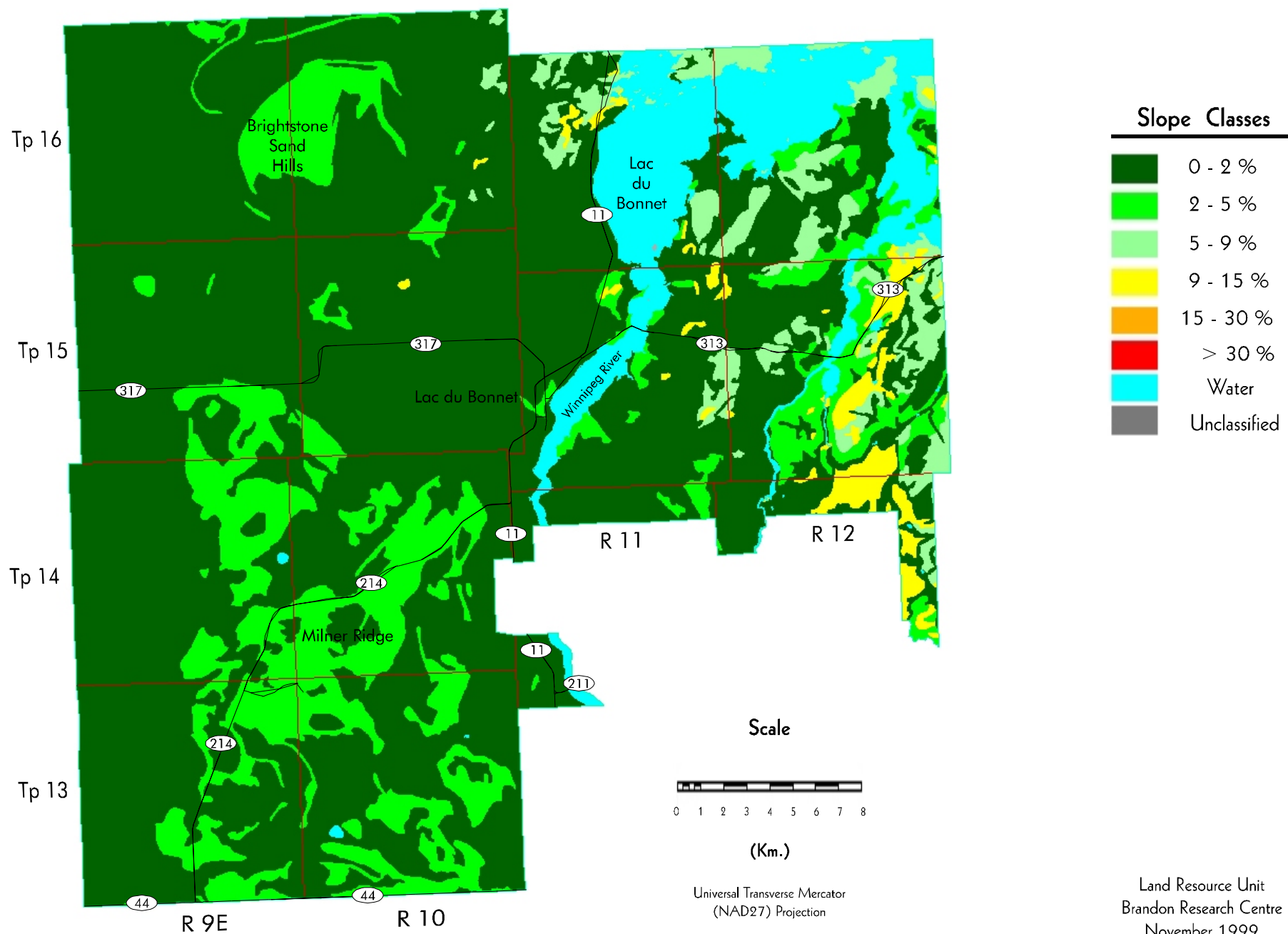
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil and terrain layer database. Specific colours are used to indicate the dominant slope class for each polygon in the RM. Additional slope classes may occur in each polygon area,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

Table 1. Slope Classes¹

Slope Class	Area (ha)	Percent of RM
0 - 2 %	83357	69.8
2 - 5 %	19462	16.3
5 - 9 %	5039	4.2
9 - 15 %	2288	1.9
15 - 30 %	0	0.0
> 30 %	0	0.0
Unclassified	10	0.0
Water	9304	7.8
Total	119461	100.0

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

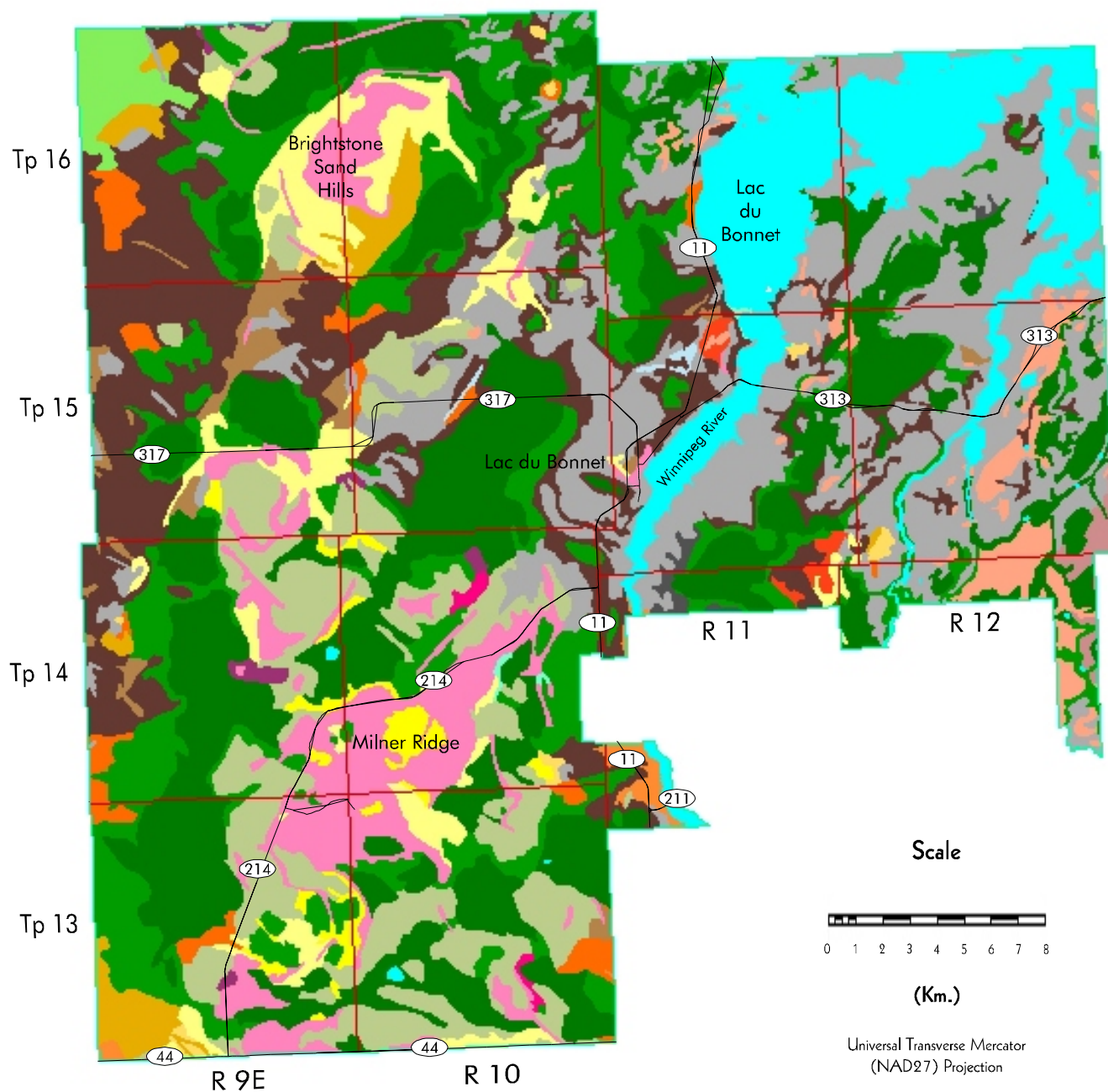
More detailed maps showing the dominant and subdominant soils in each polygon can also be produced at larger map scales.

Table 2. Generalized Soil Groups¹

Soil Groups	Area (ha)	Percent of RM
Precambrian Bedrock	2288	1.9
Deep Organic Forest or Sphagnum Peat	25222	21.1
Shallow Organic Forest Peat	15532	13.0
Clayey Lacustrine	20110	16.8
(Luvisols and Dark Gray Chernozems)		
Clayey Lacustrine (Gleysols)	280	0.2
Highly Calcareous Loamy Till (Gleysols)	333	0.3
Weakly Calcareous, Sandy Loam Till	321	0.3
Acidic, Coarse Loamy Till	421	0.4
Loamy Till (Luvisols)	10626	8.9
Marsh	89	0.1
Clayey Lacustrine (Gleysols)	13855	11.6
Loamy Lacustrine (Gleysols)	1687	1.4
Sandy Loam Lacustrine (Gleysols)	1873	1.6
Shallow Organic Fen Peat	1178	1.0
Sandy Lacustrine (Gleysols)	1186	1.0
Clayey Lacustrine (Black Chernozems)	1442	1.2
Loamy Lacustrine	425	0.4
Sandy Loam Lacustrine	370	0.3
Variable Textured Alluvium (Regosols)	116	0.1
Sandy Lacustrine	4798	4.0
Sand and Gravel (Gleysols)	166	0.1
Sand and Gravel	7827	6.6
Water	9304	7.8
Unclassified	10	0.0
Total	119461	100.0

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

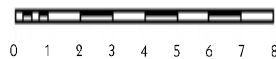
Generalized Soil Map



Soil Associations

- Precambrian Bedrock
- Deep Organic Forest or Sphagnum Peat
- Shallow Organic Forest Peat
- Clayey Lacustrine (Luvisols and Dark Gray Chernozems)
- Clayey Lacustrine (Gleysols)
- Highly Calcareous Loamy Till (Gleysols)
- Weakly Calcareous, Sandy Loam Till
- Loamy Till (Luvisols)
- Marsh
- Clayey Lacustrine (Gleysols)
- Loamy Lacustrine (Gleysols)
- Sandy Loam Lacustrine (Gleysols)
- Shallow Organic Fen Peat
- Sandy Lacustrine (Gleysols)
- Clayey Lacustrine (Black Chernozems)
- Loamy Lacustrine
- Sandy Loam Lacustrine
- Variable Textured Alluvium (Regosols)
- Sandy Lacustrine
- Sand & Gravel (Gleysols)
- Sand & Gravel
- Water
- Unclassified

Scale



(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Brandon Research Centre
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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.

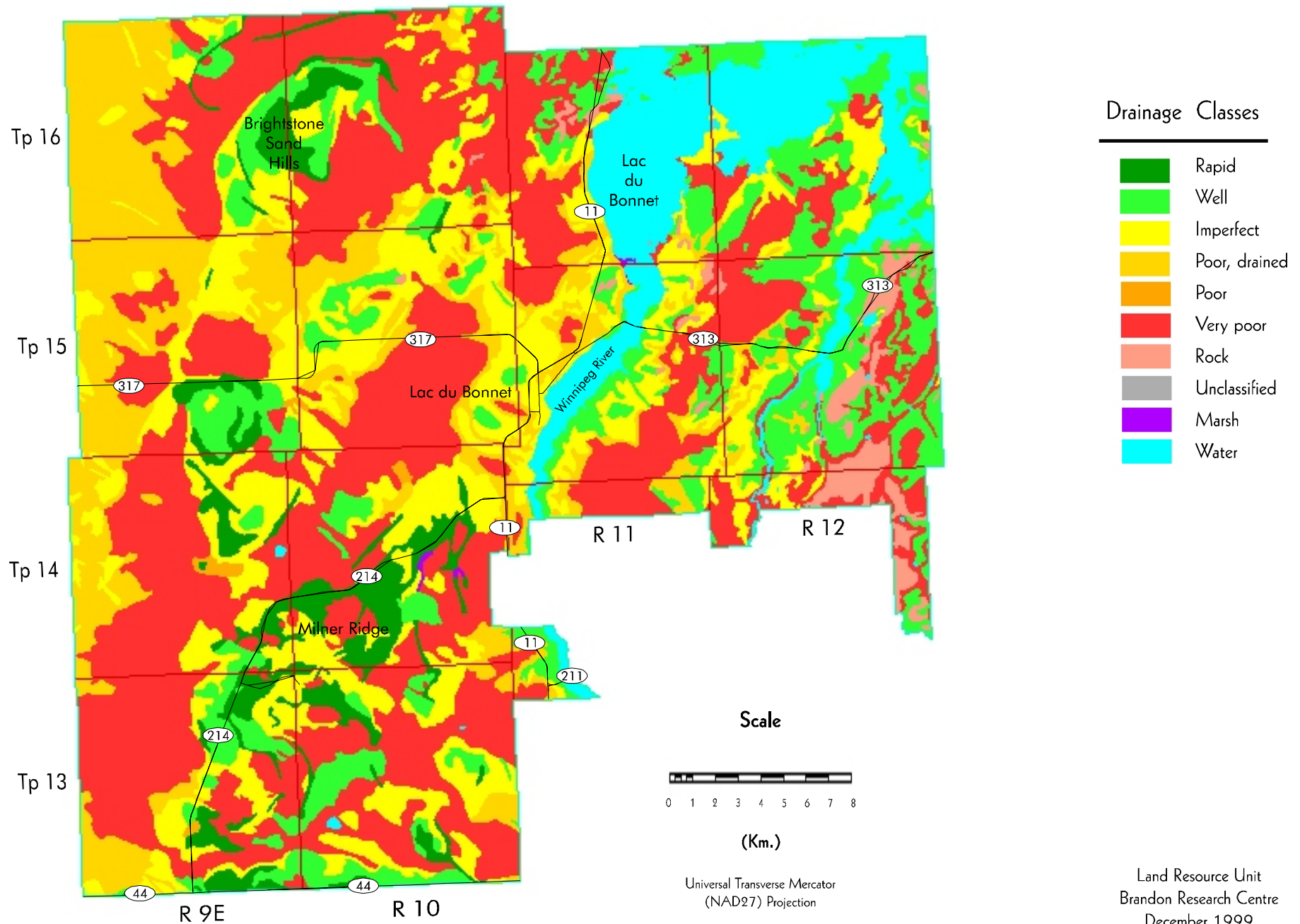
Drainage classification is based on the dominant soil series within each individual soil polygon.

Table 3. Drainage Classes¹

Drainage Class	Area (ha)	Percent of RM
Very Poor	43369	36.3
Poor	333	0.3
Poor, drained	17611	14.7
Imperfect	22868	19.1
Well	17558	14.7
Rapid	6032	5.0
Rock	2288	1.9
Marsh	89	0.1
Unclassified	10	0.0
Water	9304	7.8
Total	119461	100.0

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

Soil Drainage 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.

- **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.

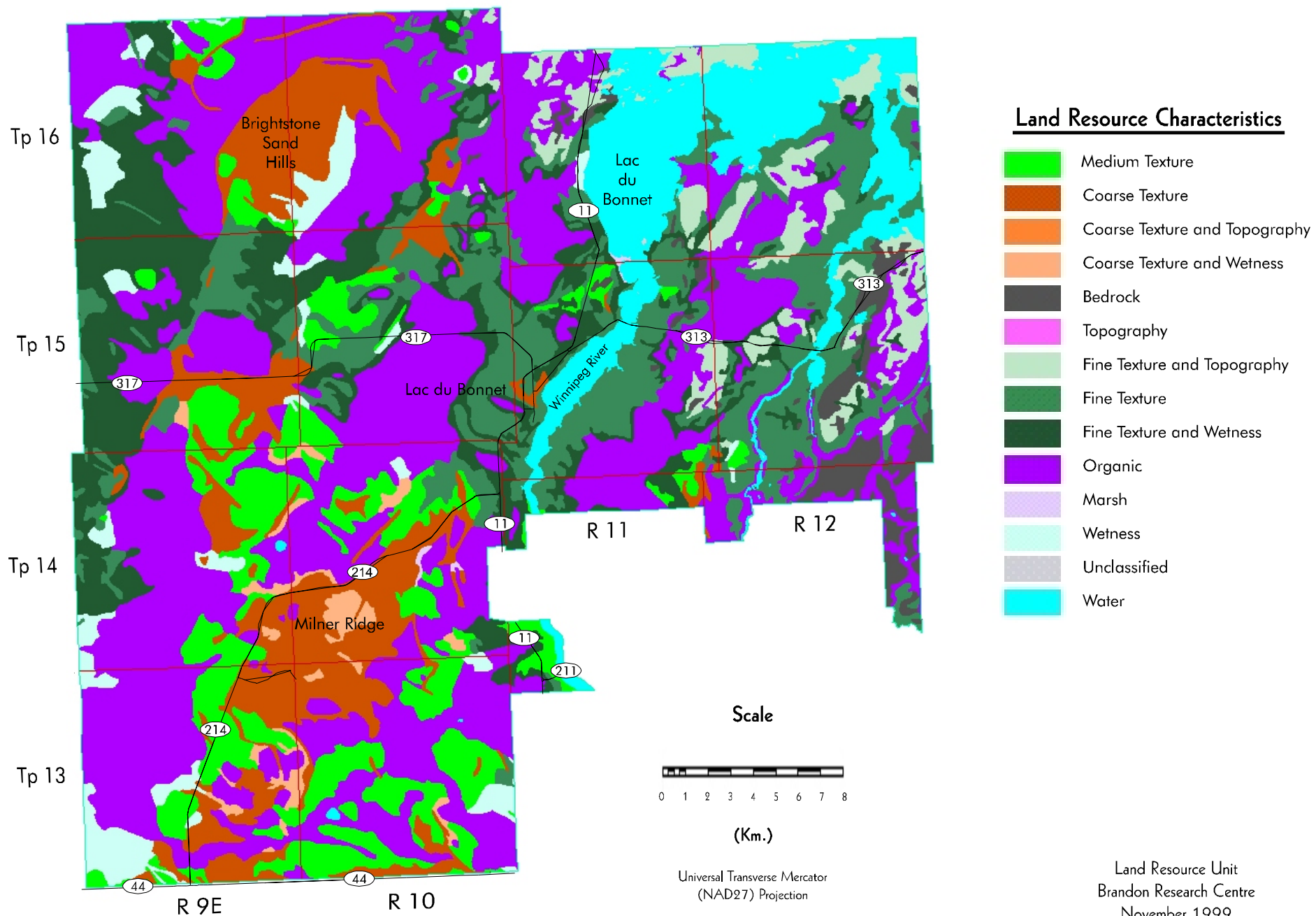
R = Bedrock - soil landscapes that have **shallow depth to bedrock (< 50 cm) and/or exposed bedrock** which may prevent the use of some or all tillage practices as well as the range of potential crops. They require special cropping and management practices to sustain agricultural production.

Table 4. Management Considerations¹

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	16935	14.2
Fine Texture and Wetness	14136	11.8
Fine Texture and Topography	4618	3.9
Medium Texture	11858	9.9
Coarse Texture	12625	10.6
Coarse Texture and Wetness	1352	1.1
Coarse Texture and Topography	0	0.0
Topography	0	0.0
Bedrock	2709	2.3
Wetness	3893	3.3
Organic	41932	35.1
Marsh	89	0.1
Unclassified	10	0.0
Water	9304	7.8
Total	119461	100.0

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

Management Considerations Map



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 5. Agricultural Capability¹

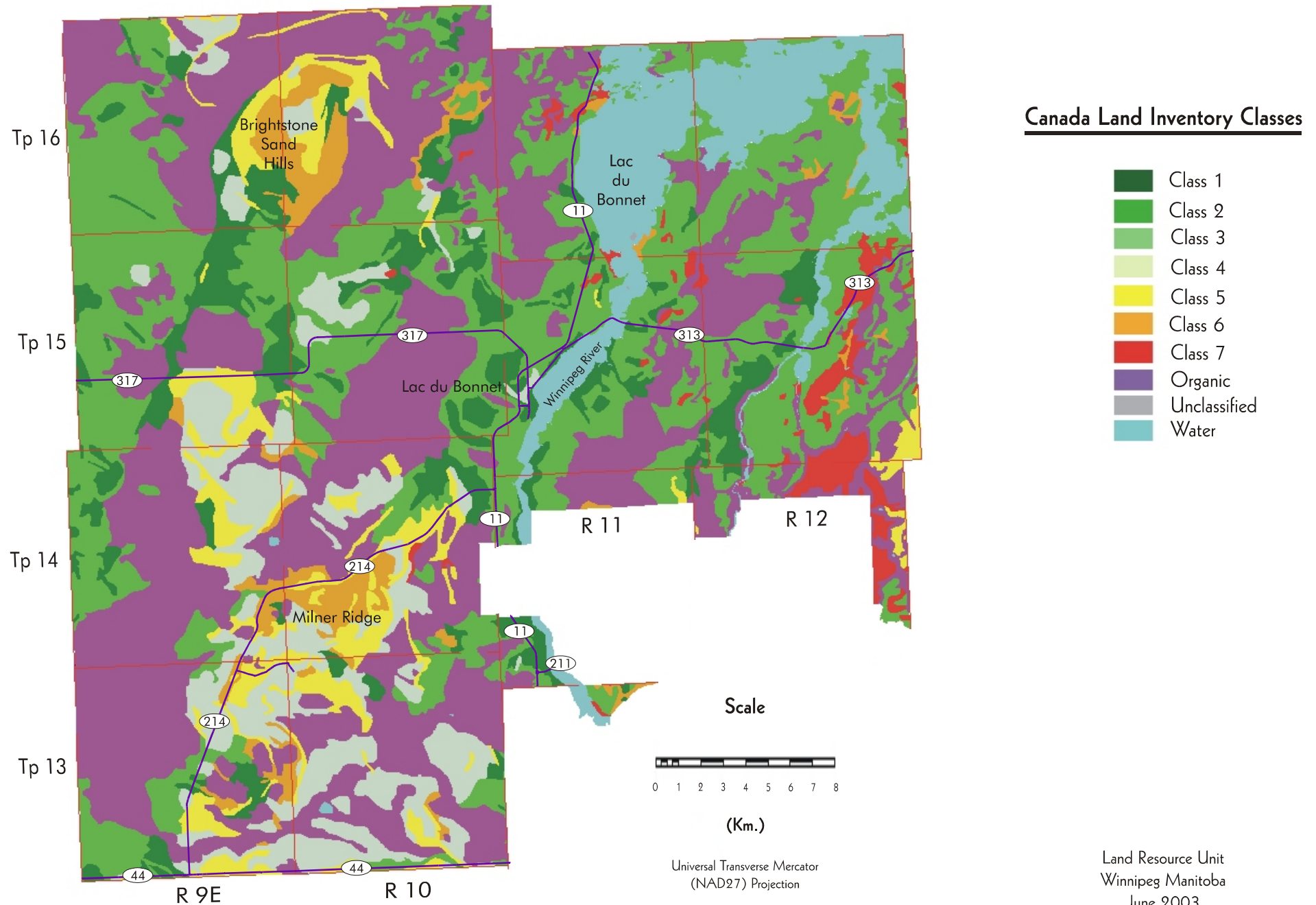
Class Subclass	Area (ha)	Percent of RM
2	9814	8.2
2D	1359	1.1
2DW	1009	0.8
2I	372	0.3
2IW	227	0.2
2M	980	0.8
2MI	87	0.1
2MP	1759	1.5
2W	4021	3.4
3	34701	28.9
3D	11852	9.9
3DW	1145	1.0

Table 5. Agricultural Capability¹ (Cont.)

Class Subclass	Area (ha)	Percent of RM
3M	414	0.3
3MP	321	0.3
3TD	4630	3.9
3W	16339	13.6
4	10544	8.8
4DP	8424	7.0
4M	2016	1.7
4W	104	0.1
5	6754	5.6
5M	5993	5.0
5RP	428	0.4
5W	333	0.3
6	4253	3.5
6P	1554	1.3
6W	2698	2.2
7	2394	2.0
7R	2306	1.9
7W	88	0.1
Unclassified	10	0.0
Water	9532	7.9
Organic	41955	35.0
Total	119956	100.0

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

Agriculture Capability Map



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.

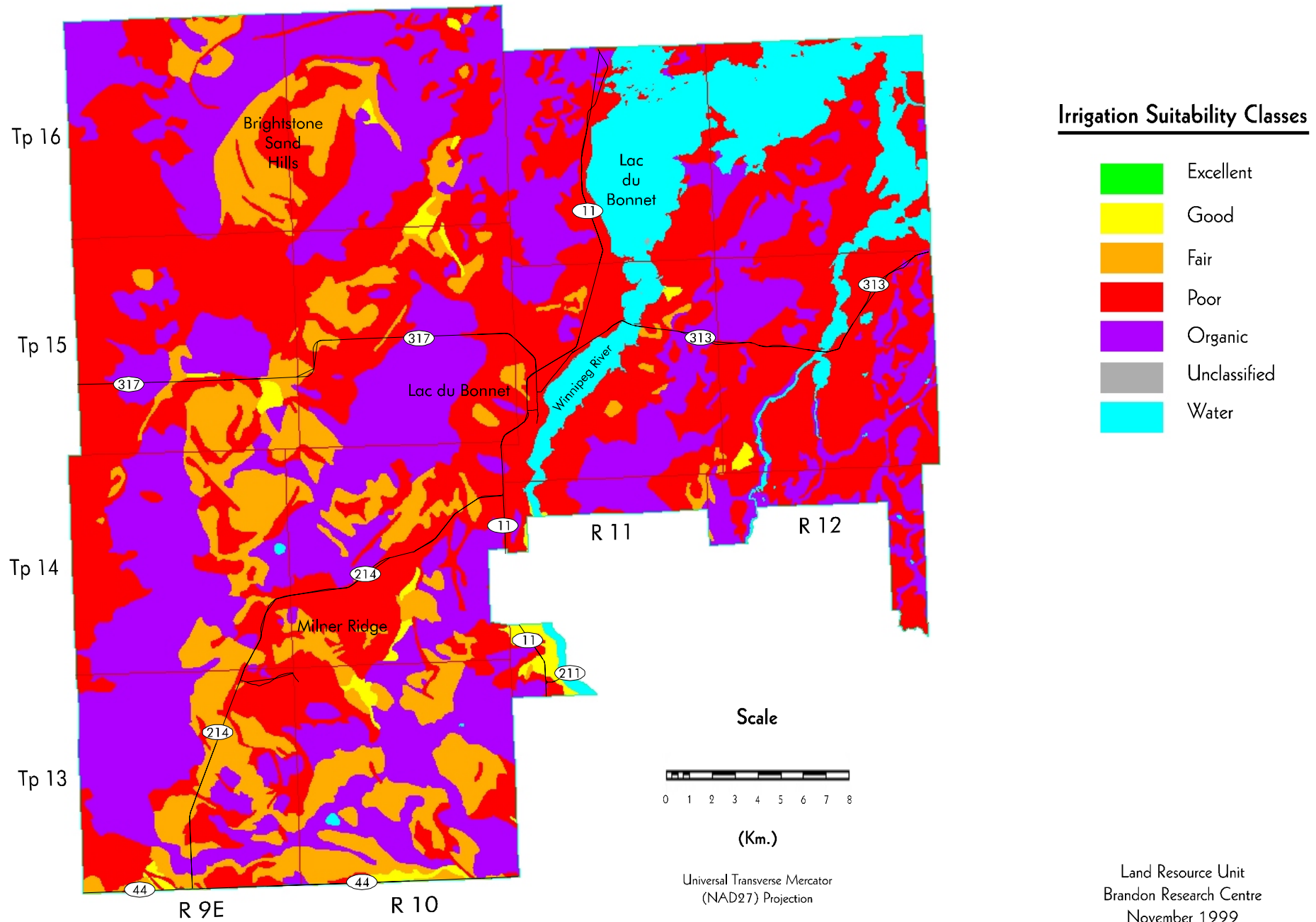
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

Table 6. Irrigation Suitability¹

Class	Area (ha)	Percent of RM
Excellent	0	0.0
Good	1315	1.1
Fair	16211	13.6
Poor	50689	42.4
Organic	41932	35.1
Unclassified	10	0.0
Water	9304	7.8
Total	119461	100.0

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

Irrigation Suitability Map



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.

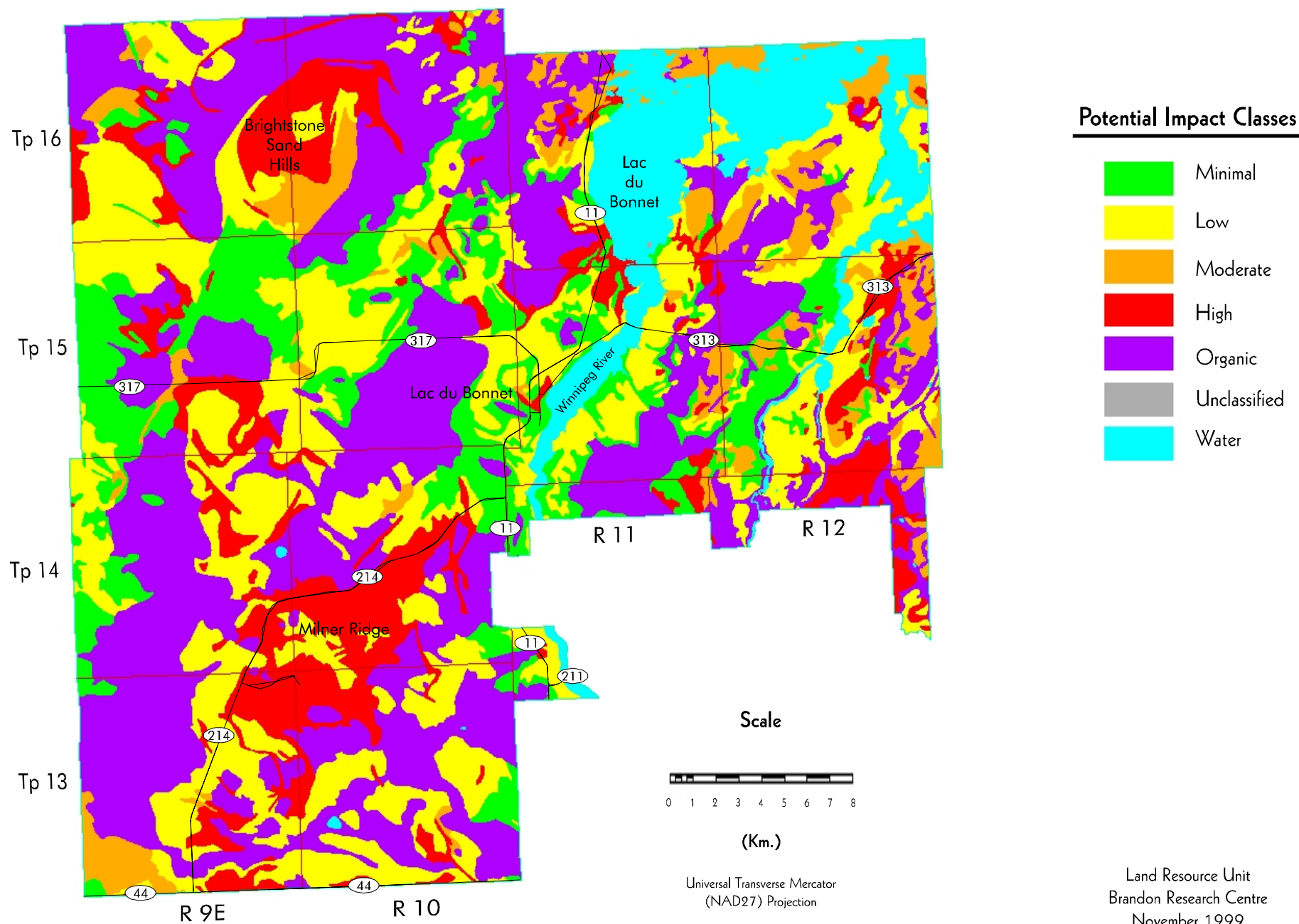
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 7. Potential Environmental Impact Under Irrigation¹

Class	Area (ha)	Percent of RM
Minimal	14445	12.1
Low	30937	25.9
Moderate	8071	6.8
High	14761	12.4
Organic	41932	35.1
Unclassified	10	0.0
Water	9304	7.8
Total	119461	100.0

¹ Based on the **dominant** soil series and slope gradient within each 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 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

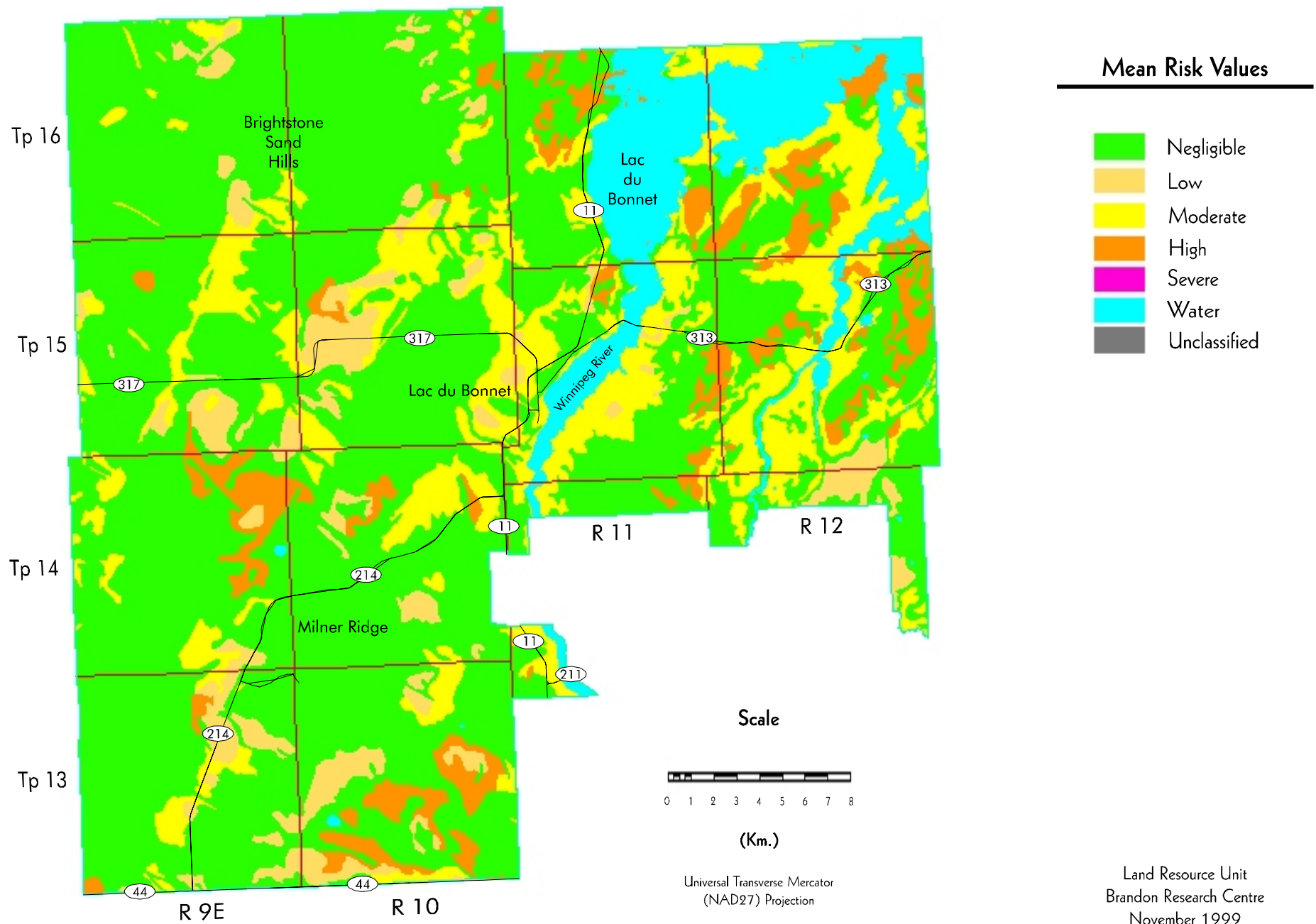
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

Table 8. Water Erosion Risk¹

Class	Area (ha)	Percent of RM
Negligible	74637	62.5
Low	7403	6.2
Moderate	20182	16.9
High	7924	6.6
Severe	0	0.0
Unclassified	10	0.0
Water	9304	7.8
Total	119461	100.0

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

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.

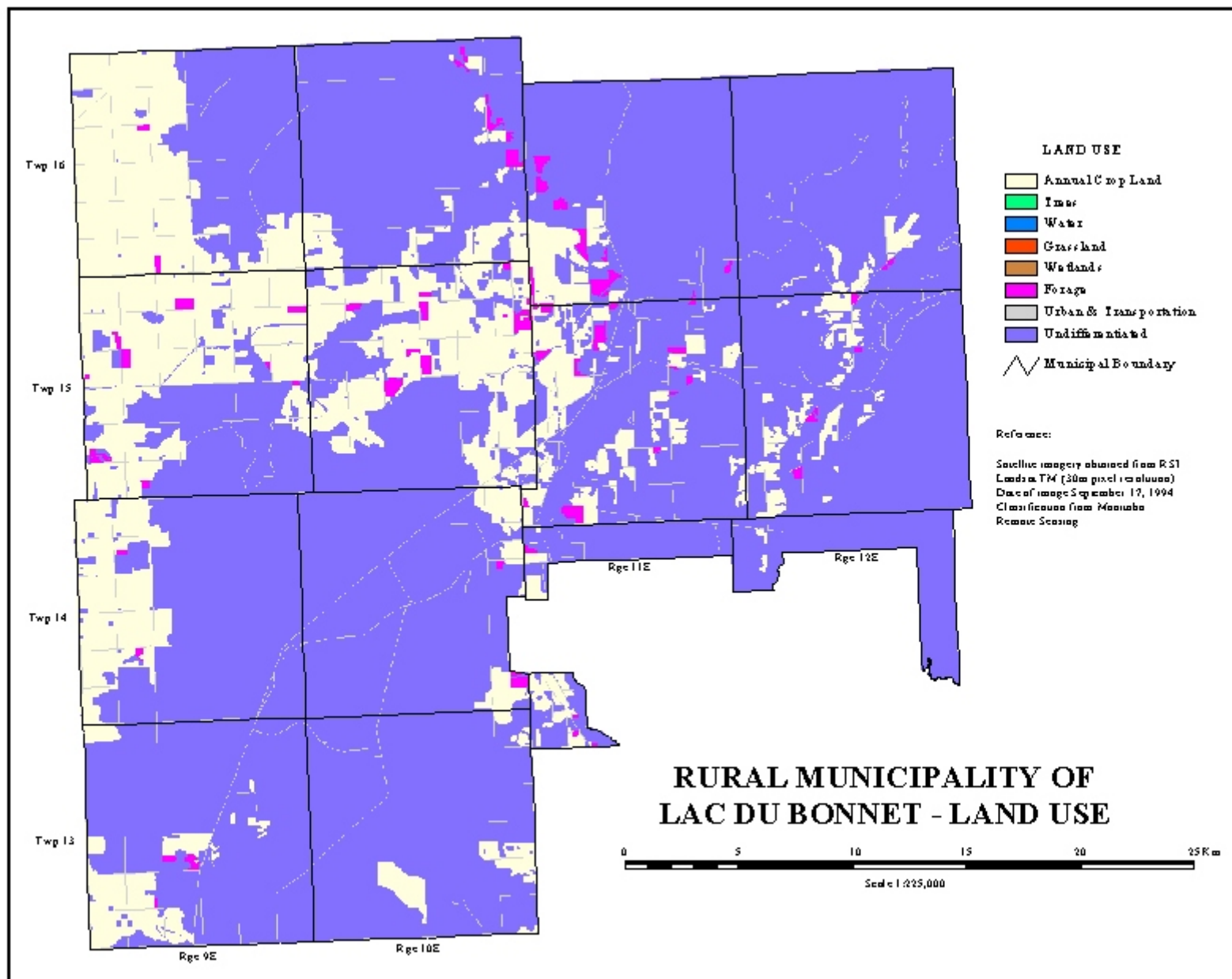
Water - open water - lakes, rivers streams, ponds, and lagoons.

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

Table 9. Land Use¹

Class	Area (ha)	Percent of RM
Annual Crop Land	25819	21.6
Forage	1313	1.1
Urban and transportation	2376	2.0
Undifferentiated	90217	75.3
Total	119725	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.



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