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Rural Municipality of Reynolds


Information Bulletin 99-23

Soils and Terrain

An introduction
to the land resource

Land Resource Unit
Brandon Research Centre



Canada 

Rural Municipality of Reynolds

Information Bulletin 99-23

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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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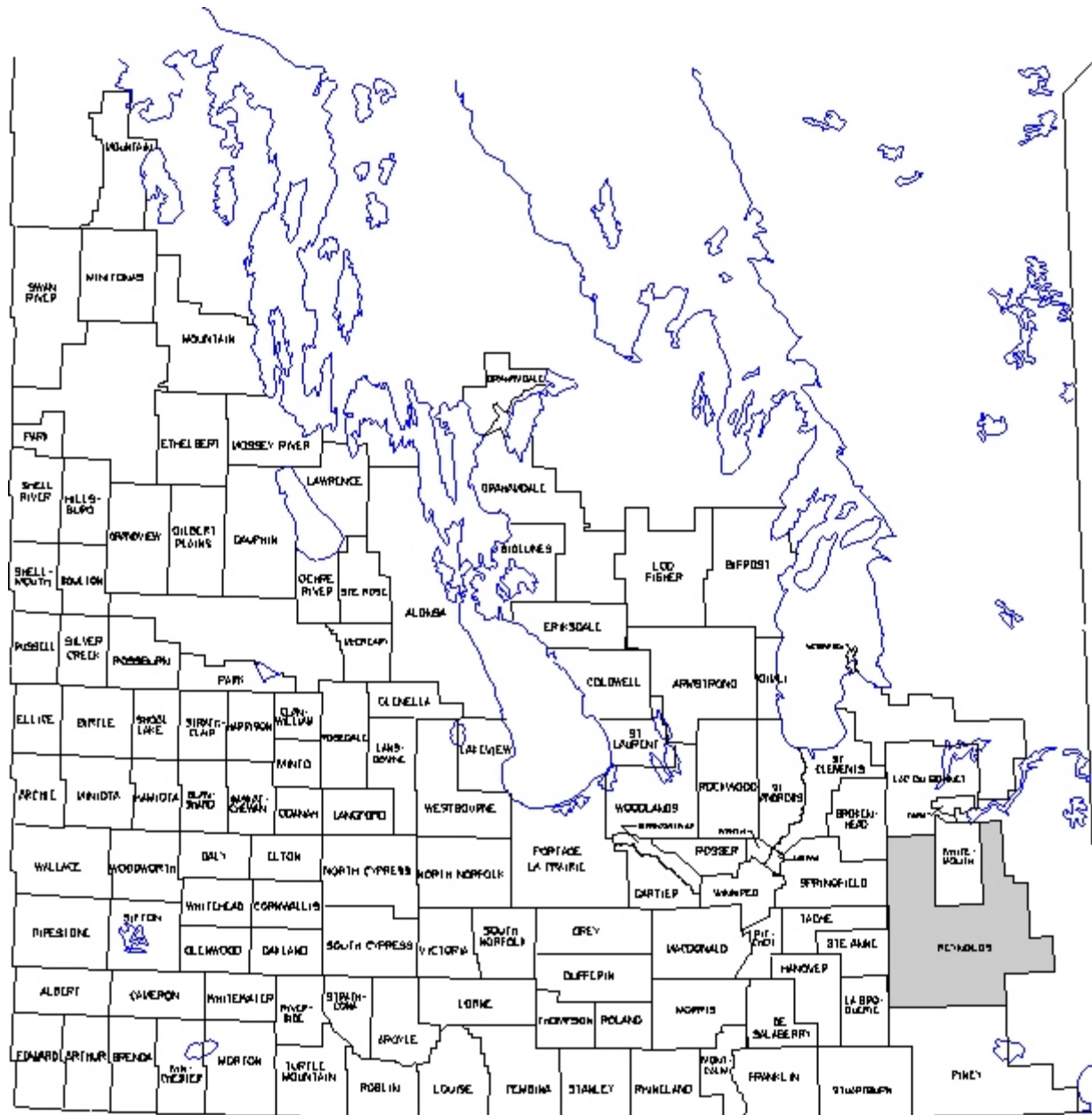


Figure 1. Rural municipalities of southern Manitoba.

INTRODUCTION

The location of the Rural Municipality of Reynolds 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.

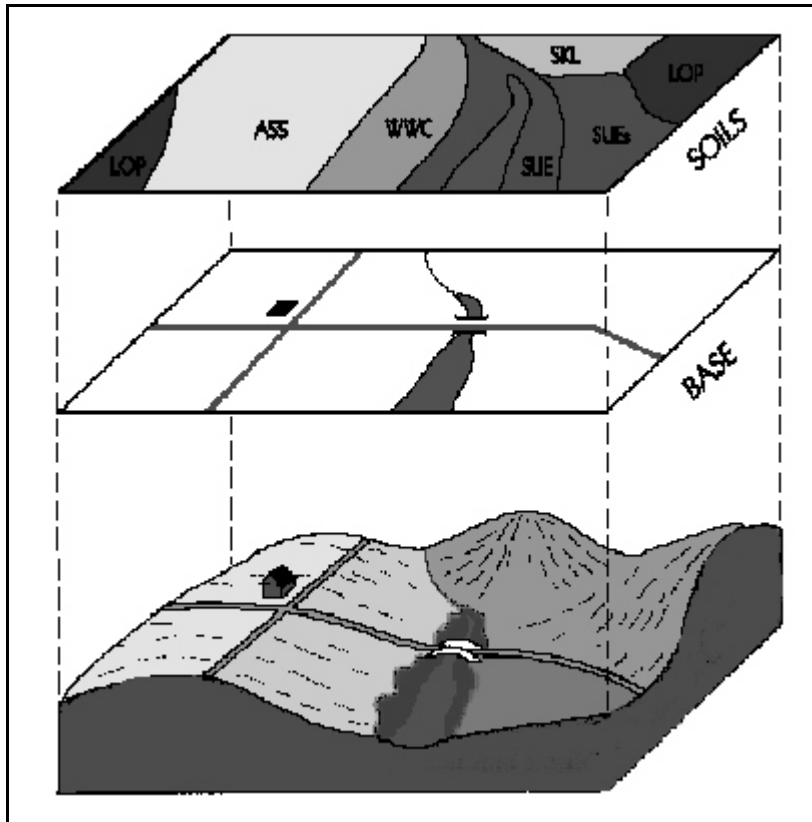


Figure 2. Soil and Base Map data.

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 Reynolds covers an area of 359 121 ha (approximately 39 townships) located immediately west of the Whiteshell Provincial Park in southeastern Manitoba (page 3). The municipality is sparsely populated as much of the land area is reserved for use within the Sandilands, Agassiz and Whiteshell Provincial Forests. Small centres of population are located in Hadashville, East Braintree, Rennie, Prawda and Ste. Rita.

Climatic conditions can be described by weather data from Beausejour and Indian Bay (Environment Canada, 1993). The mean annual temperature averages 1.6°C while the mean annual precipitation increases from 539 mm in the west to 603 mm in the east. The average frost-free period varies from 105 days in the west to about 111 days in the east whereas degree-days above 5°C accumulated from May to September average 1604 in the west and decrease to 1550 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 decreases from near 250 mm in the west to just under 200 mm in the east. The estimated effective growing degree-days accumulated from May to September decrease from 1500 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 major portion of the municipality is located in the Canadian Shield and consists of the Bedford Hills and the Lac Du Bonnet Plain in the central area and the Whitemouth Lake Lowland and the Mantario Lake Plain on the eastern side. The western side of the area is located in the Southeastern Plain section of the Manitoba Plain. Although the municipality is dominantly level to very gently undulating with slopes less than 2 percent (page 9), the Bedford Hills rise as a gently sloping to hummocky upland with local relief up to 3 metres and slopes ranging from 2 to 5 percent. Higher local relief and slopes exceeding 9 percent are common in the bedrock dominated area to the east (Canada-

Manitoba Soil Survey, 1980). Elevation of the land surface varies from 324 metres above sea level (m asl) in the south to 278 m asl in the north and 244 m asl in the northwest corner of the area. The majority of the area drains northerly via the Birch, Whitemouth and Rennie Rivers while the western portion drains through Hazel Creek and the Brokenhead River. Drainage is slow due to the low surface gradient (0.9 m/km or 4.8 ft/mi) through most of the area. Surface drainage for agricultural purposes has been improved in a few places by man-made drains 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 consist of local areas of sandy and gravelly outwash deposits and thin, sandy to coarse-loamy textured lacustrine sediments surrounded by extensive areas of shallow to deep organic deposits. Waterworked, extremely calcareous, stony loam till is more common in the Southeastern Plain and outcrops of Precambrian rock occur throughout the Mantario Lake Plain (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 South-Eastern map area (Smith et al., 1964) and the Lac Du Bonnet map area (Smith et al., 1967). The organic soils in the Hadashville area have been mapped at a detailed 1:20 000 scale (Hopkins and Smith, 1981). According to the Canadian System of Soil Classification (Soil Classification Working Group, 1998), the mineral soils are classified as dominantly Eluviated Brunisols and Gray Luvisols developed on coarse textured materials and Luvisolic and Brunisolic soils on calcareous, loam textured glacial till. Humic Gleysols and peaty phases of Gleysolic soils are found in poorly drained sites throughout the area. Organic soils developed on forest, sphagnum or fen peat occupy more than 60 percent of the municipality (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.

About 66 percent of the area is affected by very poor drainage resulting from the flat topography and high watertable associated with the extensive areas of organic soils. Imperfectly drained soils

occupy 12 percent of the municipality, well to rapidly drained soils cover 13 percent and bedrock outcrops in 7 percent of the area (page 13).

Major management considerations are related to coarse texture, organic soils and wetness (page 15). Stony and cobble surface conditions occur where the glacial till is close to the surface. Soils throughout the municipality are non-saline

Organic soils cover 62 percent of the area and have no capability for agriculture in their native undrained state. Mineral soils in the municipality range in capability for agriculture from **Class 2** to **Class 6** due to droughtiness, stoniness and wetness. Bedrock areas have no capability for agriculture and are rated in **Class 7** (page 17). About 14 percent of the soils are rated as **Fair** and 5 percent are rated **Good** for irrigation suitability while the remainder are rated as **Poor**, primarily due to poor drainage (page 19). Organic soils in the area are not classified for irrigation. The major problems limiting the agricultural use of soils are inadequate drainage, low moisture holding capacity and 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 sustain ability 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, about 11 percent of the area is at **Low** risk of degradation due to the presence of less permeable glacial till which reduces the potential for deep leaching of contaminants. In contrast, the risk for leaching is **High** on deep, sandy and gravelly soils. The risk of adverse impact on soils adjacent to rock outcrops is also **High** due to rapid runoff from the rock surface. This E.I. 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-six percent of the land in the municipality is at **Negligible** risk of degradation from water erosion, due primarily to the very low relief throughout the area. The risk of water erosion increases to **Low**, **Moderate** or **High** on soil areas with steeper slopes. Management practices focus primarily on maintaining adequate crop residues to provide sufficient surface cover.

Land use in the RM of Reynolds consists of mainly of forestry and agriculture. An assessment of the status of land use in 1994 was obtained through an analysis of satellite imagery. It showed that annual crops for agriculture covered only 1.8 percent of the land area, forage production occurred on 0.3 percent and grassland occupied 2.4 percent. Treed vegetation covers 44 percent of the area and wetlands consisting mainly of very poorly drained organic terrain cover 43 percent. Merchantable forest on well to poorly drained mineral soil and on many of the organic soils is utilized by the forest industry. These areas also provide habitat for wildlife and have the potential for recreational uses. Non-agricultural uses such as infrastructure for urban areas, transportation and recreation utilize just over 1 percent of the municipality (page 27).

The majority of soils in the RM of Reynolds have moderately severe to very severe limitations for arable agriculture. Sandy and loamy textured soils require careful management to protect against the risk of degradation by wind erosion and to help maintain productivity. 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 and imperfectly to poorly drained mineral 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 required on a watershed or regional basis to reduce surface ponding while maintaining adequate soil moisture for crop growth.

DERIVED AND INTERPRETIVE MAPS

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

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

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

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

Derived Maps

Slope

Generalized Soil

Drainage

Management Considerations

Interpretative Maps

Agricultural Capability

Irrigation Suitability

Potential Environmental Impact

Water Erosion Risk

Land Use

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.

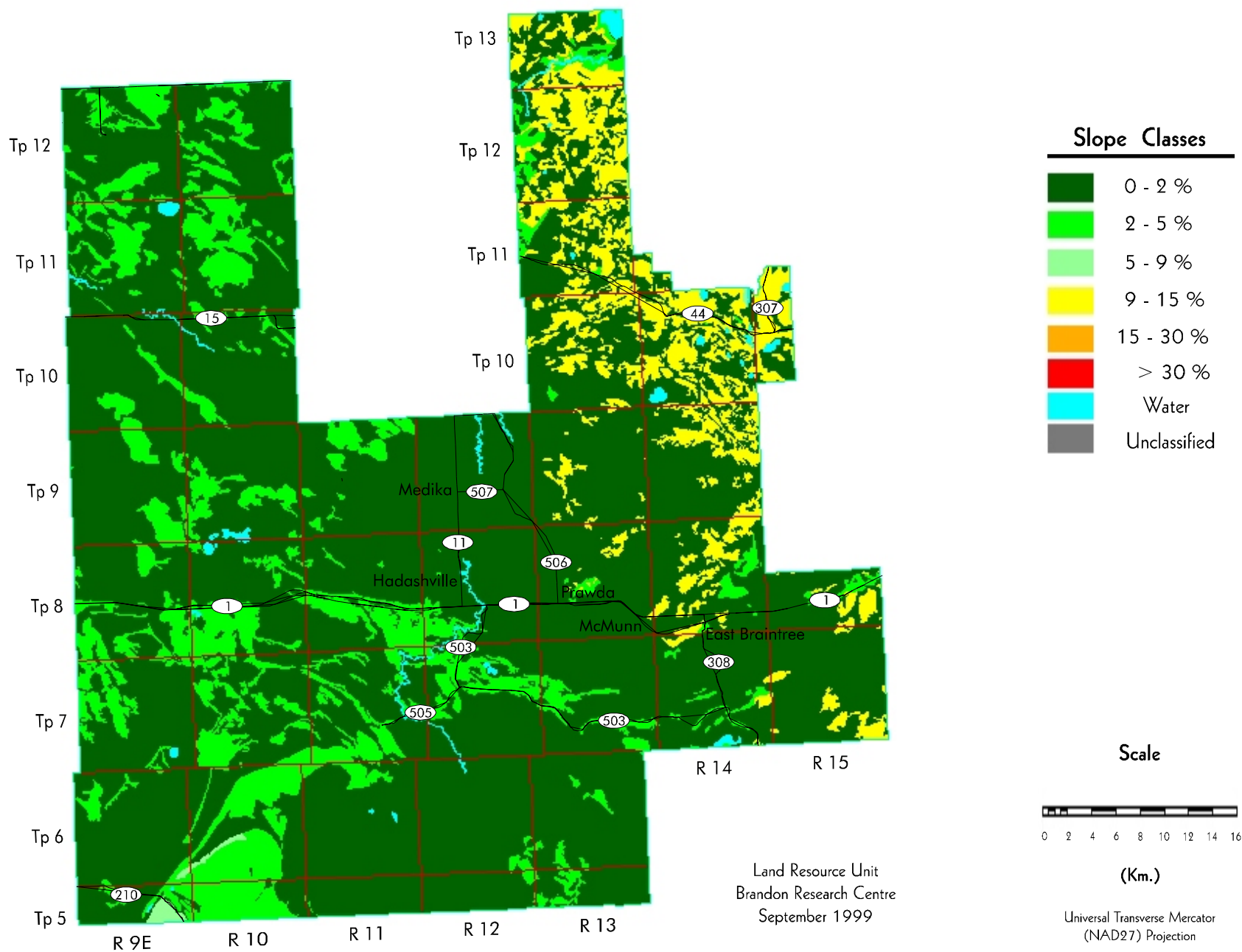
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil and terrain layer database. Specific colours are used to indicate the dominant slope class for each polygon in the RM. Additional slope classes may occur in each polygon area,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

Table 1. Slope Classes¹

Slope Class	Area (ha)	Percent of RM
0 - 2 %	276797	77.1
2 - 5 %	53317	14.8
5 - 9 %	789	0.2
9 - 15 %	26737	7.4
15 - 30 %	0	0.0
> 30 %	0	0.0
Unclassified	3	0.0
Water	1478	0.4
Total	359121	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.

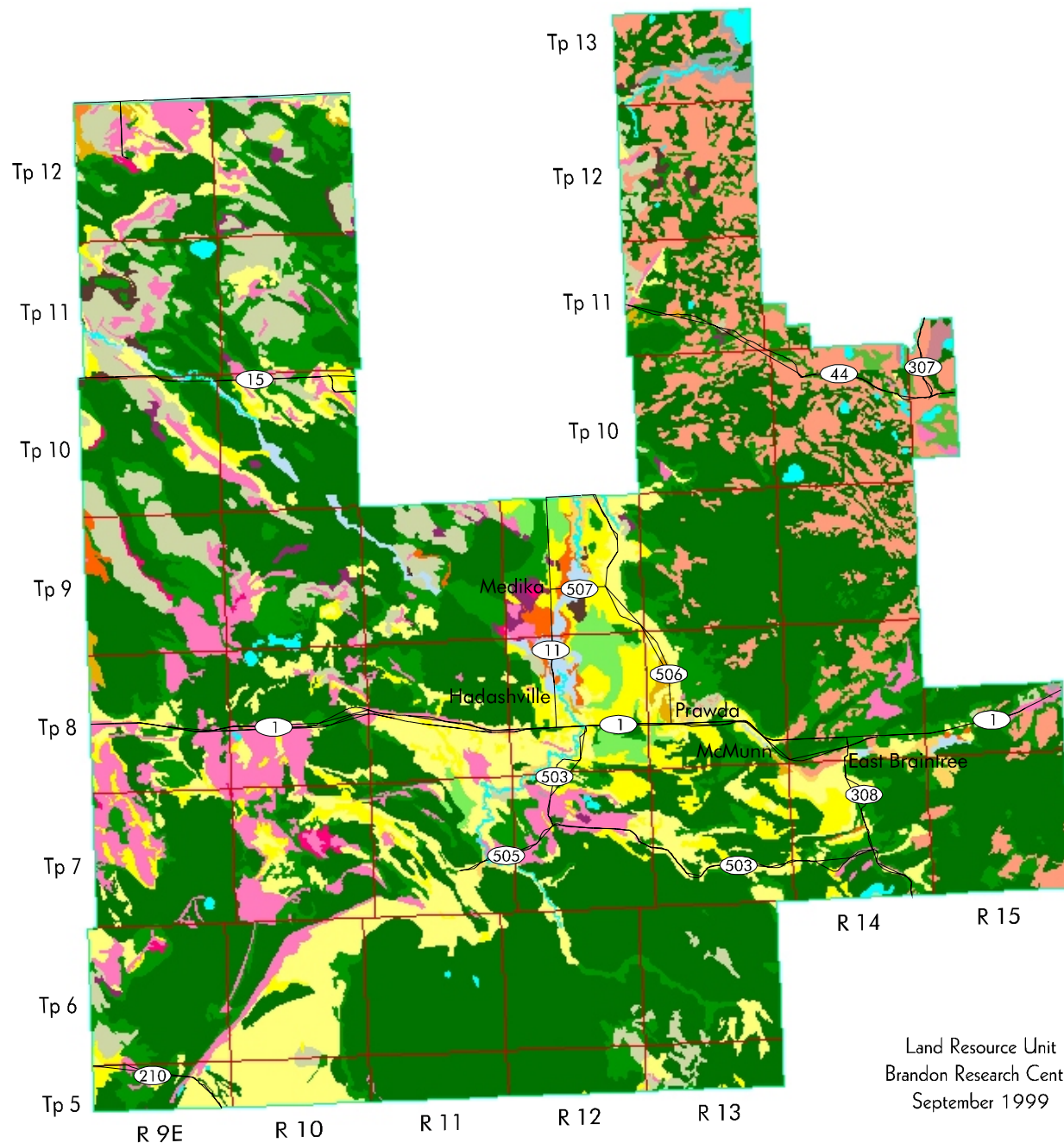
More detailed maps showing the dominant and subdominant soils in each polygon can also be produced at larger map scales.

Table 2. Generalized Soil Groups¹

Soil Groups	Area (ha)	Percent of RM
Precambrian Bedrock	26363	7.3
Deep Organic Forest or Sphagnum Peat	173864	48.4
Shallow Organic Forest Peat	43053	12.0
Clayey Lacustrine (Luvisols and Dark Gray Chernozems)	1155	0.3
Highly Calcareous Loamy Till (Gleysols)	1593	0.4
Acidic, Coarse Loamy Till	446	0.1
Loamy Till (Luvisols)	21313	5.9
Clayey Lacustrine (Gleysols)	1350	0.4
Loamy Lacustrine (Gleysols)	1614	0.4
Sandy Loam Lacustrine (Gleysols)	1312	0.4
Deep Organic Fen Peat	1011	0.3
Shallow Organic Fen Peat	3428	1.0
Sandy Lacustrine (Gleysols)	14868	4.1
Clayey Lacustrine (Black Chernozems)	6	0.0
Loamy Lacustrine	92	0.0
Sandy Loam Lacustrine	1869	0.5
Variable Textured Alluvium (Regosols)	2818	0.8
Sandy Lacustrine	38088	10.6
Sand and Gravel (Gleysols)	860	0.2
Sand and Gravel	22537	6.3
Water	1478	0.4
Unclassified	3	0.0
Total	359121	100.0

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

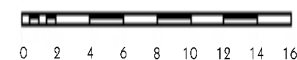
Generalized Soil Map



Soil Associations

- Precambrian Bedrock
- Deep Organic Forest or Sphagnum Peat
- Shallow Organic Forest Peat
- Clayey Lacustrine (Luvisols and Dark Gray Chernozems)
- Highly Calcareous Loamy Till (Gleysols)
- Acidic, Coarse Loamy Till
- Loamy Till (Luvisols)
- Clayey Lacustrine (Gleysols)
- Loamy Lacustrine (Gleysols)
- Sandy Loam Lacustrine (Gleysols)
- Deep Organic Fen Peat
- 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
September 1999

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.

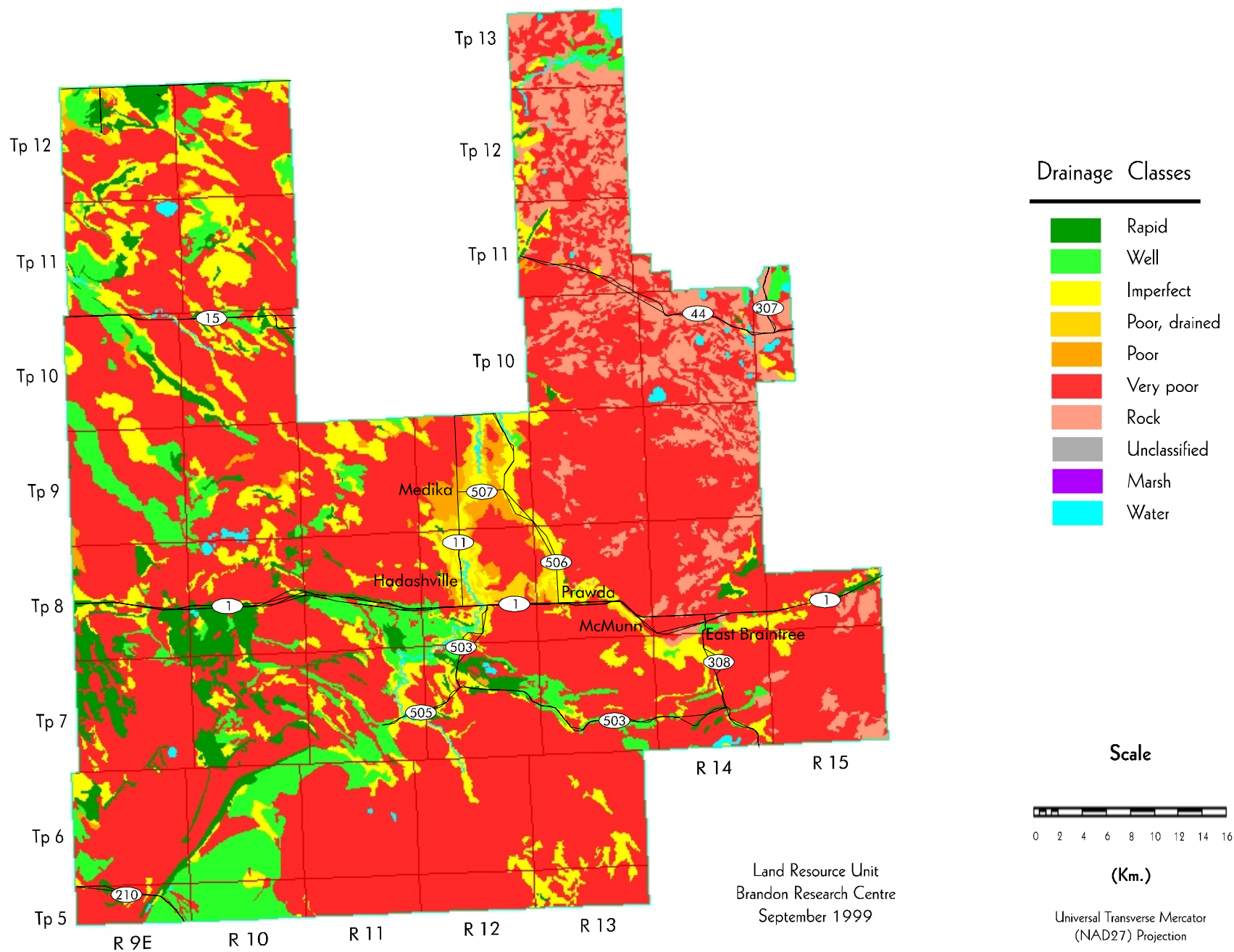
Drainage classification is based on the dominant soil series within each individual soil polygon.

Table 3. Drainage Classes¹

Drainage Class	Area (ha)	Percent of RM
Very Poor	235604	65.6
Poor	5101	1.4
Poor, drained	2248	0.6
Imperfect	41345	11.5
Well	29660	8.3
Rapid	17321	4.8
Rock	26363	7.3
Marsh	0	0.0
Unclassified	3	0.0
Water	1478	0.4
Total	359121	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.

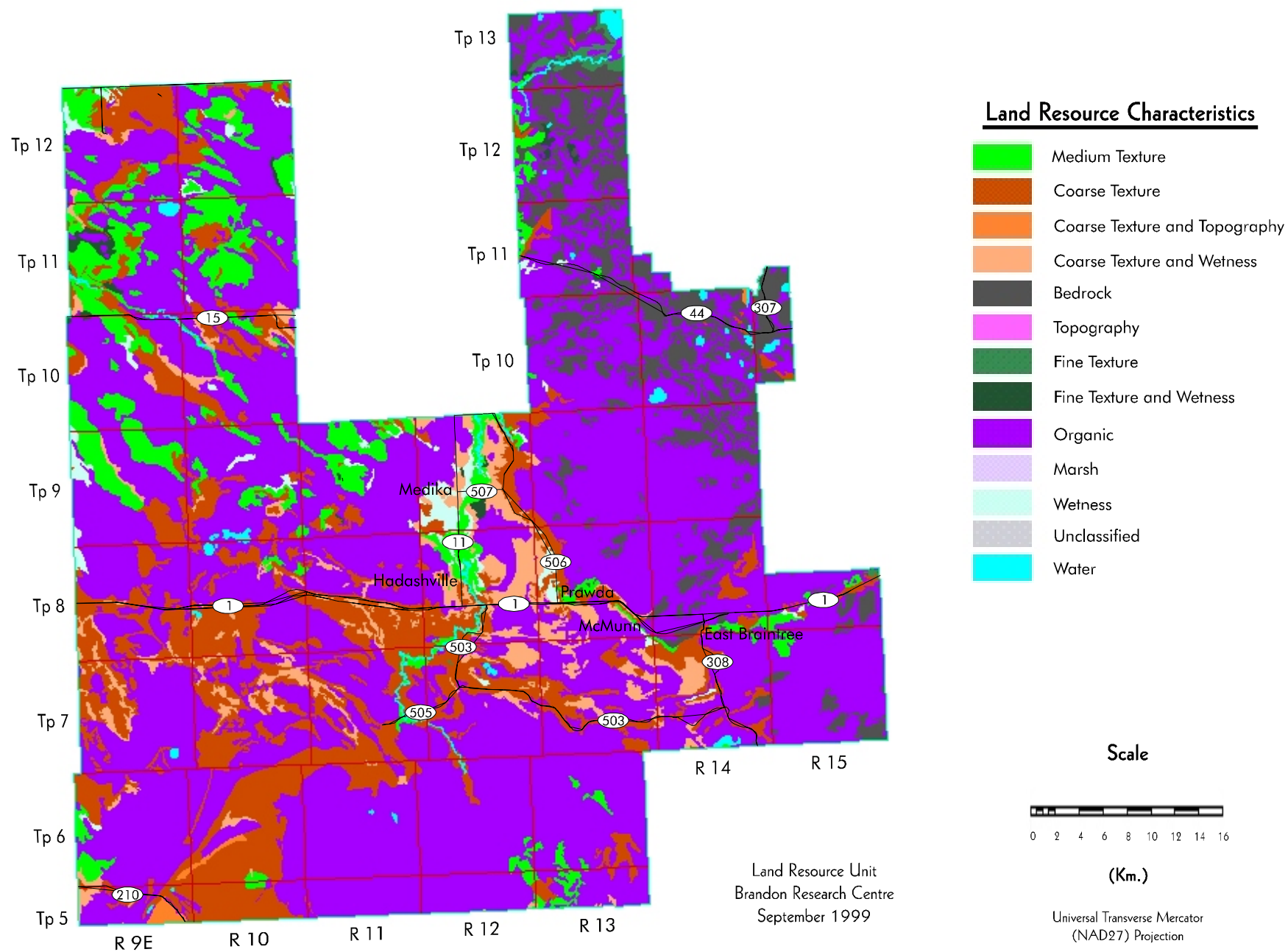
R = Bedrock - soil landscapes that have **shallow depth to bedrock (< 50 cm) and/or exposed bedrock** which may prevent the use of some or all tillage practices as well as the range of potential crops. They require special cropping and management practices to sustain agricultural production.

Table 4. Management Considerations¹

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	1161	0.3
Fine Texture and Wetness	1350	0.4
Fine Texture and Topography	0	0.0
Medium Texture	26093	7.3
Coarse Texture	59908	16.7
Coarse Texture and Wetness	15728	4.4
Coarse Texture and Topography	789	0.2
Topography	0	0.0
Bedrock	26737	7.4
Wetness	4519	1.3
Organic	221356	61.6
Marsh	0	0.0
Unclassified	3	0.0
Water	1478	0.4
Total	359121	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

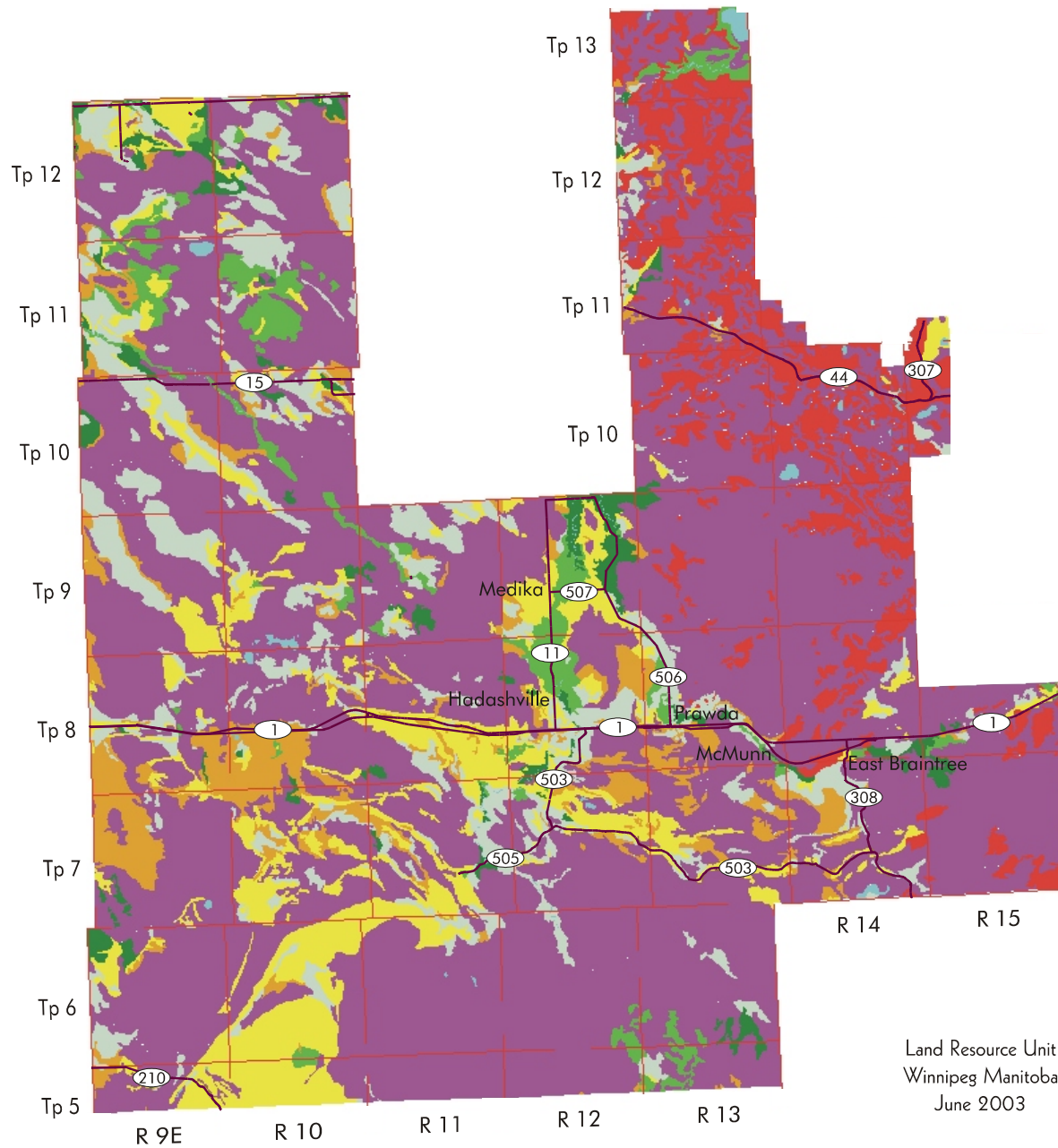
Class Subclass	Area (ha)	Percent of RM
2	8130	2.3
2I	1	0.0
2IW	126	0.0
2M	1505	0.4
2MI	1167	0.3
2MP	4668	1.3
2W	662	0.2
3	11635	3.2
3D	6204	1.7
3DW	91	0.0
3I	2771	0.8

Table 5. Agricultural Capability¹ (Cont.)

Class Subclass	Area (ha)	Percent of RM
3M	1191	0.3
3W	1378	0.4
4	33910	9.4
4DP	16141	4.5
4M	16897	4.7
4W	872	0.2
5	35862	10.0
5M	30941	8.6
5RP	378	0.1
5W	4542	1.3
6	20319	5.7
6P	5498	1.5
6W	14822	4.1
7	26259	7.3
7R	26259	7.3
Unclassified	3	0.0
Water	1470	0.4
Organic	221296	61.7
Total	358884	100.0

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

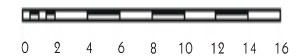
Agriculture Capability Map



Canada Land Inventory Classes

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

Scale



(Km.)

Universal Transverse Mercator
(NAD27) Projection

Land Resource Unit
Winnipeg Manitoba
June 2003

Irrigation Suitability Map.

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

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

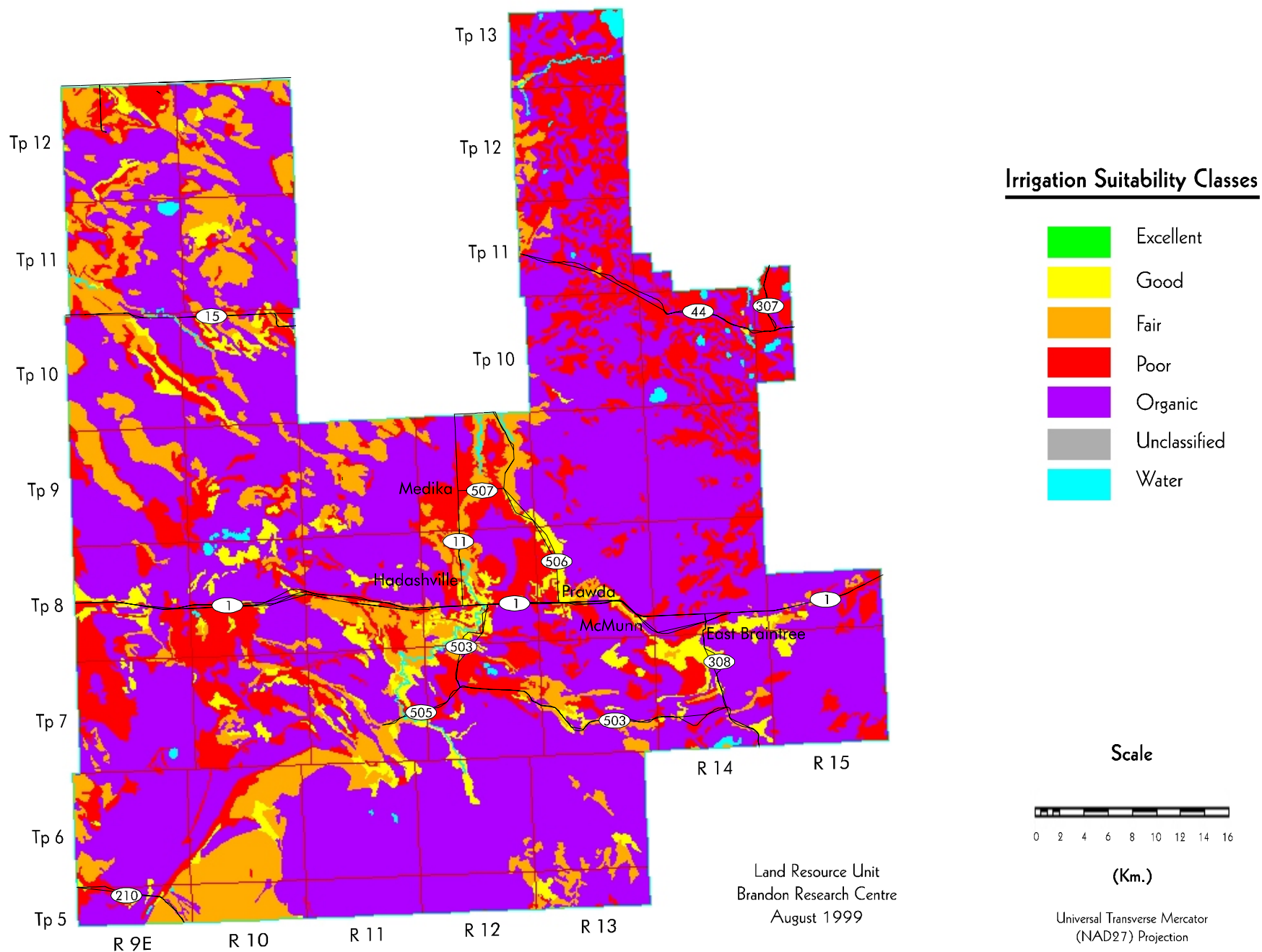
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

Table 6. Irrigation Suitability¹

Class	Area (ha)	Percent of RM
Excellent	0	0.0
Good	16045	4.5
Fair	48970	13.6
Poor	71270	19.8
Organic	221356	61.6
Unclassified	3	0.0
Water	1478	0.4
Total	359121	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.

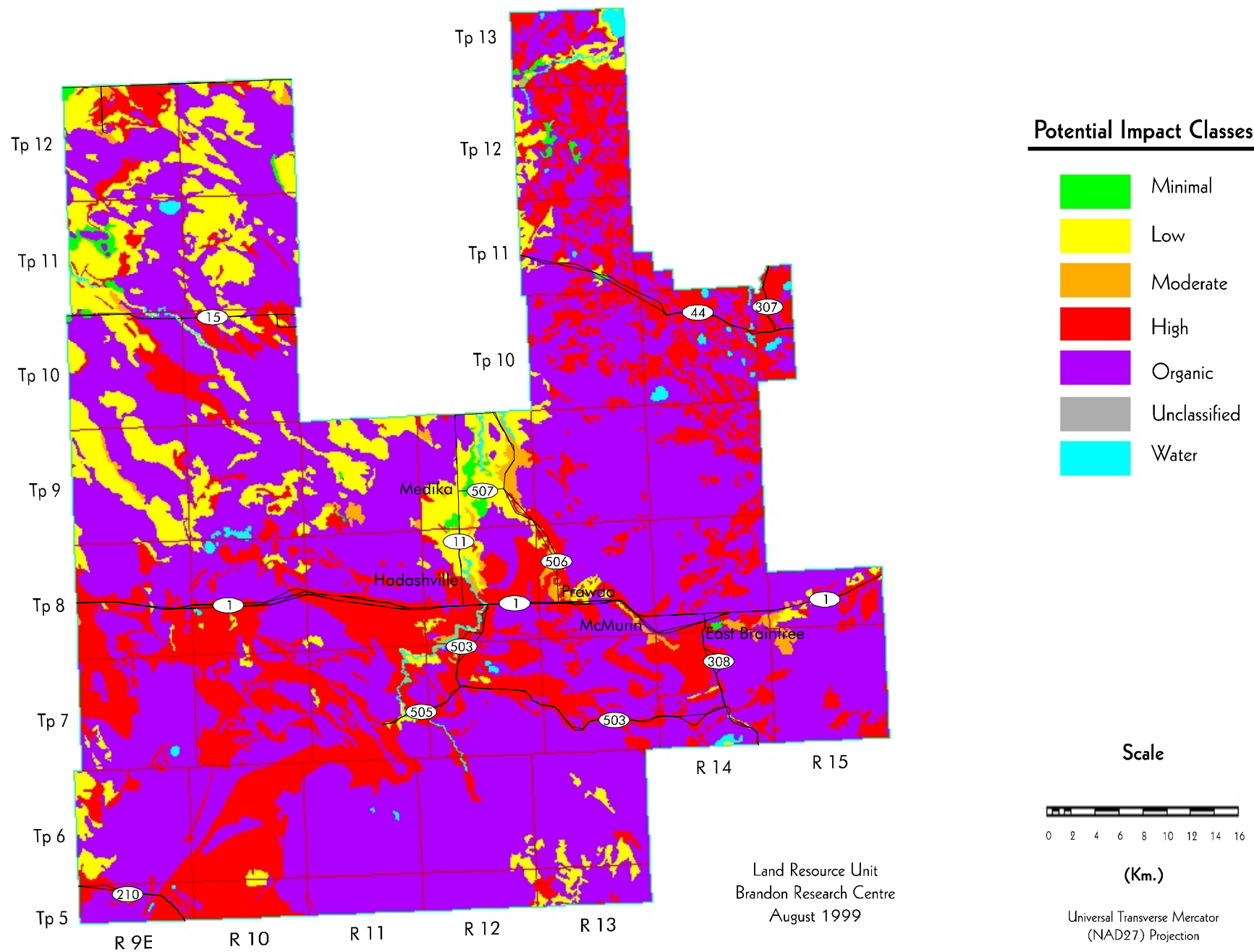
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 7. Potential Environmental Impact Under Irrigation¹

Class	Area (ha)	Percent of RM
Minimal	2006	0.6
Low	40346	11.2
Moderate	4013	1.1
High	89964	25.1
Organic	221312	61.6
Unclassified	3	0.0
Water	1478	0.4
Total	359121	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

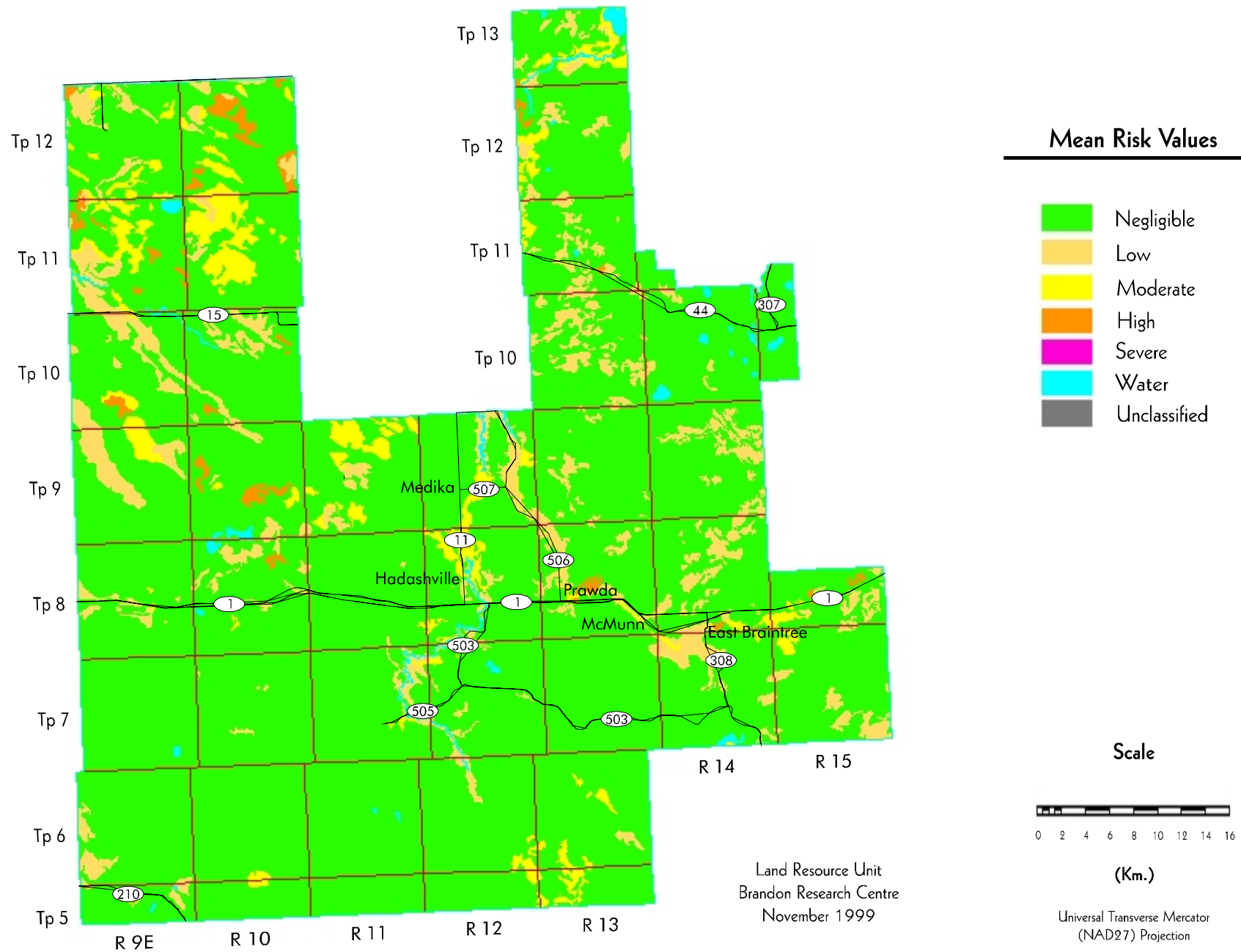
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

Table 8. Water Erosion Risk¹

Class	Area (ha)	Percent of RM
Negligible	308458	85.9
Low	29751	8.3
Moderate	16009	4.5
High	3423	1.0
Severe	0	0.0
Unclassified	3	0.0
Water	1478	0.4
Total	359121	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.

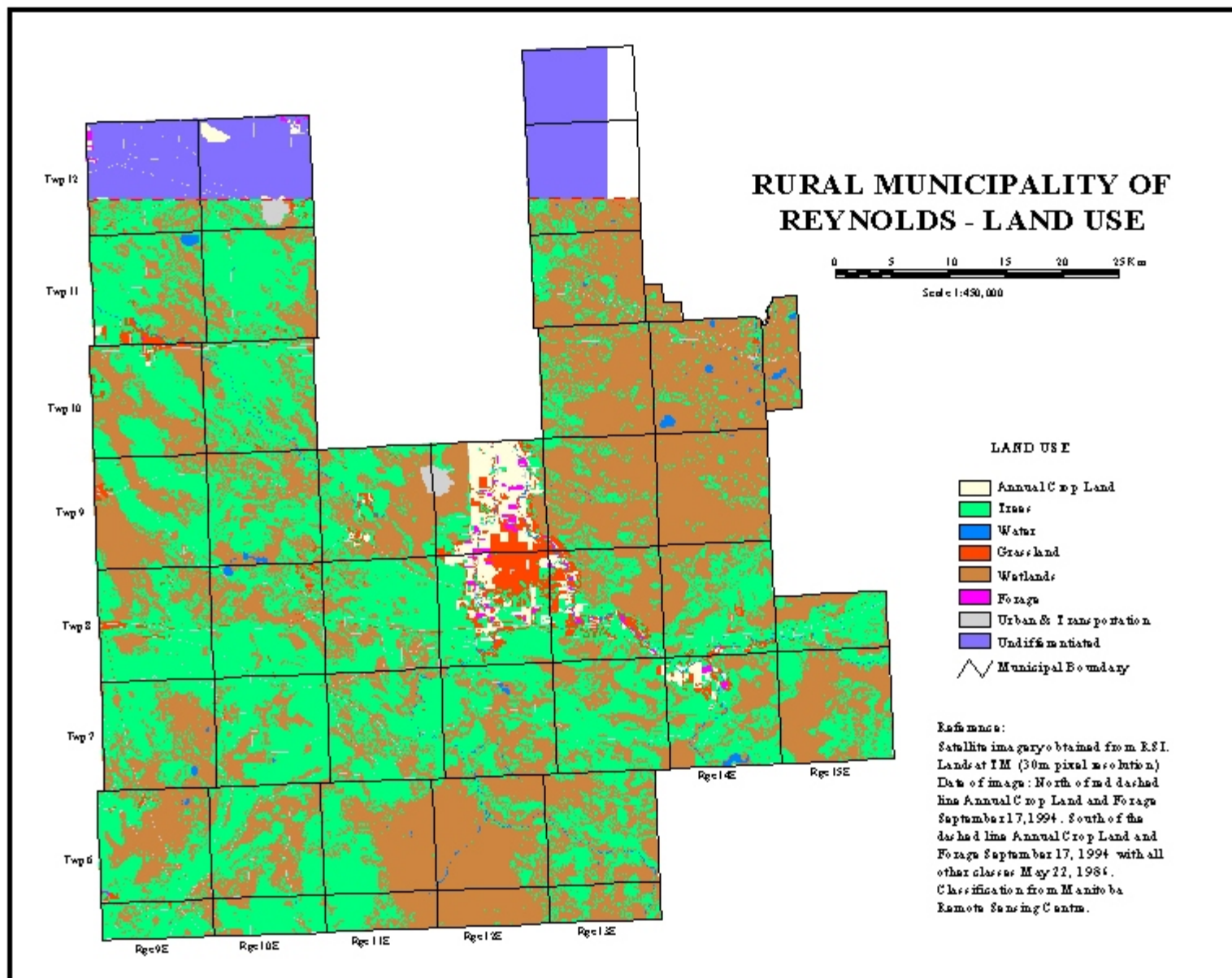
Water - open water - lakes, rivers streams, ponds, and lagoons.

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

Table 9. Land Use¹

Class	Area (ha)	Percent of RM
Annual Crop Land	6576	1.8
Forage	993	0.3
Grassland	8688	2.4
Trees	157222	44.1
Undifferentiated	22862	6.4
Urban and transportation	4308	1.2
Water	2021	0.6
Wetlands	153607	43.1
Total	356277	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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