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**Rural Municipality of Grandview**


**Information Bulletin 97-30**

## **Soils and Terrain**

An introduction  
to the land resource

Land Resource Unit  
Brandon Research Centre



Canada 

## **Rural Municipality of Grandview**

### **Information Bulletin 97-30**

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Printed February, 1998

## 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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## CITATION

Manitoba Land Resource Unit, 1997. Soils and Terrain. An Introduction to the Land Resource. Rural Municipality of Grandview. Information Bulletin 97-30, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada.

## ACKNOWLEDGEMENTS

This project was supported under the Canada-Manitoba Agreement of Agricultural Sustainability.

The following individuals and agencies contributed significantly to the compilation, interpretation, and derivation of the information contained in this report.

Managerial and administrative support was provided by:

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Technical support was provided by:

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J. Griffiths, C. Aglugub, Manitoba Soil Resource Section, Soils and Crops Branch, Manitoba Agriculture.

R. Lewis, PFRA, Agriculture and Agri-Food Canada.

G.F. Mills, P.Ag, Winnipeg, Manitoba

Professional expertise for data conversion, correlation, and interpretation was provided by:

W.R. Fraser and W. Michalyna, Manitoba Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada.

P. Haluschak and G. Podolsky, Manitoba Soil Resource Section, Soils and Crops Branch, Manitoba Agriculture.

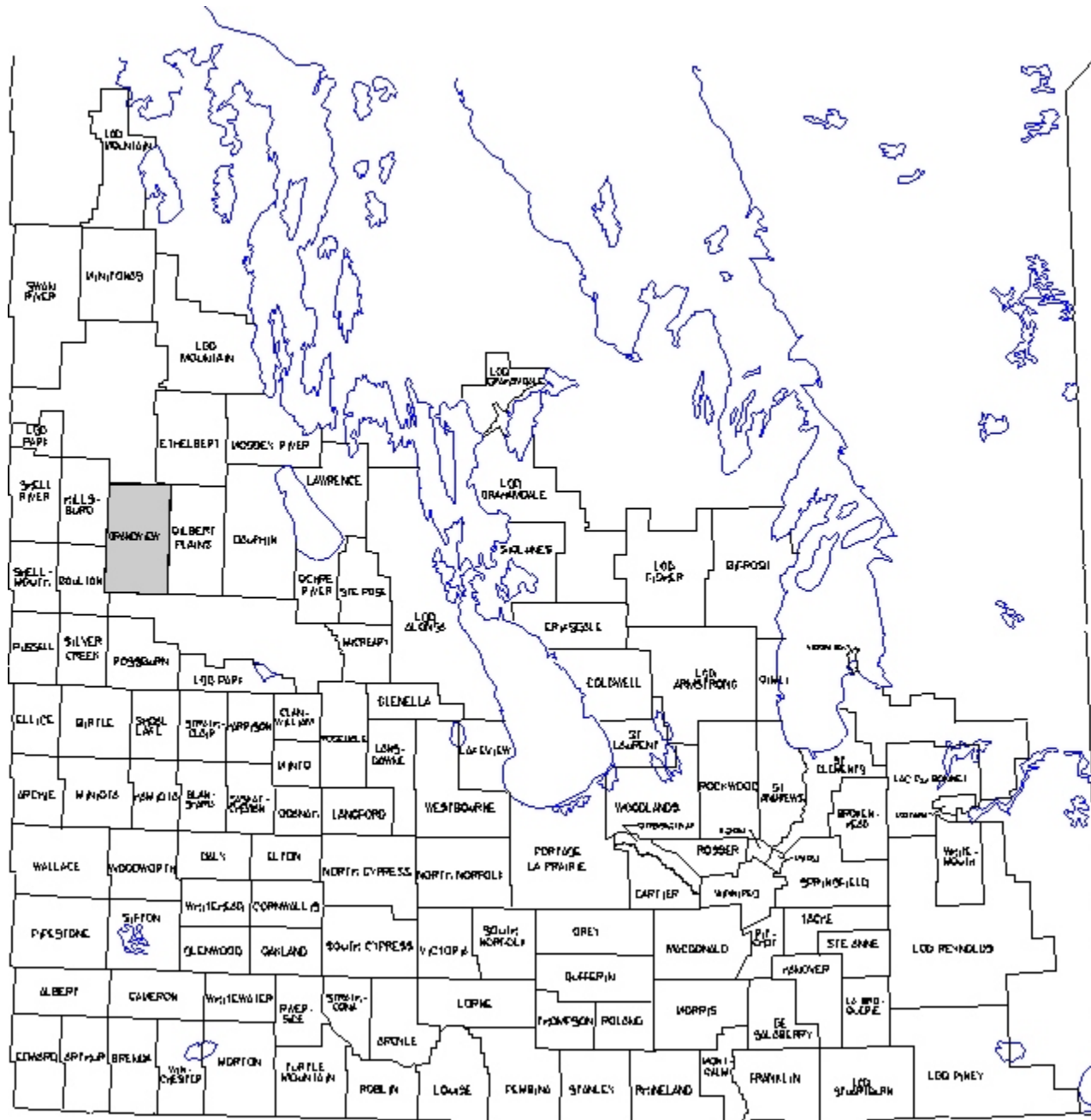


Figure 1. Rural municipalities of southern Manitoba.

## INTRODUCTION

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

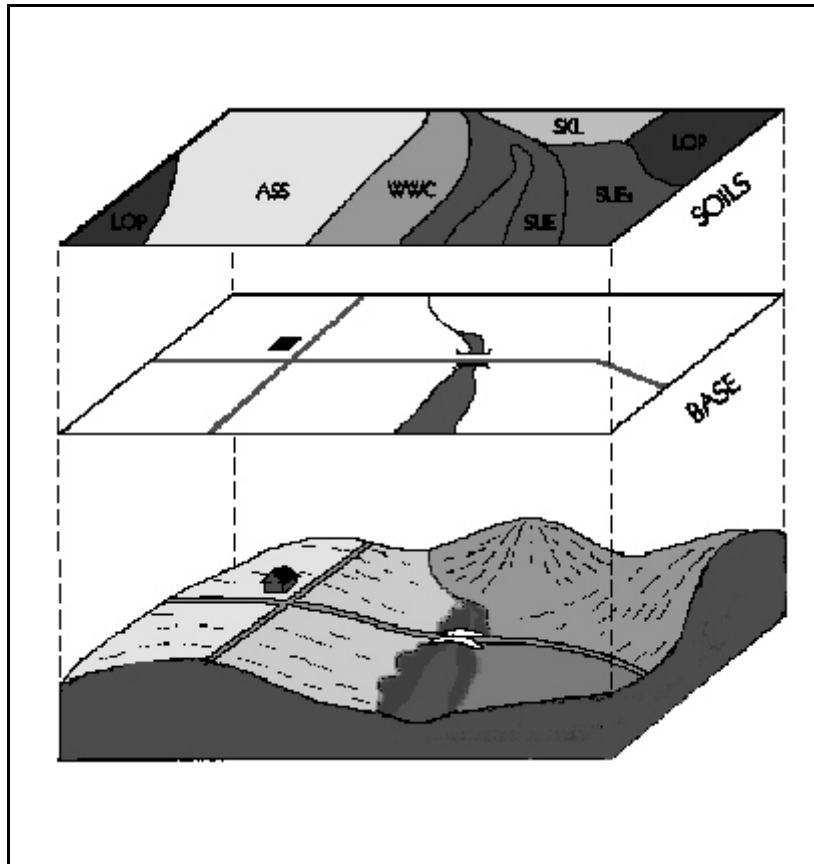
The soil map and database were compiled and registered using the computerized Geographic Information System (PAMAP GIS) facilities of the Manitoba Land Resource Unit. These databases were used in GIS to create the generalized, derived and interpretive maps and statistics contained in this report. The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

This bulletin is available in printed or digital format. The digital bulletin is a Windows based executable file which offers 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, based on photo-interpretation.

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

classes were also added, based on photo-interpretation.

## SOIL AND TERRAIN OVERVIEW

The Rural Municipality (RM) of Grandview covers an area of approximately 13 townships (120 624 hectares) of land in western Manitoba (page 3). Sixteen percent of this land area is in the Duck Mountain Forest Reserve, 12 percent in the Riding Mountain National Park and 3.3 percent in the Valley River Indian Reserve.

Though land resource information exists for the Duck Mountain Forest Reserve, it was not classified in this generalized report. The Town of Grandview is the main population and agriculture service centre in the municipality.

The climate in the municipality can be related to weather data from several stations within the area. The mean annual temperature at Roblin is 0.2°C and the mean annual precipitation is 476 mm (Environment Canada, 1982). The average frost-free period based on data from nearby stations varies from 96 to 108 days, and degree-days above 5°C range from 1450 to 1500 (Ash, 1991). The calculated seasonal moisture deficit for the period between May and September for the area is 200 to 250 mm. The estimated effective growing degree days (EGDD) above 5°C, accumulated from date of seeding to the date of the first fall frost is 1200 to 1300 (Agronomic Interpretations Working Group, 1995). These parameters provide an indication of length of growing season and the moisture and heat energy available for crop growth.

Physiographically, the RM of Grandview is part of the Saskatchewan Plain. It includes part of the Duck Mountain Upland to the north, the Valley River Plain in the central area and the northern edge of the Riding Mountain Upland on the south (Canada-Manitoba Soil Survey, 1980). The land surface in the upland areas is characterized by hummocky terrain with local relief of 3 to 8 m and slopes of 2 to 9 percent whereas the central portion of the RM is level to nearly level with slopes of 0 to 2 percent (page 10). A steep morainic ridge with slopes exceeding 15 percent stretches for several kilometres in the western part of the municipality.

Elevations in the Duck Mountain Upland exceed 500 metres above sea level (m asl) and in the Riding Mountain Upland range from 480 m to about 650 m asl. Lowest elevations occur in the Valley River Plain, decreasing gradually from 480 m asl in the west to about 410 m where the Valley River flows to the east from the municipality.

The dominant soil materials in the RM consist of loamy textured glacial till. Local areas of lacustrine clay and shaly clay till occur adjacent to the Riding Mountain and minor areas of sand and gravel are associated with the meltwater channel containing the Valley River. Loamy, sandy and clayey lacustrine materials occur around Grandview and in the Valley River Indian Reserve (page 11).

Soils in the municipality have been mapped at a reconnaissance map scale of 1:126 720 and published in the soil survey report for the Grandview Map Sheet Area (Ehrlich et al., 1959) and Soils of the Duck Mountain Forest Reserve (MLRU, Open File). According to the Canadian System of Soil Classification (Expert Committee on Soil Survey, 1987), the soils in the municipality are classified as dominantly Chernozemic Black (Meharry, Plainview, Dutton and Gilbert associations). Gray Luvisols (Waitville, Duck Mountain, Blackstone and Grifton Associations) occur at higher elevations and Dark Gray Chernozems (Erickson and Rose Ridge Associations) commonly occur between the Black soils and the Luvisols. Local areas of poorly drained soils (Gleysols) and shallow peat (Organic) soils are common in depressional areas. Regosolic soils occur on stratified minor stream deposits in the valleys and on steeply sloping areas of eroded slopes (page 11). A more detailed and complete description of the type, distribution and textural variability of soils in the municipality is provided in the published reconnaissance soil survey.

Surface drainage of the RM is well developed and is facilitated by a network of rivers and streams tributary to the Valley River. The majority of the soils in the municipality are well drained with minor areas of imperfect drainage on level areas and lower slopes. Poorly

drained and peaty soils are locally important in depressional areas throughout this municipality (page 13).

Topography is a major management consideration on higher terrain in the municipality whereas fine and coarse soil textures and minor local wet areas are more of a concern in the Valley River Plain (page 15). Variably stony conditions occur on the till soils throughout the area and very stony conditions are of particular concern in sharply hilly landscapes in the western portion of the RM.

The majority of the well drained, medium textured soils in gently sloping landscapes are rated as **Class 2** for agriculture capability (page 17) and **Good** for irrigation suitability (page 19). Level, well drained loamy soils are rated in **Class 1**. Moderately severe limitations resulting from sandy and clayey textures and topography are rated in **Class 3**. Very poorly drained soils, organic (peaty) soils and steeply sloping lands are rated in **Class 6** for agriculture and **Poor** for irrigation. Clay textured soils are also rated **Poor** for irrigation.

A major issue currently receiving considerable attention is the sustainability of agricultural practices and their potential impact on the soil and groundwater environment. To assist in highlighting this concern to land planners and agricultural producers, an assessment of potential environmental impact (EI) under irrigation has been included in this bulletin (page 21). As shown, the majority of the RM is at a **Low to Minimal** risk of degradation. Gently sloping soils have a **Moderate** risk of degradation and steeply sloping soils and areas of sandy and gravelly soils are rated as having a **High** potential impact. These conditions increase the risk for deep leaching of potential contaminants on the soil surface and the potential for rapid runoff from the soil surface into adjacent wetlands or water bodies. This EI map is intended to be used in association with the irrigation suitability map.

Another issue of concern to producers, soil conservationists and

land use specialists is soil erosion caused by agricultural cropping and tillage practices. To highlight areas with potential for water erosion, a risk map has been included to show where special practices should be adopted to mitigate this risk (page 23). About 38 percent of the land in the RM is at a **Severe to High** risk for potential water erosion and 21 percent is estimated to have a **Moderate** risk. Although agriculture is a major land use in the RM, the area within the Forest Reserve, the National Park and many of the steeply sloping soils in the agriculture area remain in tree cover. Management practices for land in annual crop focus primarily on maintaining adequate crop residues to provide sufficient surface cover. However, protection of the steeper sloping lands and the coarse textured soils at risk from wind erosion may require a shift in land use away from annual cultivation to production of perennial forages, pasture or permanent tree cover.

An assessment of the status of land use in the RM of Grandview in 1994 was obtained through analysis of satellite imagery (page 25). It showed that 42 percent of the land in the RM is in annual cropland. Production of perennial forages takes place on 2.2 percent of the area while grassland occupies 12.8 percent. Most of the wooded area (34.6%) occurs in the Forest Reserve and the National Park but steeper sloping soils in the agricultural area are often tree covered. Wetlands and small water bodies occupy 5.6 percent of the land area and non-agricultural uses such as recreation and infrastructure for urban areas and transportation utilize 2.3 percent.

A careful choice of crops and maintenance of adequate surface cover is essential for the management of sensitive lands with sandy textures or steeper slopes. This includes leaving adequate crop residues on the surface to provide sufficient trash cover during the early spring period. Implementation of minimum tillage practices and crop rotations including forage on a site by site basis will help to reduce the risk of soil degradation, maintain productivity and insure that agriculture land-use is sustainable over the long-term.

**DERIVED AND INTERPRETIVE MAPS**

localized site specific land use suitability requirements.

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 Classes

Generalized Soil

Drainage

Management Consideration

Interpretative Maps

Agricultural Capabilities

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

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

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

**Slope Map.**

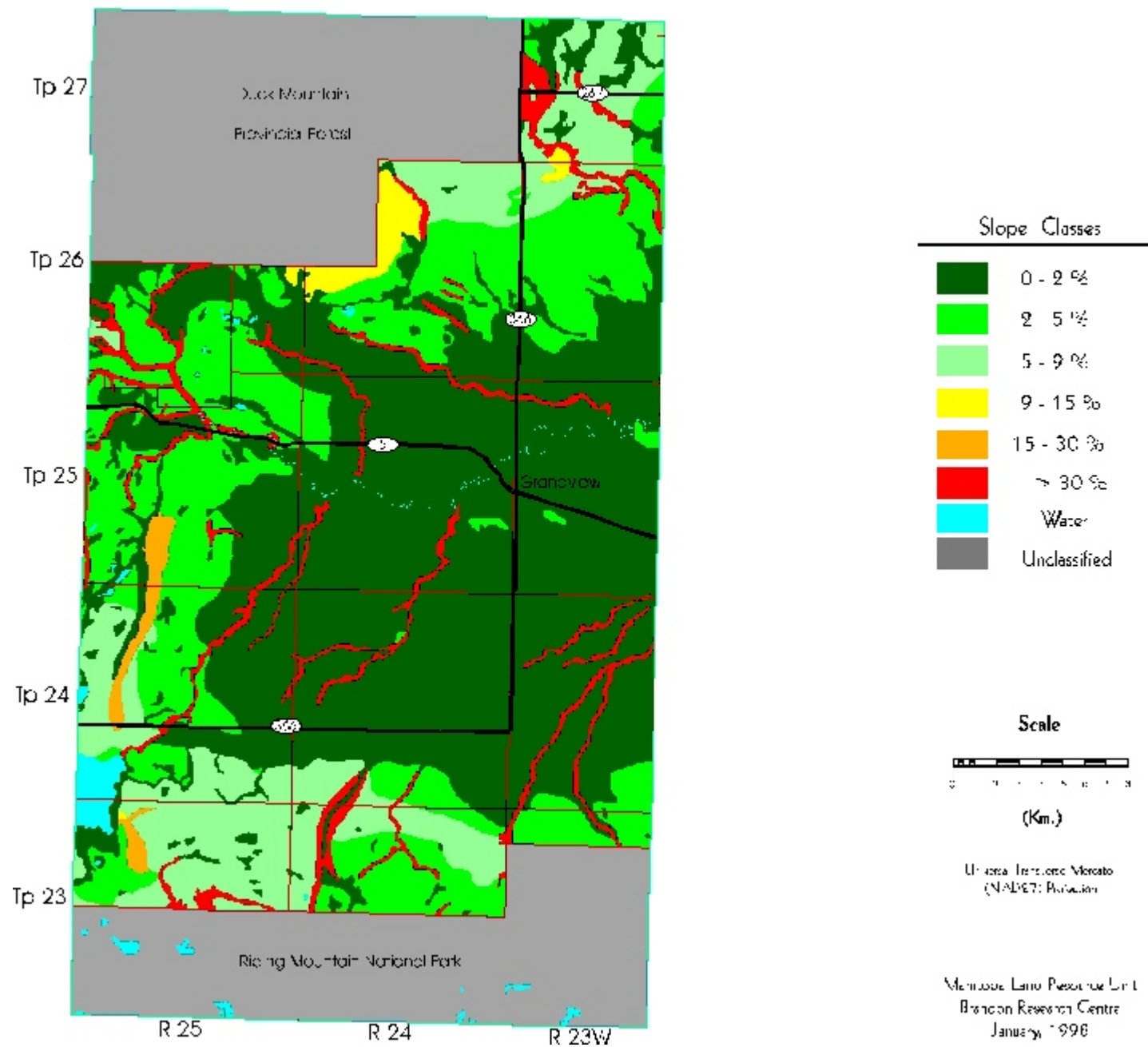
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil layer database. Specific colours are used to indicate the dominant slope class for each soil polygon in the RM. Additional slope classes may occur in each polygon area, but cannot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

**Table 1. Slope Classes<sup>1</sup>**

<b>Slope Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>0 - 2 %</b>	<b>43913</b>	<b>36.4</b>
<b>2 - 5 %</b>	<b>21878</b>	<b>18.1</b>
<b>5 - 9 %</b>	<b>12330</b>	<b>10.2</b>
<b>9 - 15 %</b>	<b>1147</b>	<b>1.0</b>
<b>15 - 30 %</b>	<b>873</b>	<b>0.7</b>
<b>&gt; 30 %</b>	<b>5102</b>	<b>4.2</b>
<b>Unclassified</b>	<b>34284</b>	<b>28.4</b>
<b>Water</b>	<b>1096</b>	<b>0.9</b>
<b>Total</b>	<b>120624</b>	<b>100.0</b>

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

## Slope Map



### Generalized Soil Map.

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

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

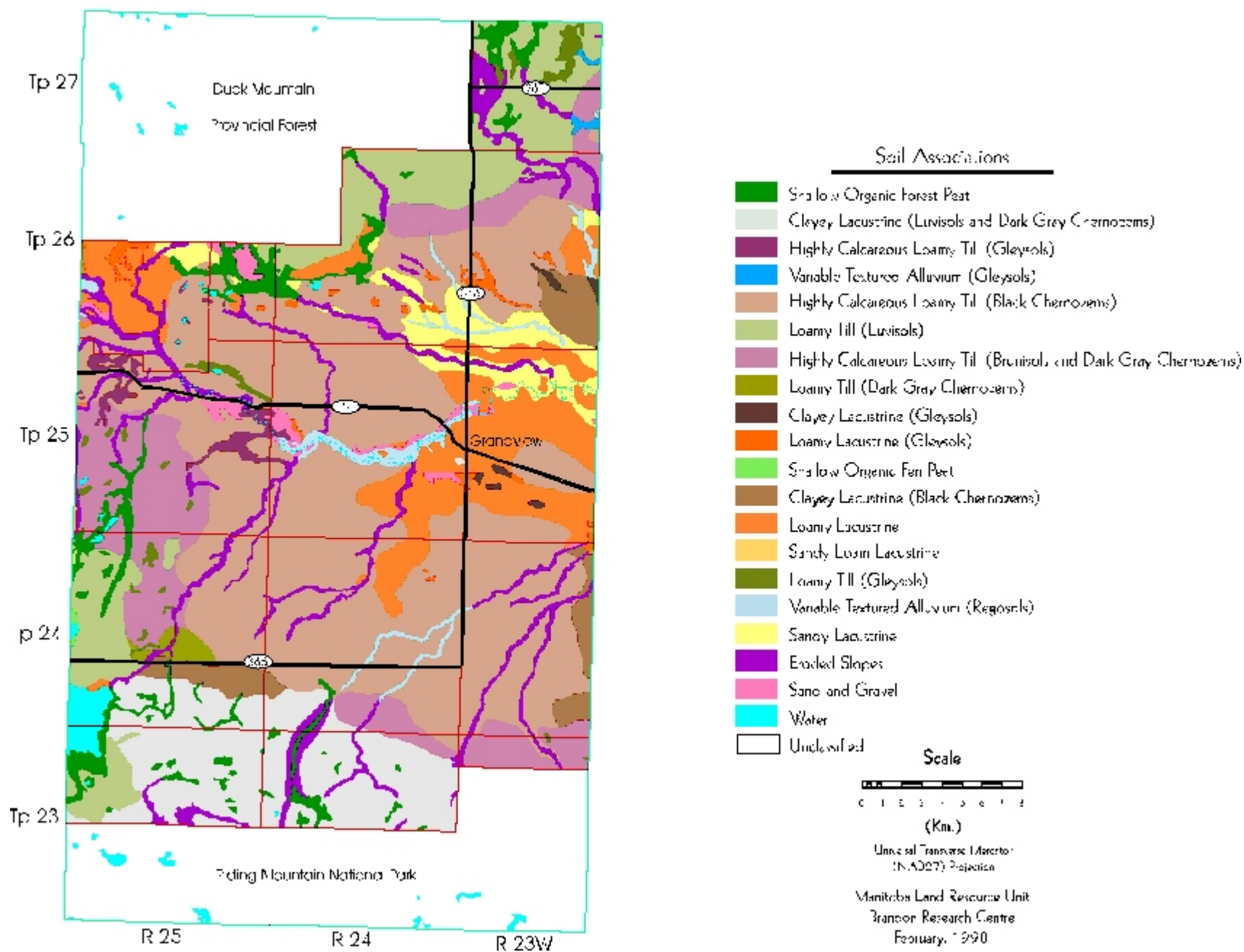
More detailed maps showing the dominant and subdominant soils in each polygon can also be produced at larger map scales.

**Table 2. Generalized Soil Groups<sup>1</sup>**

<b>Soil Groups</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Organic Forest Peat</b>	<b>3204</b>	<b>2.7</b>
<b>Clayey Lacustrine (Luvisols and Dark Gray Chernozems)</b>	<b>9021</b>	<b>7.5</b>
<b>Highly Calcareous Loamy Till (Gleysols)</b>	<b>754</b>	<b>0.6</b>
<b>Variable Textured Alluvium (Gleysols)</b>	<b>116</b>	<b>0.1</b>
<b>Highly Calcareous Loamy Till (Black Chernozems)</b>	<b>32756</b>	<b>27.2</b>
<b>Loamy Till (Luvisols)</b>	<b>8169</b>	<b>6.8</b>
<b>Highly Calcareous Loamy Till (Brunisols and Dark Gray Chernozems)</b>	<b>8380</b>	<b>6.9</b>
<b>Loamy Till (Dark Gray Chernozems)</b>	<b>409</b>	<b>0.3</b>
<b>Clayey Lacustrine (Gleysols)</b>	<b>208</b>	<b>0.2</b>
<b>Loamy Lacustrine (Gleysols)</b>	<b>664</b>	<b>0.6</b>
<b>Shallow Organic Fen Peat</b>	<b>27</b>	<b>0.0</b>
<b>Clayey Lacustrine (Black Chernozems)</b>	<b>2312</b>	<b>1.9</b>
<b>Loamy Lacustrine</b>	<b>8251</b>	<b>6.8</b>
<b>Sandy Loam Lacustrine</b>	<b>32</b>	<b>0.0</b>
<b>Loamy Till (Gleysols)</b>	<b>732</b>	<b>0.6</b>
<b>Variable Textured Alluvium (Regosols)</b>	<b>1338</b>	<b>1.1</b>
<b>Sandy Lacustrine</b>	<b>2932</b>	<b>2.4</b>
<b>Eroded Slopes</b>	<b>5102</b>	<b>4.2</b>
<b>Sand and Gravel</b>	<b>836</b>	<b>0.7</b>
<b>Water</b>	<b>1191</b>	<b>1.0</b>
<b>Unclassified</b>	<b>34189</b>	<b>28.3</b>
<b>Total</b>	<b>120624</b>	<b>100.0</b>

<sup>1</sup> Based on the **dominant** soil series for each soil polygon.

## Generalized Soil Map



**Soil Drainage Map.**

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

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

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

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

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

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

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

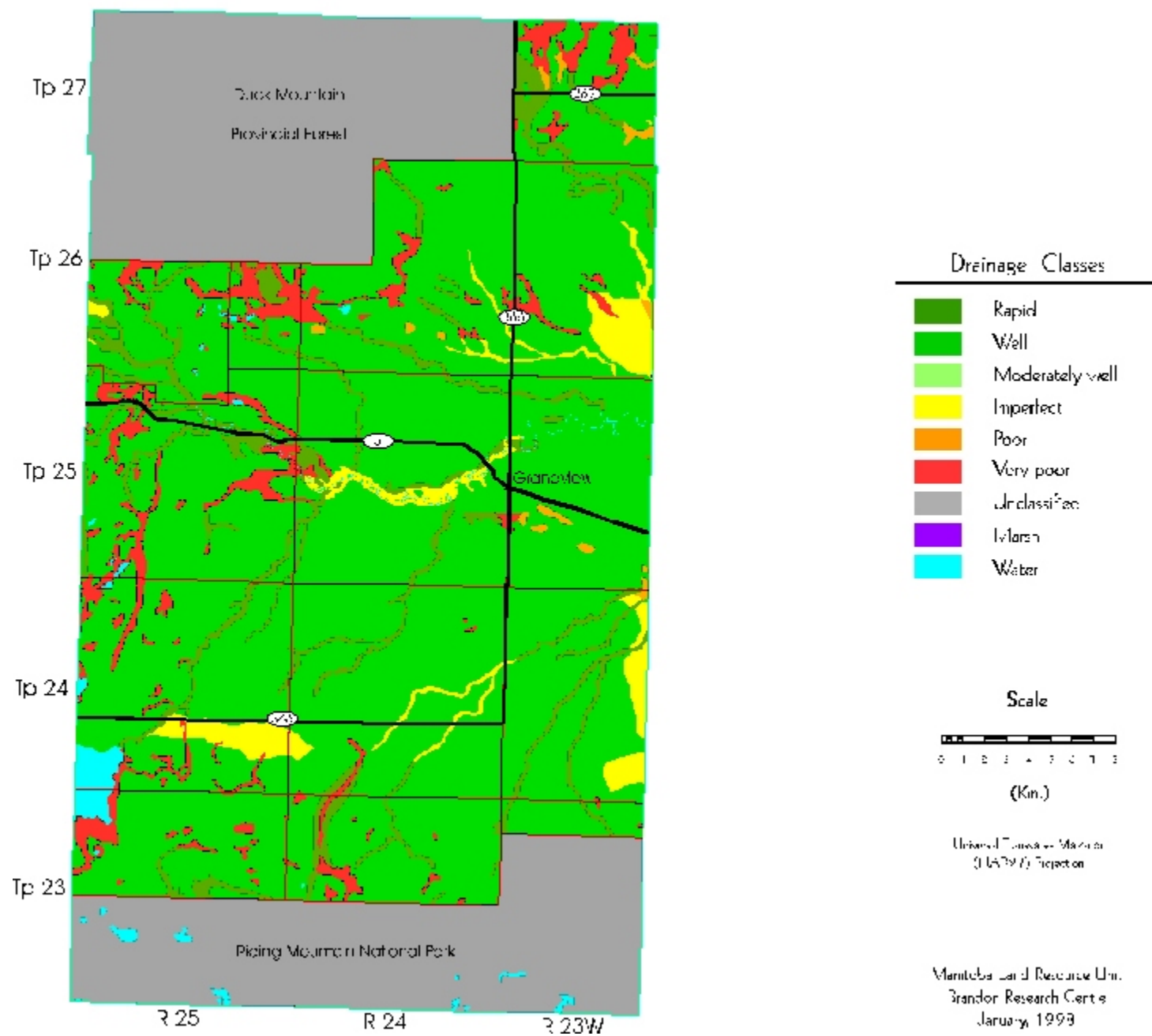
Drainage classification is based on the dominant soil series within each individual soil polygon.

**Table 3. Drainage Classes<sup>1</sup>**

<b>Drainage Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Very Poor</b>	<b>5254</b>	<b>4.4</b>
<b>Poor</b>	<b>451</b>	<b>0.4</b>
<b>Imperfect</b>	<b>3650</b>	<b>3.0</b>
<b>Moderately Well</b>	<b>0</b>	<b>0.0</b>
<b>Well</b>	<b>69950</b>	<b>58.0</b>
<b>Rapid</b>	<b>5939</b>	<b>4.9</b>
<b>Marsh</b>	<b>0</b>	<b>0.0</b>
<b>Unclassified</b>	<b>34284</b>	<b>28.4</b>
<b>Water</b>	<b>1096</b>	<b>0.9</b>
<b>Total</b>	<b>120624</b>	<b>100.0</b>

<sup>1</sup> 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.

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

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

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

**M = Medium texture** - soil landscapes with medium to moderately fine 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.

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

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

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

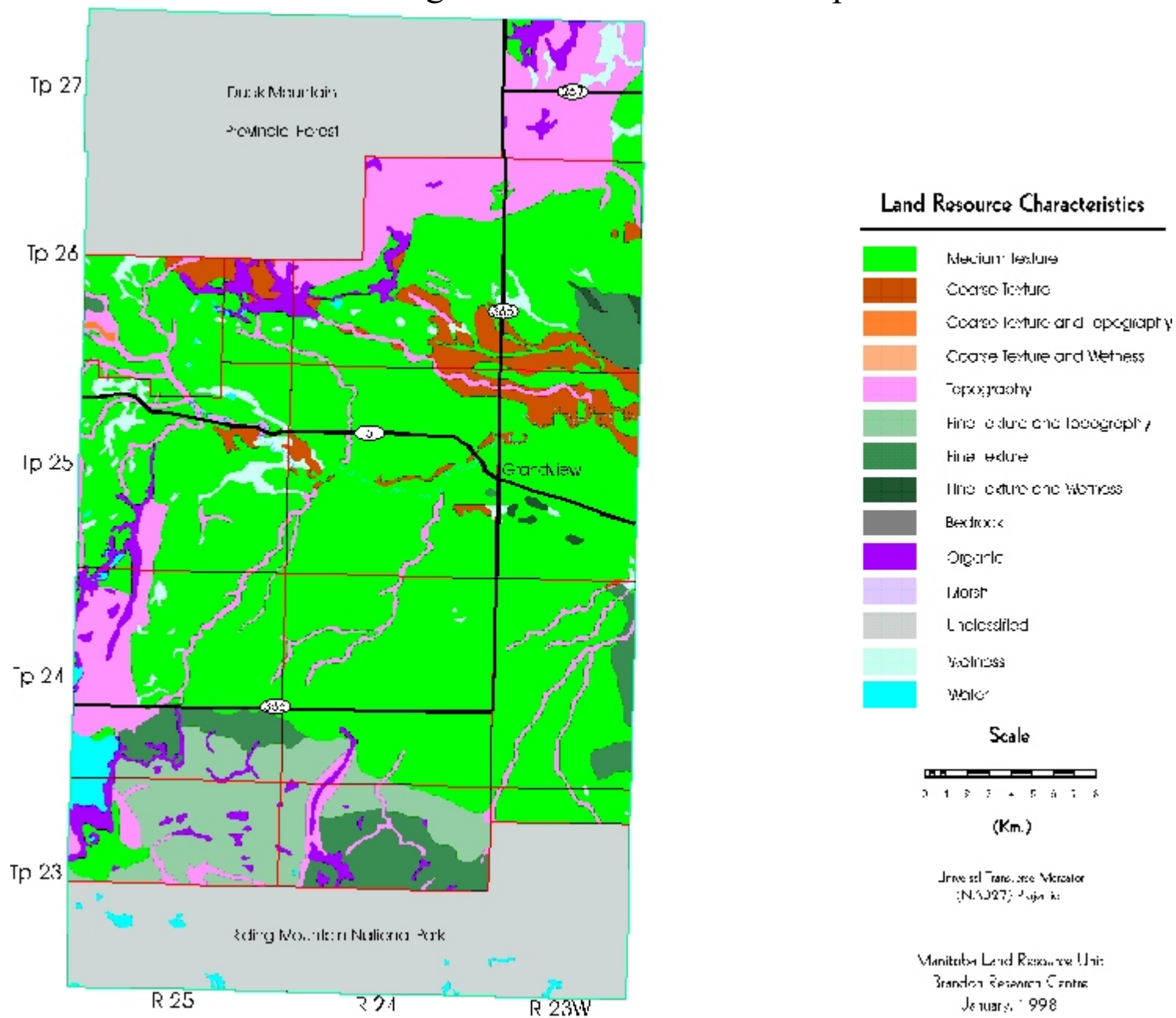
**R = Bedrock** - soil landscapes that have **shallow depth to bedrock (< 50 cm) and/or exposed bedrock** which may prevent the use of some or all tillage practices as well as the range of potential crops. They require special cropping and management practices to sustain agricultural production.

**Table 5. Management Considerations<sup>1</sup>**

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	4861	4.0
Fine Texture and Wetness	208	0.2
Fine Texture and Topography	6531	5.4
Medium Texture	51496	42.7
Coarse Texture	3730	3.1
Coarse Texture and Wetness	0	0.0
Coarse Texture and Topography	39	0.0
Topography	12883	10.7
Topography and Bedrock	0	0.0
Wetness	2265	1.9
Wetness and Topography	0	0.0
Bedrock	0	0.0
Organic	3231	2.7
Marsh	0	0.0
Unclassified	34284	28.4
Water	1096	0.9
<b>Total</b>	<b>120624</b>	<b>100.0</b>

<sup>1</sup> Based on **dominant** soil series for each soil 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 6. Agricultural Capability<sup>1</sup>**

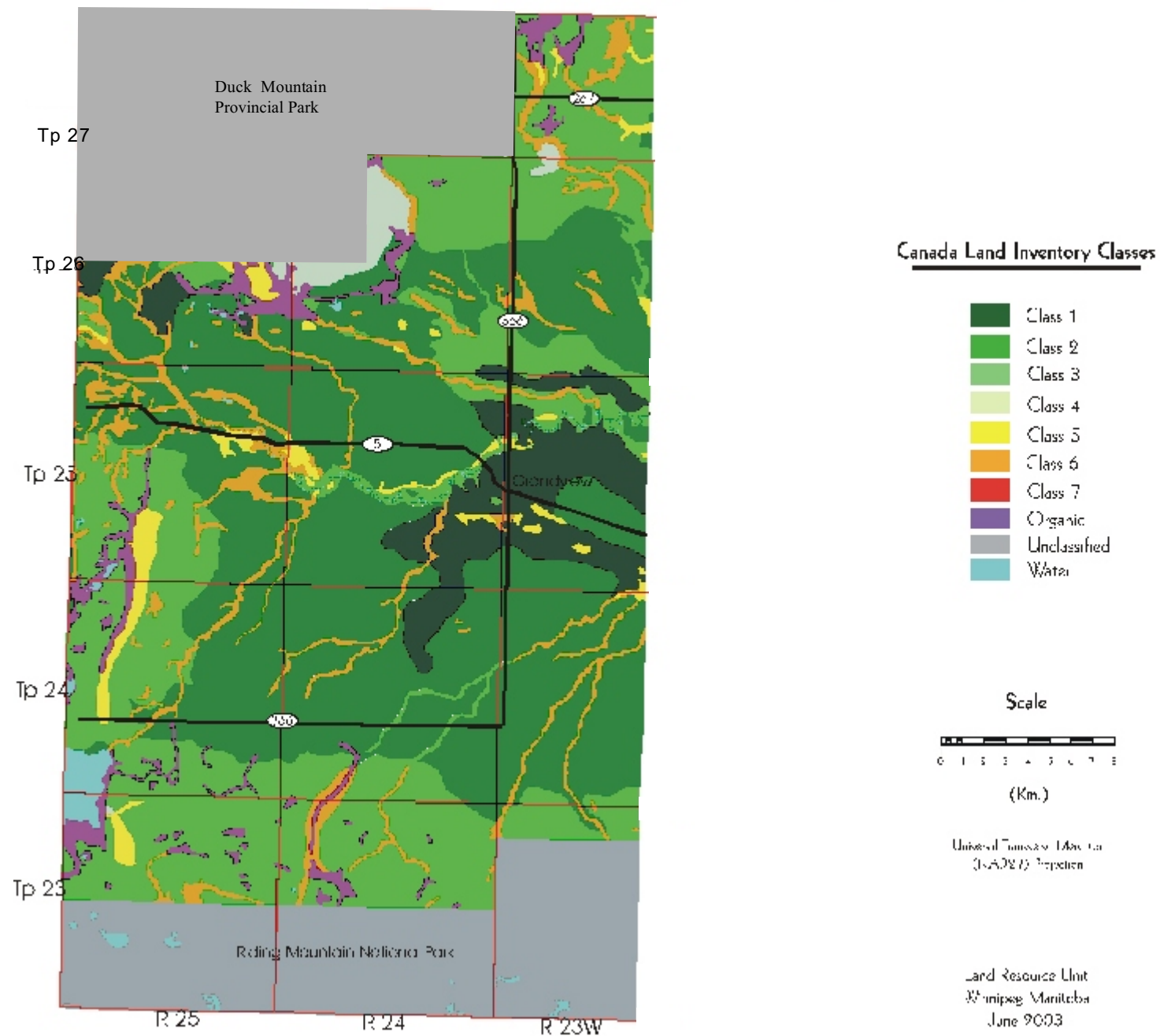
<b>Class Subclass</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>1</b>	<b>6410</b>	<b>5.3</b>
<b>2</b>	<b>37286</b>	<b>30.9</b>
2M	314	0.3
2MT	1084	0.9
2T	8824	7.3
2TW	256	0.2
2W	2055	1.7
2X	24753	20.5
<b>3</b>	<b>28040</b>	<b>23.3</b>
3I	1339	1.1
3M	2934	2.4
3T	11064	9.2

**Table 6. Agricultural Capability<sup>1</sup>(cont)**

<b>Class Subclass</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
3TP	1222	1.0
3X	11482	9.5
<b>4</b>	<b>1142</b>	<b>0.9</b>
4T	1142	0.9
<b>5</b>	<b>2168</b>	<b>1.8</b>
5M	840	0.7
5T	874	0.7
5W	333	0.3
5WI	121	0.1
<b>6</b>	<b>6905</b>	<b>5.7</b>
6T	4892	4.1
6W	2013	1.7
<b>Unclassified</b>	<b>34140</b>	<b>28.3</b>
<b>Water</b>	<b>1192</b>	<b>1.0</b>
<b>Organic</b>	<b>3222</b>	<b>2.7</b>
<b>Total</b>	<b>120504</b>	<b>100.0</b>

<sup>1</sup> Based on **dominant** soil, slope gradient, and slope length of each soil 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.

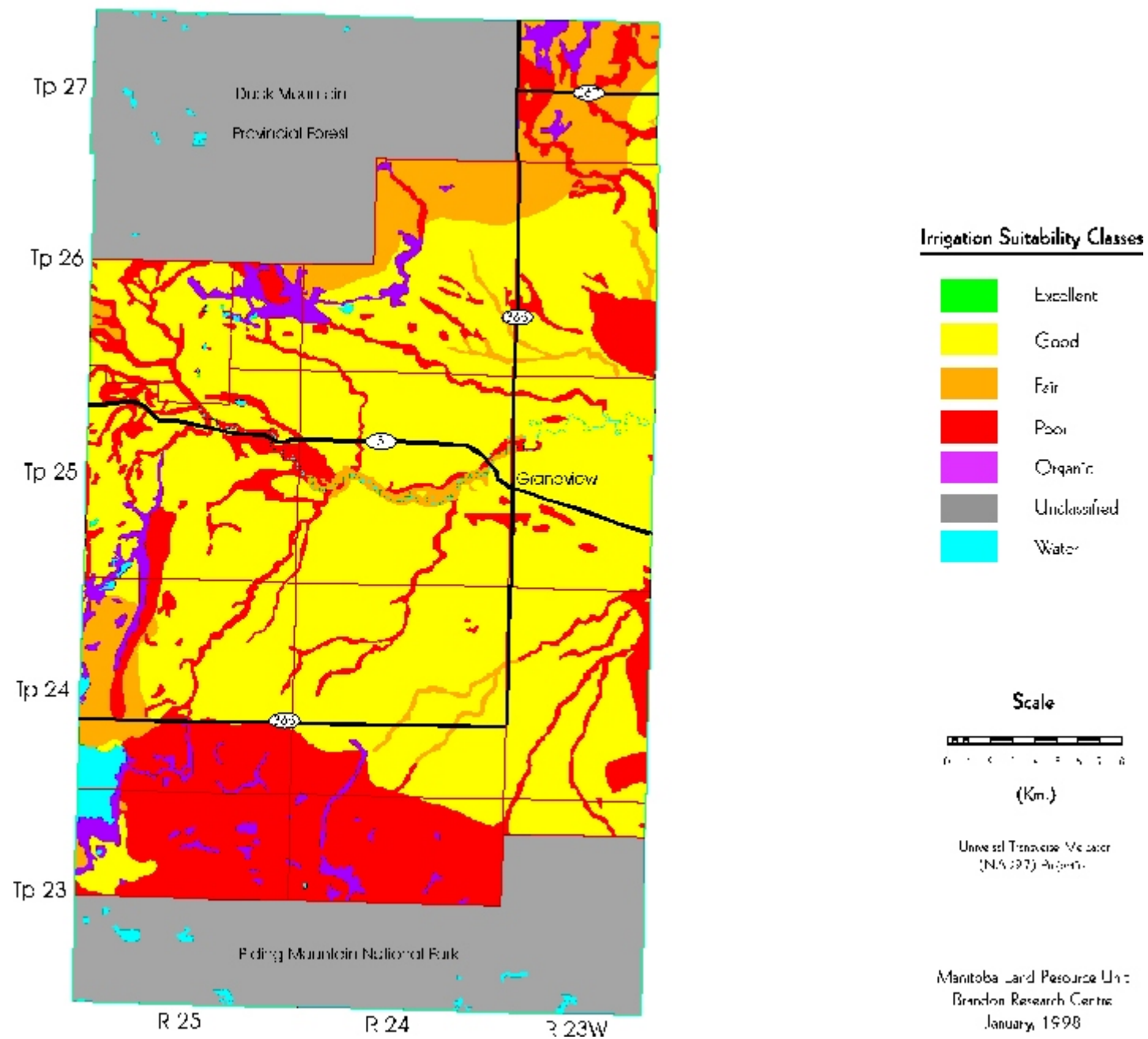
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

**Table 7. Irrigation Suitability<sup>1</sup>**

<b>Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Excellent</b>	<b>0</b>	<b>0.0</b>
<b>Good</b>	<b>52945</b>	<b>43.9</b>
<b>Fair</b>	<b>8449</b>	<b>7.0</b>
<b>Poor</b>	<b>20618</b>	<b>17.1</b>
<b>Organic</b>	<b>3231</b>	<b>2.7</b>
<b>Unclassified</b>	<b>34189</b>	<b>28.3</b>
<b>Water</b>	<b>1191</b>	<b>1.0</b>
<b>Total</b>	<b>120624</b>	<b>100.0</b>

<sup>1</sup> Based on **dominant** soil, slope gradient, and slope length of each soil polygon.

## Irrigation Suitability Map



**Potential Environmental Impact Under Irrigation Map.**

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

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

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

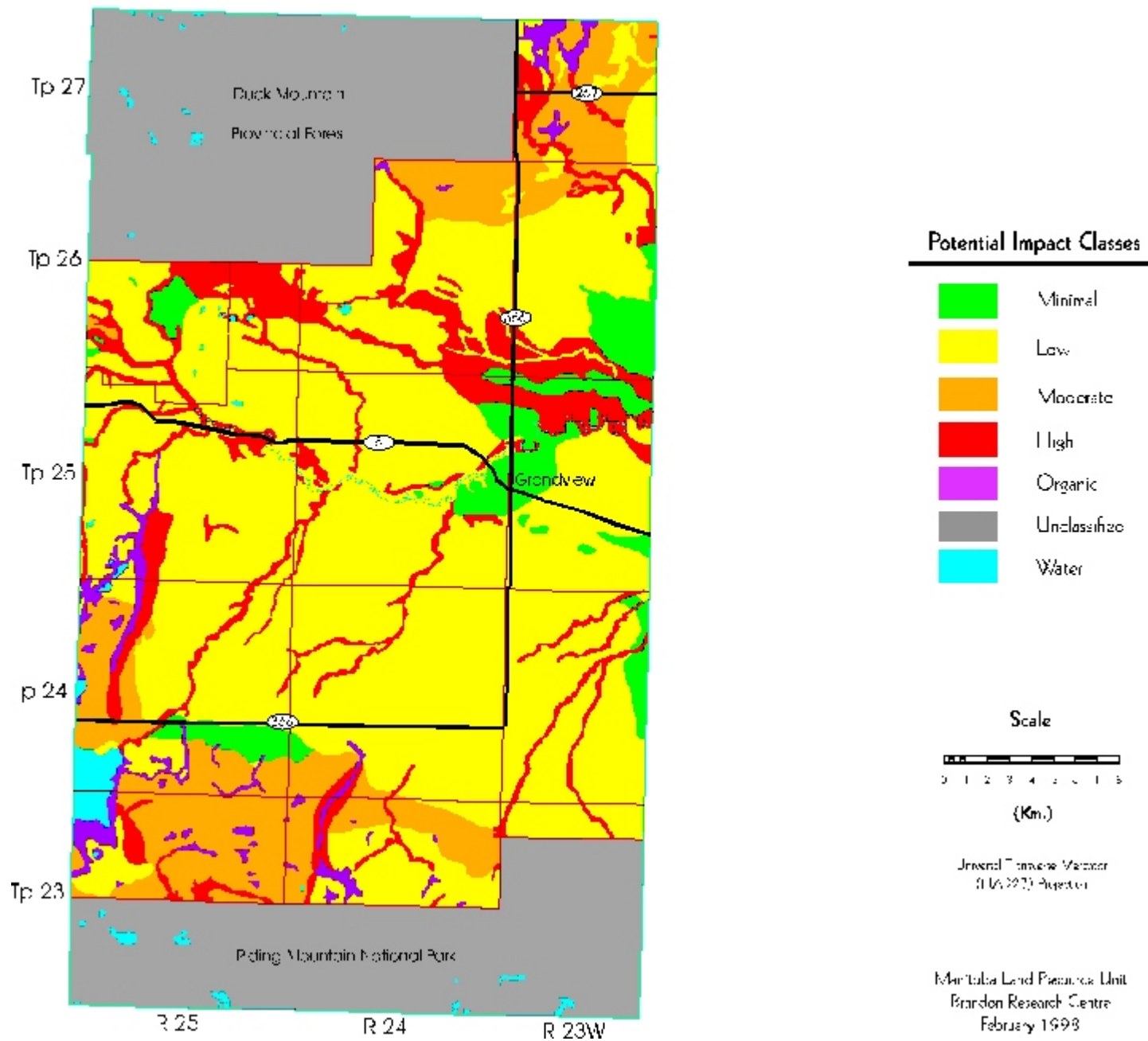
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

**Table 8. Potential Environmental Impact Under Irrigation<sup>1</sup>**

<b>Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Minimal</b>	<b>4930</b>	<b>4.1</b>
<b>Low</b>	<b>55035</b>	<b>45.6</b>
<b>Moderate</b>	<b>12291</b>	<b>10.2</b>
<b>High</b>	<b>10700</b>	<b>8.9</b>
<b>Organic</b>	<b>2288</b>	<b>1.9</b>
<b>Unclassified</b>	<b>34189</b>	<b>28.3</b>
<b>Water</b>	<b>1191</b>	<b>1.0</b>
<b>Total</b>	<b>120624</b>	<b>100.0</b>

<sup>1</sup> Based on **dominant** soil, slope gradient, and slope length of each soil polygon.

## Potential Environmental Impact Under Irrigation



**Water Erosion Risk Map.**

The risk of water erosion was estimated using the universal soil loss equation (USLE) developed by Wischmeier and Smith (1965). The map shows 5 classes of soil erosion risk based on bare unprotected soil:

**negligible**  
**low**  
**moderate**  
**high**  
**severe.**

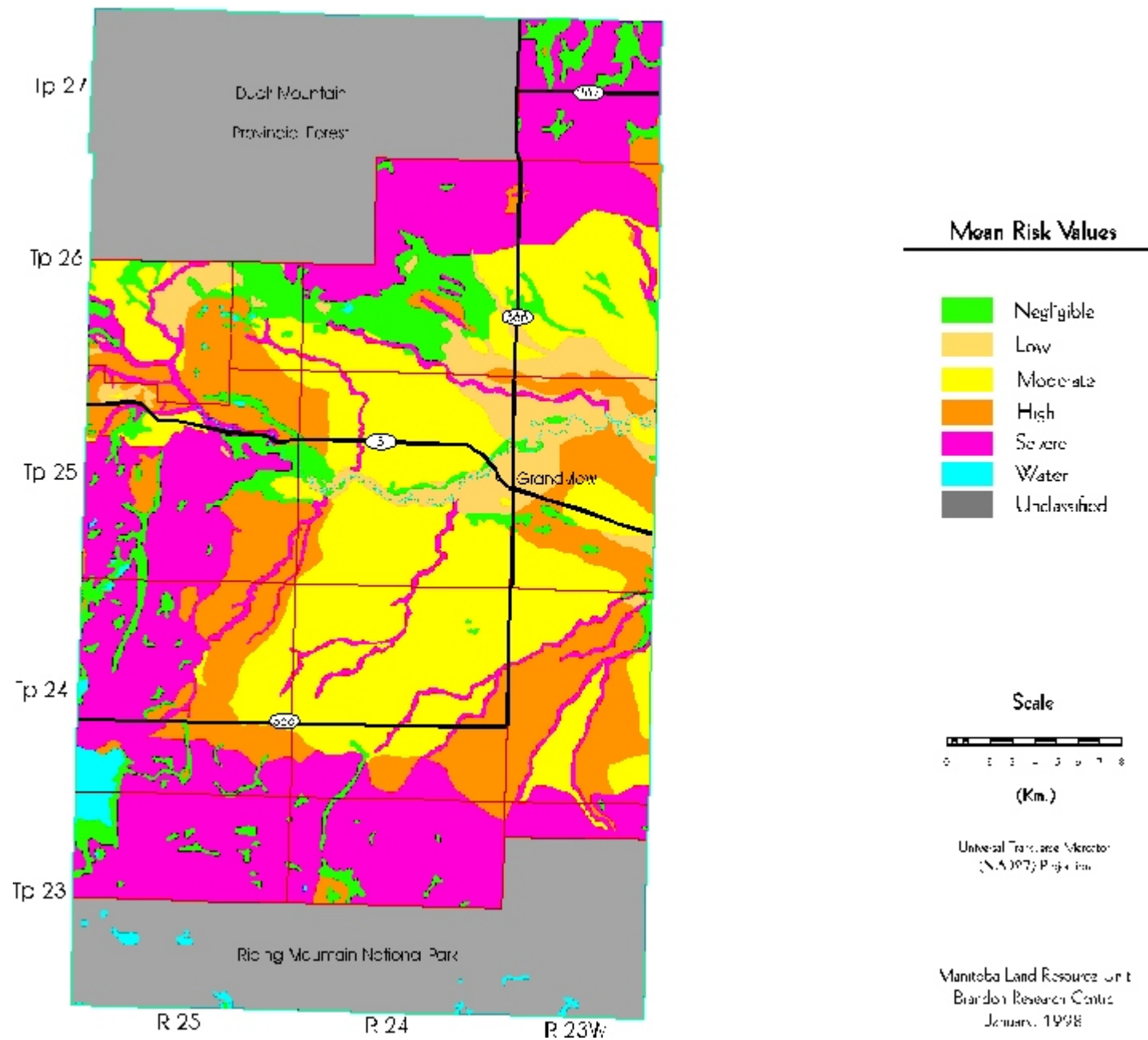
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

**Table 9. Water Erosion Risk<sup>1</sup>**

<b>Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Negligible</b>	<b>8098</b>	<b>6.7</b>
<b>Low</b>	<b>5425</b>	<b>4.5</b>
<b>Moderate</b>	<b>25015</b>	<b>20.7</b>
<b>High</b>	<b>15607</b>	<b>12.9</b>
<b>Severe</b>	<b>31102</b>	<b>25.8</b>
<b>Unclassified</b>	<b>34281</b>	<b>28.4</b>
<b>Water</b>	<b>1096</b>	<b>0.9</b>
<b>Total</b>	<b>120624</b>	<b>100.0</b>

<sup>1</sup> Based on **dominant** soil, slope gradient, and slope length of each soil polygon.

## Water Erosion Risk Map



**Land Use Map.**

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

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

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

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

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

**Trees** - lands that are primarily in tree cover.

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

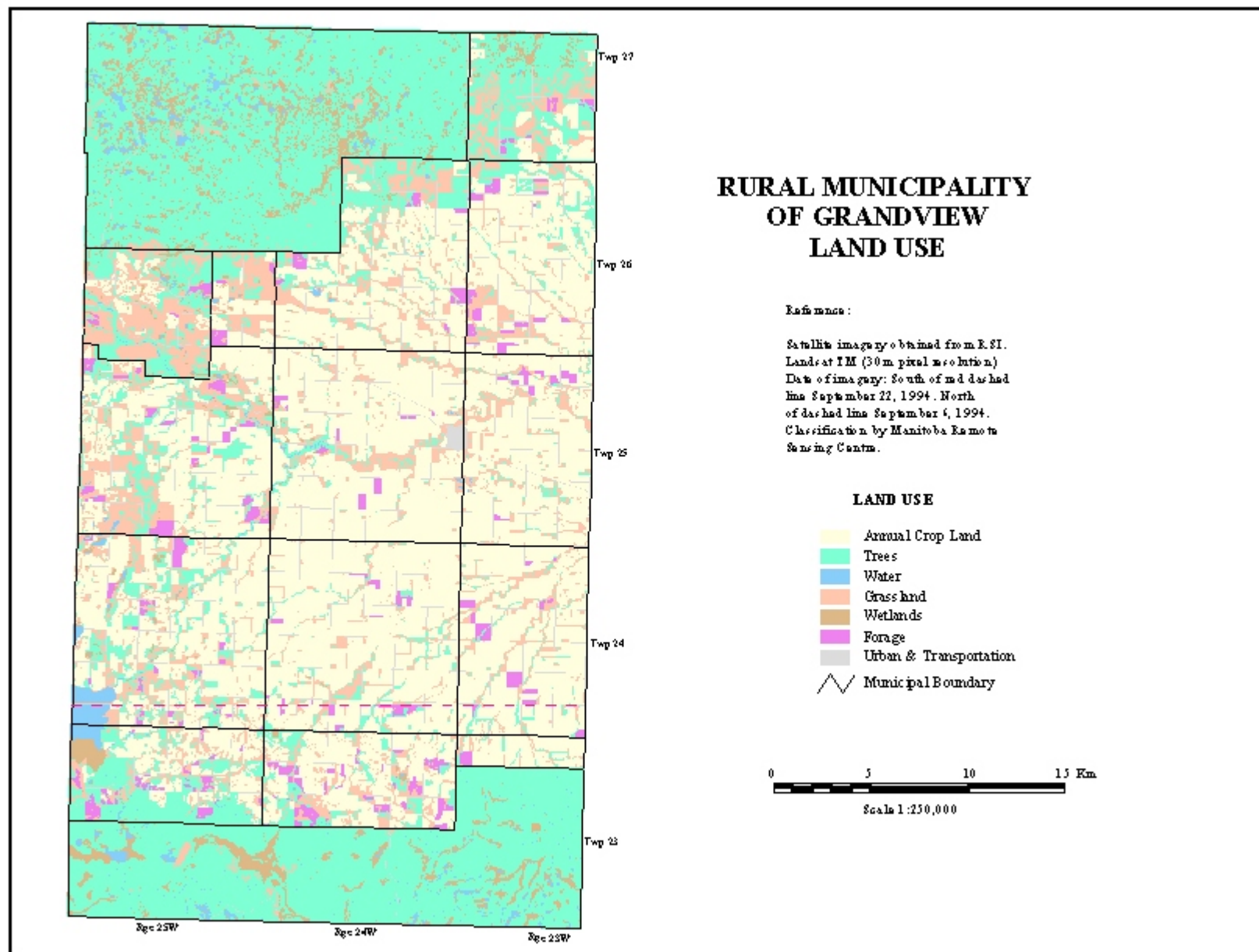
**Water** - open water - lakes, rivers streams, ponds, and lagoons.

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

**Table 10. Land Use<sup>1</sup>**

<b>Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Annual Crop Land</b>	<b>51701</b>	<b>42.5</b>
<b>Forage</b>	<b>2623</b>	<b>2.2</b>
<b>Grasslands</b>	<b>15586</b>	<b>12.8</b>
<b>Trees</b>	<b>42154</b>	<b>34.6</b>
<b>Wetlands</b>	<b>4892</b>	<b>4.0</b>
<b>Water</b>	<b>1924</b>	<b>1.6</b>
<b>Urban and Transportation</b>	<b>2769</b>	<b>2.3</b>
<b>Total</b>	<b>121649</b>	<b>100.0</b>

<sup>1</sup> Land use information (1995) and map supplied by PrairieFarm Rehabilitation Administration. Areas may vary from previous maps due to differences in analytical procedures.



**REFERENCES**

Agronomic Interpretations Working Group. 1995. Land Suitability Rating System for Agricultural Crops: 1. Spring-seeded Small Grains. Edited by W.W. Pettapiece. Tech. Bull. 1995-6E. Centre for Land and Biological Resources Research, Agriculture and Agri-Food Canada, Ottawa. 90 pages, 2 maps.

Canada Land Inventory. 1965. Soil Capability Classification for Agriculture. Canada Land Inventory Report No. 2. ARDA, Dept. of Forestry, Canada, Ottawa.

Canada-Manitoba Soil Survey. 1980. Physiographic Regions of Manitoba. Ellis Bldg., University of Manitoba, Winnipeg. Revised. Unpublished Report.

Canada-Manitoba Soil Survey. 1979. Ecological Regions and Subregions in Manitoba. Ellis Bldg., University of Manitoba, Winnipeg. Revised. Unpublished Report.

Ehrlich, W.A., Pratt, L.E. and Leclaire, F.P. 1959 Report of Reconnaissance Soil Survey of Grandview Map Sheet Area. Soils Report No. 9. Manitoba Soil Survey. Published by Manitoba Dept. of Agriculture. 121pp and 2 maps.

Eilers R.G. 1983. Soils of the Roblin Area. Report No. D47. Canada-Manitoba Soil Survey. Winnipeg.

Environment Canada. 1982. Canadian Climatic Normals 1951-1980. Frost, Vol. 6; Atmospheric Environment, Downsview, Ontario.

Environment Canada. 1993. Canadian Climatic Normals 1961-1990. Prairie Provinces. Atmospheric Environment, Downsview, Ontario.

Expert Committee on Soil Survey. 1987. The Canadian System of Soil Classification. Second Edition. Publ. No. 1646. Research Branch, Agriculture Canada.

Irrigation Suitability Classification Working Group. 1987. An Irrigation Suitability Classification System for the Canadian Prairies. LRRC contribution no. 87-83, Land Resource Research Centre, Research Branch, Agriculture Canada, Ottawa

MacDonald, K.B., and Valentine, K.W.G. 1992. CanSIS Manual 1 CanSIS/NSDB: A General Description. Land Resource Division, Centre for Land and Biological Resources Research, Research Branch, Agriculture Canada, Ottawa.

Manitoba Land Resource Unit. 1997. Soil and Terrain Classification System Manual. In preparation. Ellis Bldg. University of Manitoba. Winnipeg.

Manitoba Land Resource Unit. 1997 Soils of the Duck Mountain Forest Reserve. Open File Map and Legend. Ellis Bldg. University of Manitoba. Winnipeg.

Wischmeier, W.H. and Smith, D.D. 1965. Predicting Rainfall-erosion Loss from Cropland East of the Rocky Mountains. U.S. Department of Agriculture, Agriculture Handbook No. 282, U.S. Government Printing Office, Washington, D.C.