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Rural Municipality of Shell River


Information Bulletin 97-28

Soils and Terrain

An introduction
to the land resource

Land Resource Unit
Brandon Research Centre



Canada 

Rural Municipality of Shell River

Information Bulletin 97-28

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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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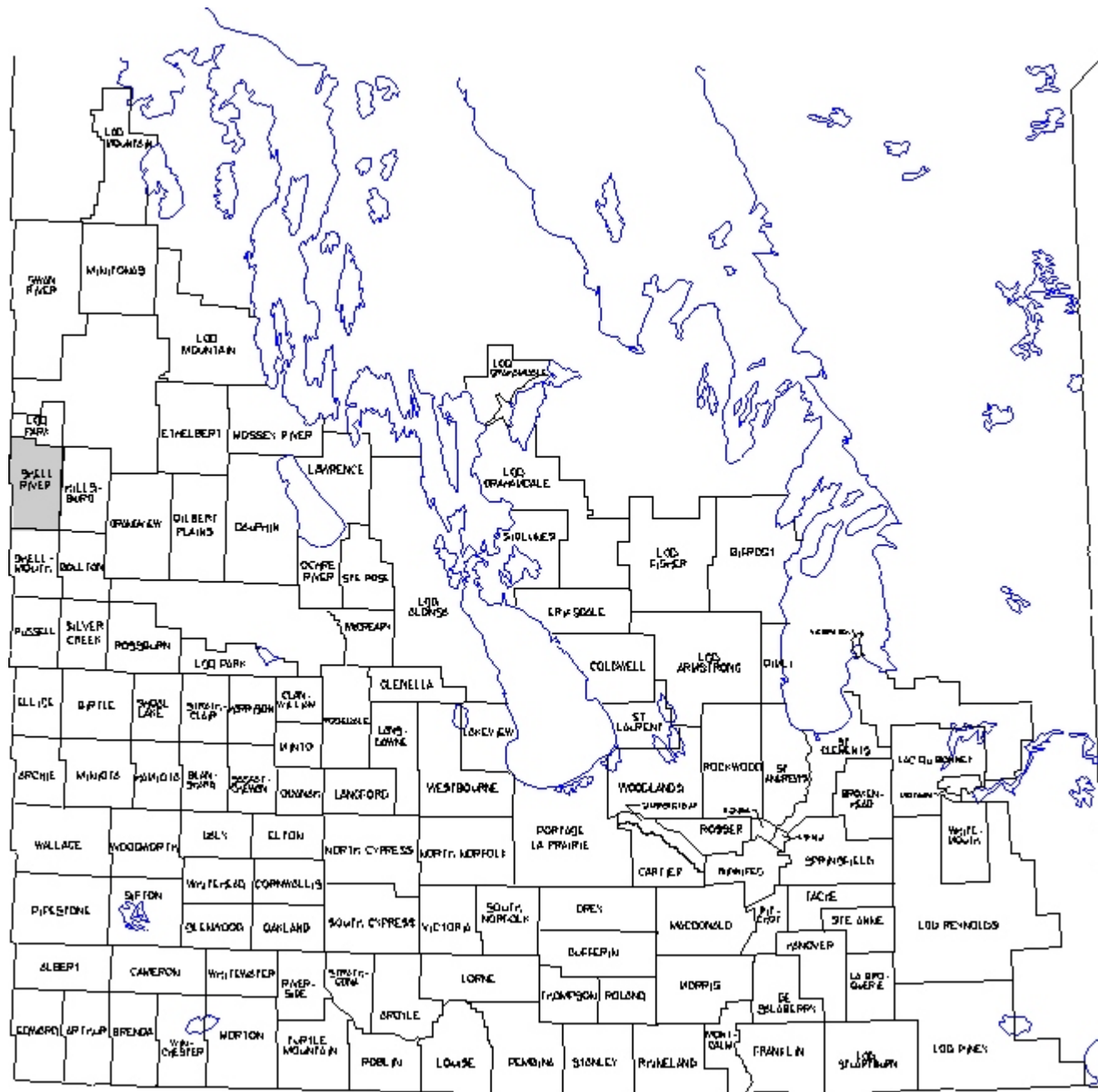
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INTRODUCTION

The location of the Rural Municipality of Shell River 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.

Figure 1. Rural municipalities of southern Manitoba.

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.

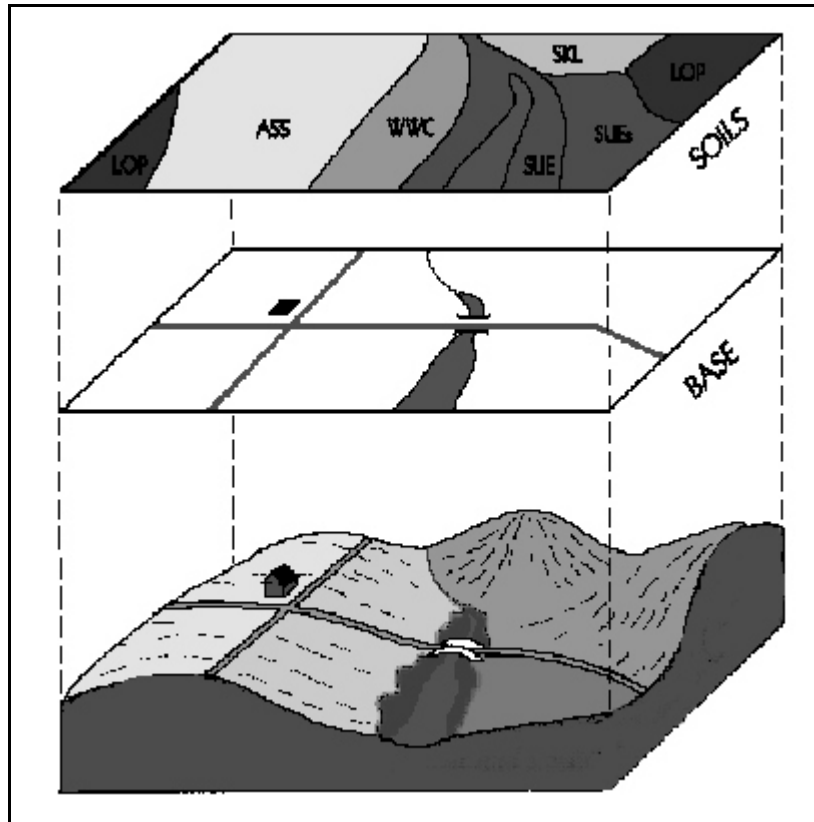


Figure 2. Soil and Base Map data.

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 Shell River covers an area of 8 townships (approximately 77 298 hectares) of land in western Manitoba (page 3). The Town of Roblin is the largest population and service centre in the municipality.

The climate in the municipality can be related to the 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 Shell River is located mainly in the northern portion of the Newdale Plain subsection of the Saskatchewan Plain (Canada-Manitoba Soil Survey, 1980). A portion of the Riding Mountain and Duck Mountain Uplands occupies higher terrain to the east. Elevation varies from 615 m asl in the northeast to 555 m in the south and 450 m on the Lake of the Prairies in the Assiniboine Valley. The land surface in the municipality is undulating to hummocky with local relief generally less than 3 m and slopes of 2 to 5 percent (page 9). Higher local relief (3 to 8 m and slopes ranging from 5 to 9 percent) occurs in the north and along the eastern boundary of the RM. The prominent glacial meltwater channels associated with the Assiniboine and Shell Rivers and Big Boggy Creek provide the greatest local relief as slopes along these deep valleys and their tributary channels and gullies commonly exceed 30 percent. Near level terrain occurs primarily on the bottomlands within the Shell River valley and along Big Boggy Creek.

The soil materials in this RM consist primarily of loamy textured glacial till deposits. Areas of sand and gravel, often covered by overlays, are common near the glacial meltwater channels (page 11). The deep ravines and side walls of the river valleys are characterized by stream eroded glacial till and in places, shale rock mantled with till, colluvium and slump debris.

Soils in the municipality have been mapped at a reconnaissance scale of 1:126 720 and published in the soil survey report for the Grandview Map Sheet Area (Ehrlich et al., 1959). Detailed soil studies at a 1:20 000 scale are available for the area adjacent to the Shellmouth Reservoir (Michalyna and Fraser, 1986) and around the Town of Roblin (Eilers, 1983). According to the Canadian System of Soil Classification (Expert Committee on Soil Survey, 1987), the soils are dominantly Dark Gray Chernozems (Erickson and Leary Associations) and Gray Luvisols (Waitville Association). Black Chernozemic soils (Newdale and Marringhurst Associations) occur in the southern part of the municipality near the Assiniboine Valley. The Newdale and Erickson soils close to the meltwater channels have been modified by glacial meltwaters leaving an erosion surface of coarse sediments, gravel and stones. Poorly and very poorly drained soils (Gleysolic and Organic) occur in depressional areas of the landscape. Regosolic soils are found on stratified stream deposits (alluvium) 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 soil surveys for the area.

The majority of soils in the municipality are well drained with minor areas of imperfect drainage on lower slopes. Level areas of sand and gravel deposits and areas of steeply sloping soils are dominantly rapidly drained. Surface runoff collects in poorly drained depressional areas, many of which contain shallow ponds and small lakes. Drainage from the municipality is facilitated by numerous gullies and intermittent streams associated with the deeply cut valleys of the Shell River and Big Boggy Creek, both of which drain into the Lake of the Prairies and the Assiniboine River (page 13).

Major management considerations are related to topography, wetness and soil texture (page 15). Excessively wet soils are minor in extent and there are no significant bedrock outcrops. Although variably stony soils occur throughout the area, very stony conditions are of particular concern adjacent to the Assiniboine Valley and within the Shell Valley. Soils in these areas are modified by stream erosion and as a result, are coarse textured and in many places very stony.

Approximately three-quarters of the land in the RM is rated as **Class 2** and **3** for agriculture capability (page 17) and **Good** to **Fair** for irrigation suitability (page 19). Topography, wetness and stoniness are the main limitations for agriculture capability. Well drained sandy and gravelly soils in level landscapes are rated as **Class 5** for agriculture and **Poor** for irrigation. Steeply sloping land is rated in **Class 6 and 7** for agriculture and poorly drained soils are rated in **Class 5, 6 or 7**. Steeply sloping soils and poorly drained areas are rated **Poor** for irrigation suitability.

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 has a **Low** to **Moderate** risk of degradation. However, areas of deep sandy and gravelly soils and steeply sloping soils have a **High** potential for impact on the environment under irrigation. These conditions increase the risk for deep leaching of potential contaminants on the soil surface and the potential for rapid runoff from the soil surface into adjacent wetlands or water bodies. These ratings are 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 78 percent of the land in the municipality is at a **Severe** to **High** risk

of degradation. An additional 5.5 percent of the RM is considered to have a **Moderate** risk of water erosion. Management practices for land in annual crop focus primarily on maintaining adequate crop residues to provide sufficient surface cover. However, adequate protection of the steeper sloping lands most at risk may require a shift in land use away from annual cultivation to production of perennial forages and pasture or permanent tree cover.

An assessment of the status of land use in the RM of Shell River in 1994 was obtained through analysis of satellite imagery. It showed that 50 percent of the land in the RM is in annual cropland while an additional 24 percent of the area is in grassland. Wooded areas covering about 14.7 percent of the municipality are usually on steeper sloping lands. Natural wetlands are minor in extent but together with the Lake of the Prairies constitute 3.7 percent of the RM. Various non-agricultural uses such as recreation, urban areas, and transportation occupy 2.5 percent of the RM (page 25).

While the majority of the soils in the RM of Shell River have moderate to moderately severe limitations for arable agriculture, careful choice of crops and maintenance of adequate surface cover is essential for the management of sensitive lands with coarse texture 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

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.

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

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

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

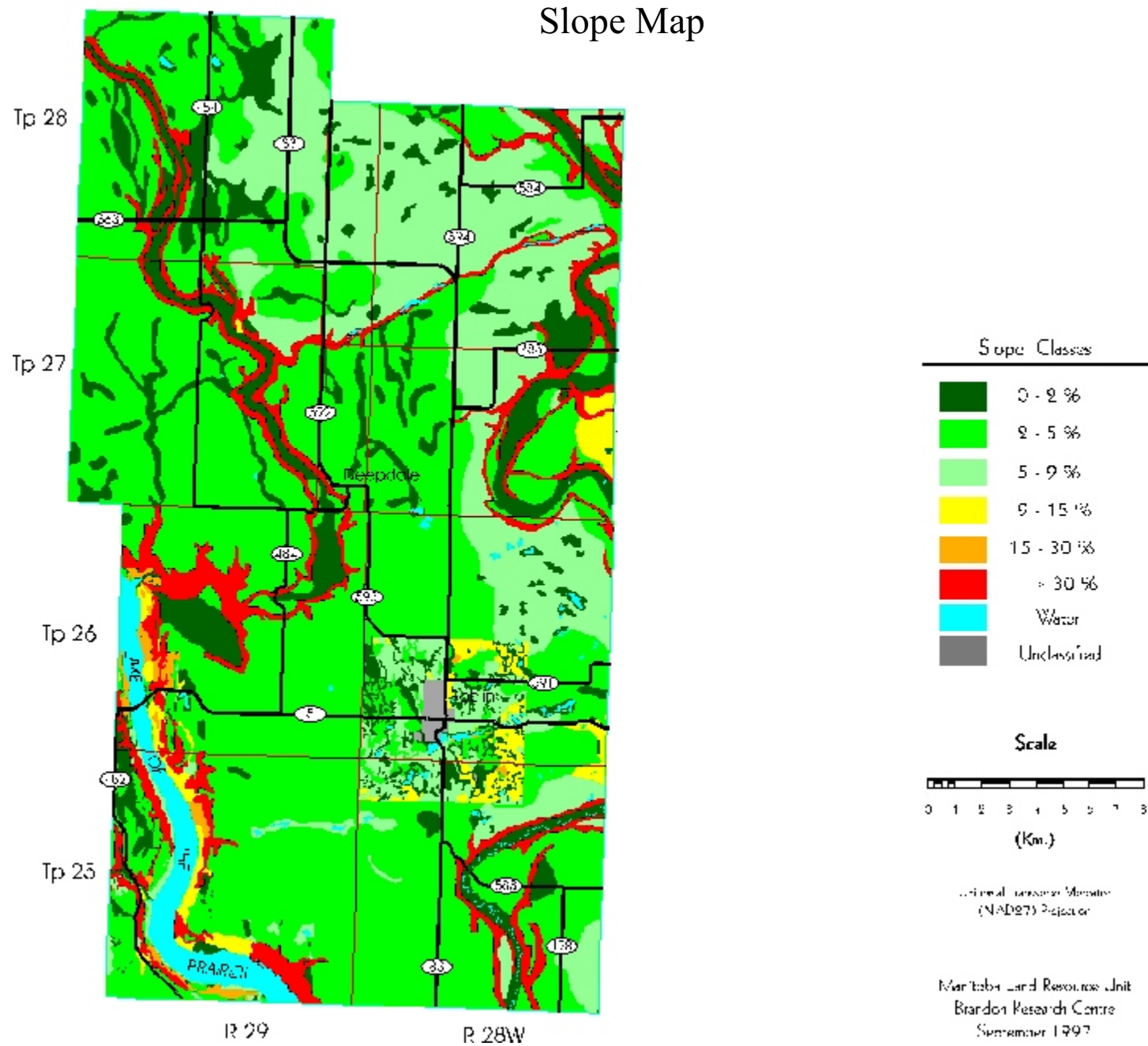
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil layer database. Specific colours are used to indicate the dominant slope class for each soil polygon in the RM. Additional slope classes may occur in each polygon area, but cannot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

Table 1. Slope Classes¹

Slope Class	Area (ha)	Percent of RM
0 - 2 %	9822	12.7
2 - 5 %	40332	52.2
5 - 9 %	15901	20.6
9 - 15 %	1806	2.3
15 - 30 %	483	0.6
> 30 %	6442	8.3
Unclassified	247	0.3
Water	2264	2.9
Total	77298	100.0

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

Slope Map



Generalized Soil Map.

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

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

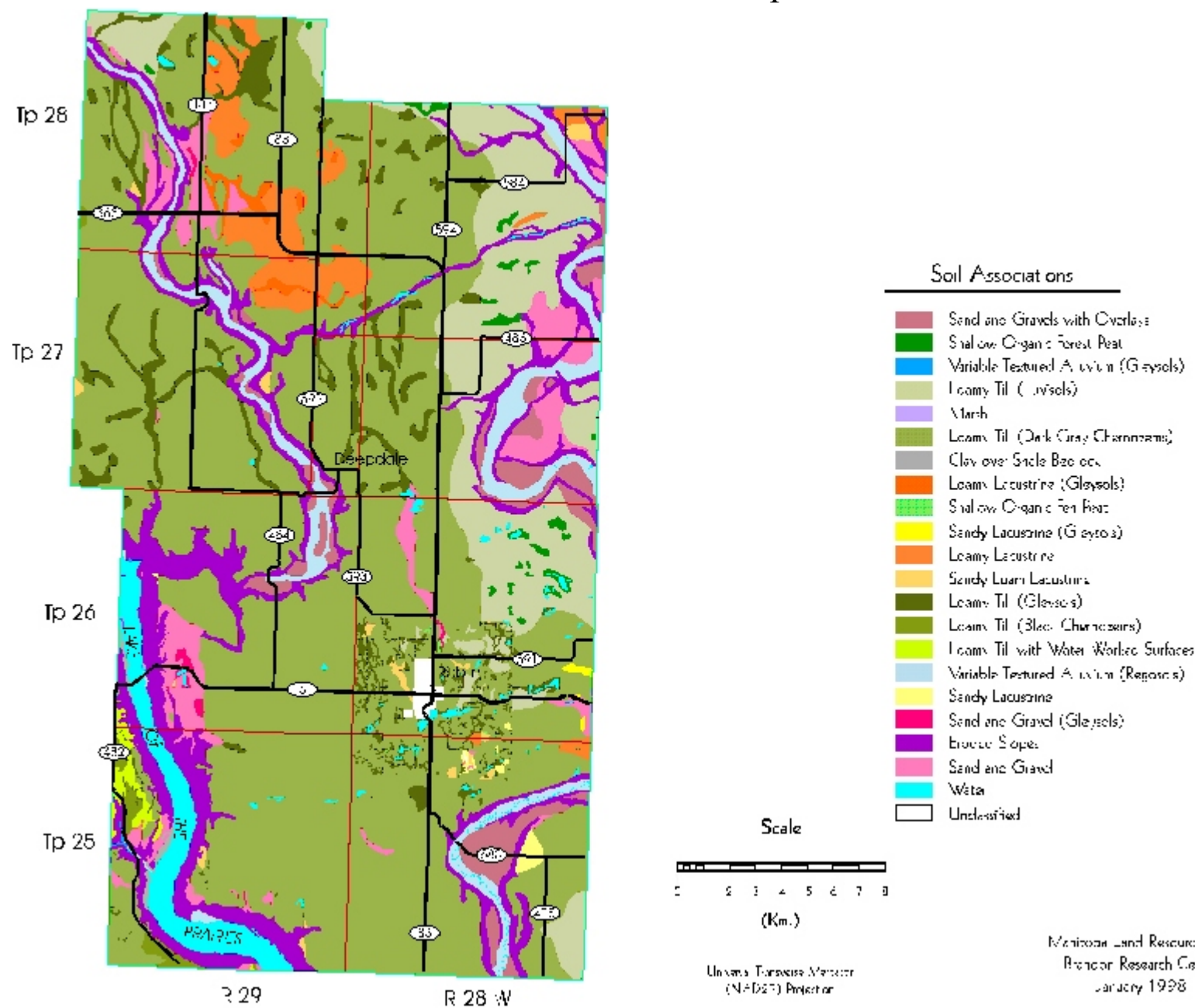
More detailed maps showing the dominant and subdominant soils in each polygon can also be produced at larger map scales.

Table 2. Generalized Soil Groups¹

Soil Groups	Area (ha)	Percent of RM
Sand and Gravel with overlays	2008	2.6
Organic Forest Peat	363	0.5
Variable Textured Alluvium (Gleysols)	21	0.0
Loamy Till (Luvisols)	8380	10.8
Marsh	3	0.0
Loamy Till (Dark Gray Chernozem)	42745	55.3
Clay over Shale Bedrock	112	0.1
Loamy Lacustrine (Gleysols)	363	0.5
Shallow Organic Fen Peat	15	0.0
Sandy Lacustrine (Gleysols)	56	0.1
Loamy Lacustrine	2516	3.3
Sandy Loam Lacustrine	295	0.4
Loamy Till (Gleysols)	3596	4.7
Loamy Till (Black Chernozem)	307	0.4
Loamy Till with water worked surfaces	308	0.4
Variable Textured Alluvium (Regosols)	2742	3.5
Sandy Lacustrine	187	0.2
Sand and Gravel (Gleysols)	117	0.2
Eroded Slopes	7597	9.8
Sand and Gravel	3055	4.0
Unclassified	247	0.3
Water	2264	2.9
Total	77298	100.0

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

Generalized Soil Map



Soil Drainage Map.

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

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

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

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

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

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

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

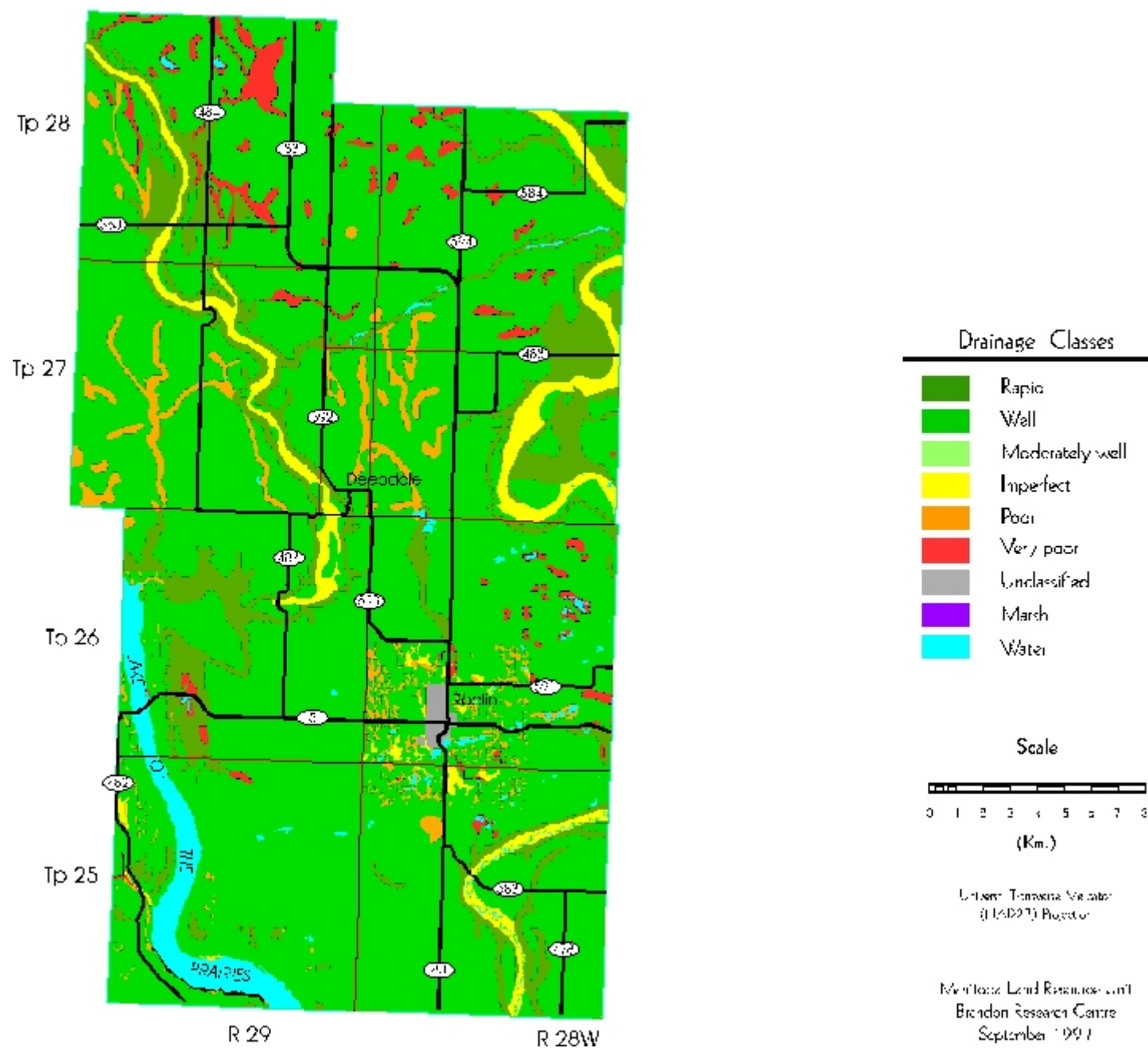
Drainage classification is based on the dominant soil series within each individual soil polygon.

Table 3. Drainage Classes¹

Drainage Class	Area (ha)	Percent of RM
Very Poor	2026	2.6
Poor	2602	3.4
Imperfect	3006	3.9
Moderately Well	0	0.0
Well	58975	76.3
Rapid	8135	10.5
Marsh	0	0.0
Unclassified	247	0.3
Water	2264	2.9
Total	77298	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.

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

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

C = Coarse texture - soil landscapes that have **coarse to very coarse textured soils (loamy sands, sands and gravels)**, and hence a high permeability throughout the profile, 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 that have medium to moderately fine texture (**loams to clay loams**), and hence have good water and nutrient retention properties, require good management and cropping practices 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 that have organic soils, require special management considerations of drainage, tillage, and cropping to sustain productivity and minimize subsidence and erosion.

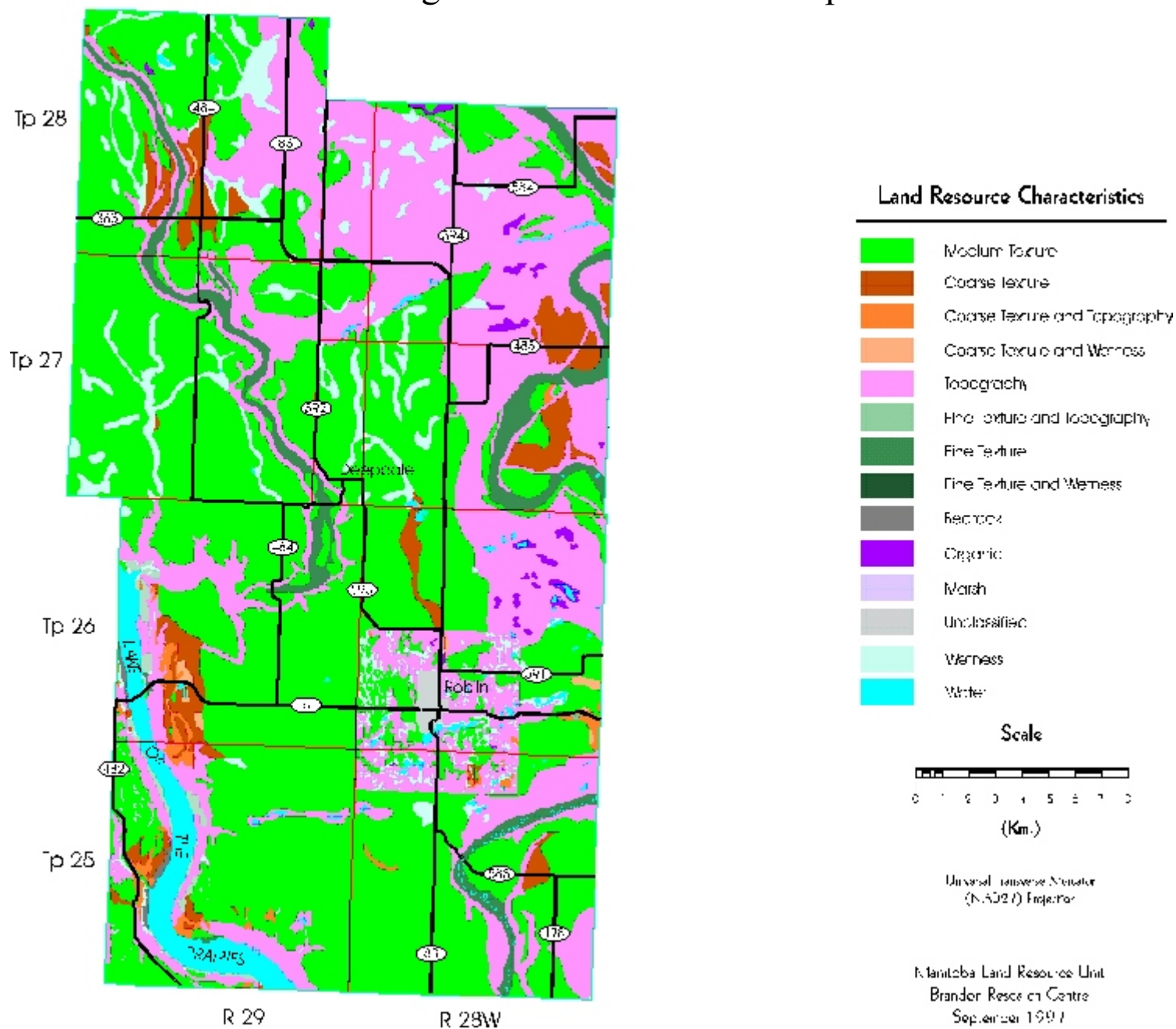
R = Bedrock - soil landscapes that have **shallow depth to bedrock (< 50 cm) and/or exposed bedrock** which may prevent the use of some or all tillage practices as well as the range of potential crop. They require special cropping and management practices to sustain agricultural production.

Table 5. Management Considerations¹

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	2706	3.5
Fine Texture and Wetness	0	0.0
Fine Texture and Topography	355	0.5
Medium Texture	39917	51.6
Coarse Texture	2909	3.8
Coarse Texture and Wetness	172	0.2
Coarse Texture and Topography	643	0.8
Topography	23515	30.4
Topography and Bedrock	0	0.0
Wetness	4075	5.3
Wetness and Topography	0	0.0
Bedrock	0	0.0
Organic	378	0.5
Marsh	3	0.0
Unclassified	247	0.3
Water	2264	2.9
Total	77298	100.0

¹ 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 Capability¹

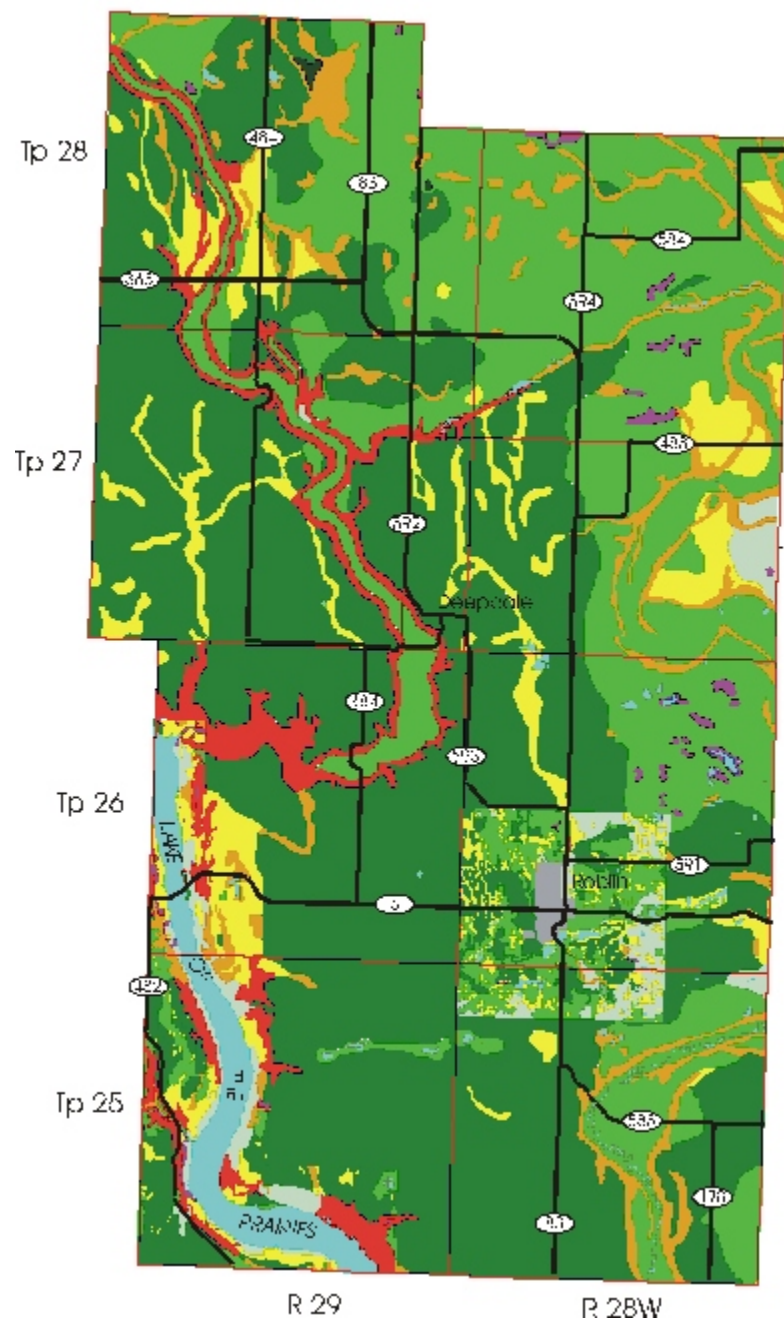
Class Subclass	Area (ha)	Percent of RM
1	44	0.1
2	35829	46.3
2I	34	0.0
2M	38	0.0
2P	6	0.0
2T	34714	44.8
2TI	6	0.0
2TP	90	0.1
2TW	120	0.2
2W	145	0.2
2X	675	0.9
3	22455	29.0
3I	2701	3.5
3M	2101	2.7
3MP	189	0.2
3MT	301	0.4
3P	236	0.3
3T	14932	19.3
3TE	320	0.4

Table 6. Agricultural Capability¹(cont)

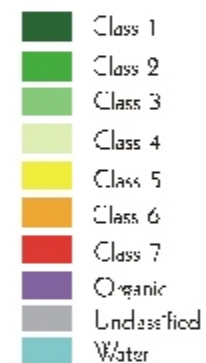
Class Subclass	Area (ha)	Percent of RM
3TP	70	0.1
3X	1605	2.1
4	1855	2.4
4R	229	0.3
4RT	287	0.4
4T	1083	1.4
4TE	256	0.3
5	6098	7.9
5M	3075	4.0
5ME	2	0.0
5MP	13	0.0
5MT	75	0.1
5T	409	0.5
5W	2514	3.2
5WI	5	0.0
5WP	5	0.0
6	4429	5.7
6P	31	0.0
6T	2761	3.6
6W	1619	2.1
6WI	15	0.0
6WP	3	0.0
7	3713	4.8
7T	3709	4.8
7W	3	0.0
Unclassified	248	0.3
Water	2264	2.9
Organic	471	0.6
Total	77406	100

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

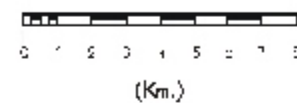
Agriculture Capability Map



Canada Land Inventory Classes



Scale



Universal Transverse Mercator
(NAD2011) 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.

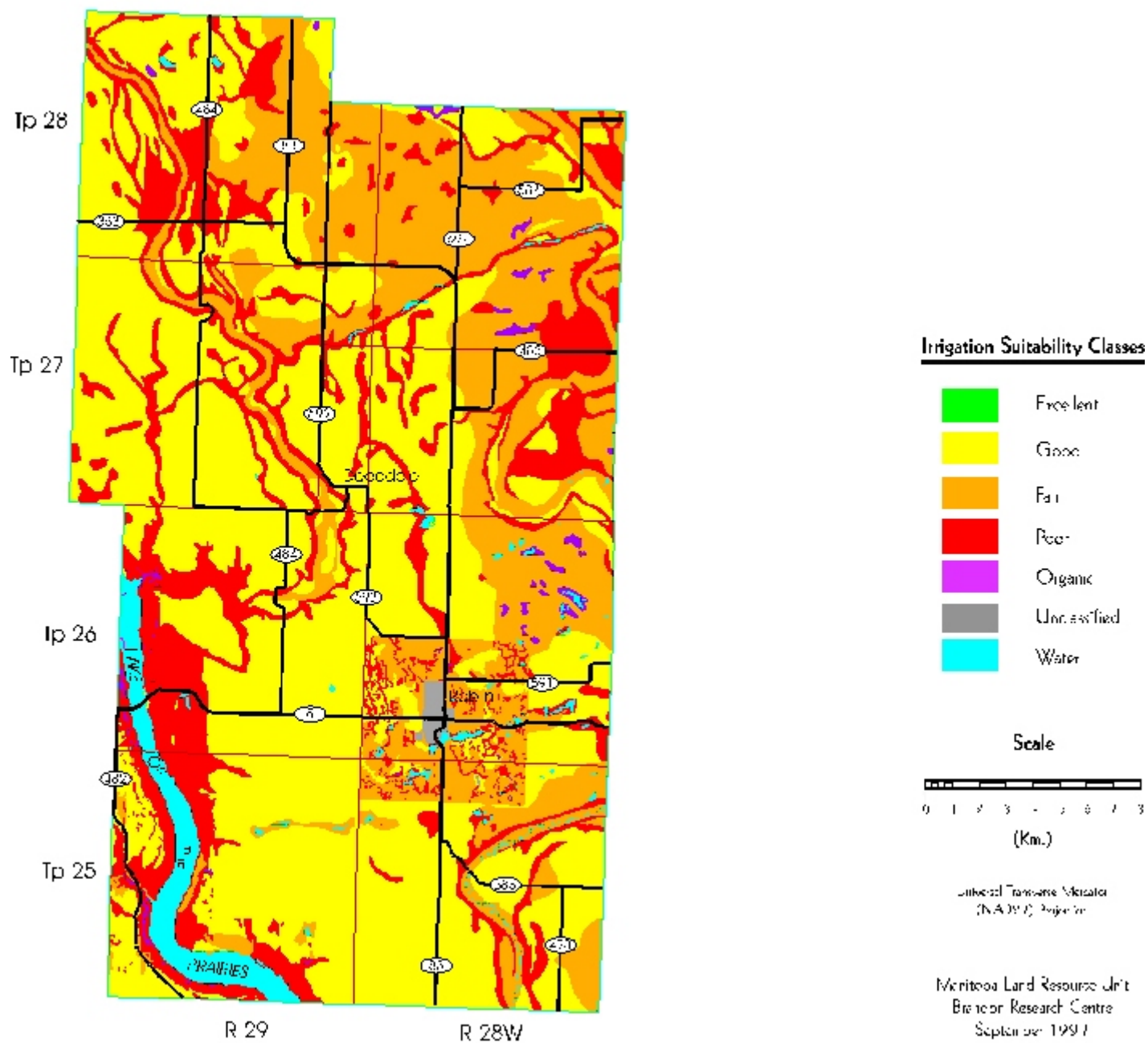
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

Table 7. Irrigation Suitability¹

Class	Area (ha)	Percent of RM
Excellent	0	0.0
Good	39676	51.3
Fair	19958	25.8
Poor	14680	19.0
Organic	473	0.6
Unclassified	247	0.3
Water	2264	2.9
Total	77298	100.0

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

Irrigation Suitability Map



Potential Environmental Impact Under Irrigation Map.

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

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

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

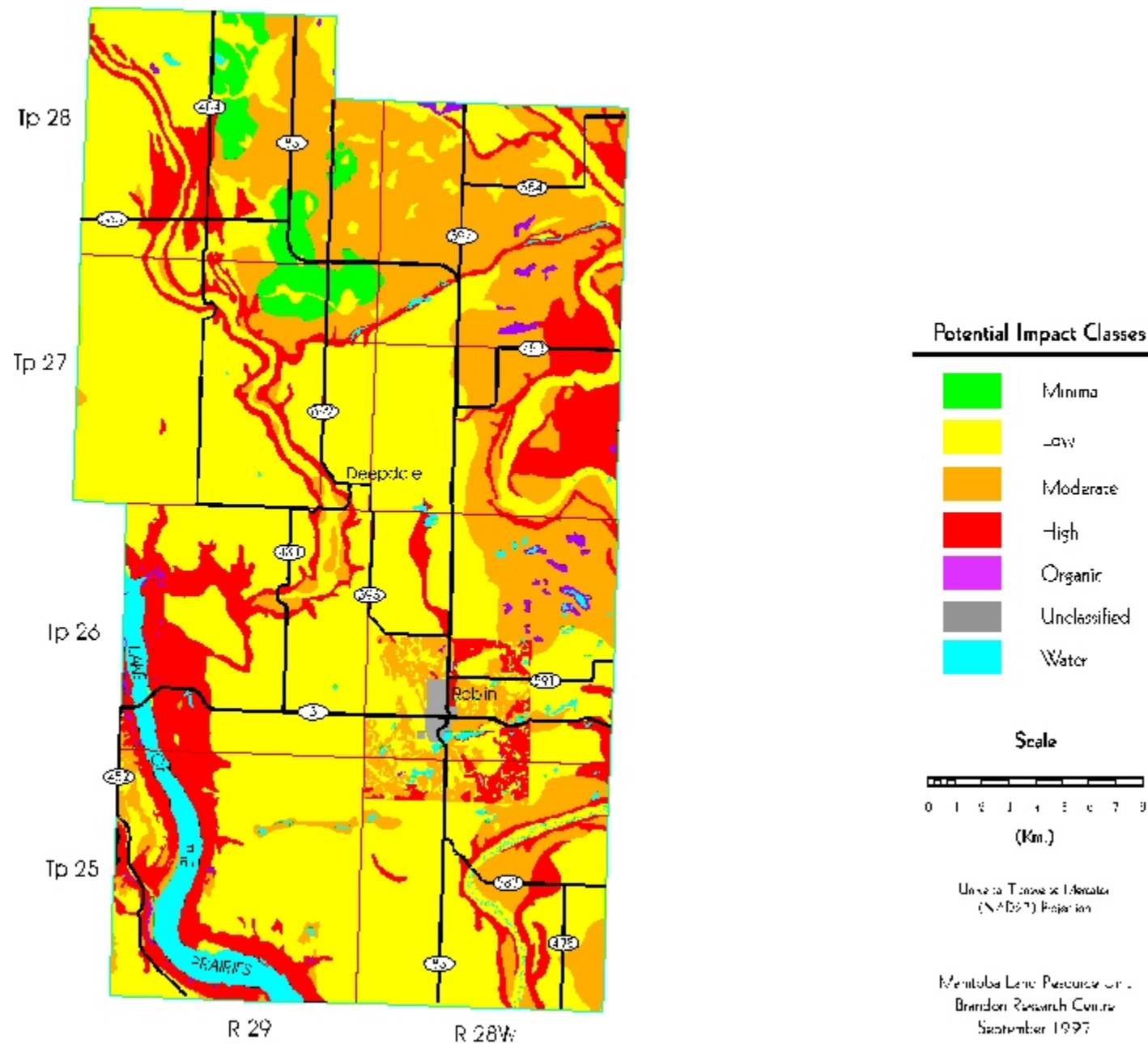
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 8. Potential Environmental Impact Under Irrigation¹

Class	Area (ha)	Percent of RM
Minimal	2006	2.6
Low	42307	54.7
Moderate	17842	23.1
High	12137	15.7
Organic	473	0.6
Unclassified	247	0.3
Water	2264	2.9
Total	77298	100.0

¹ 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.

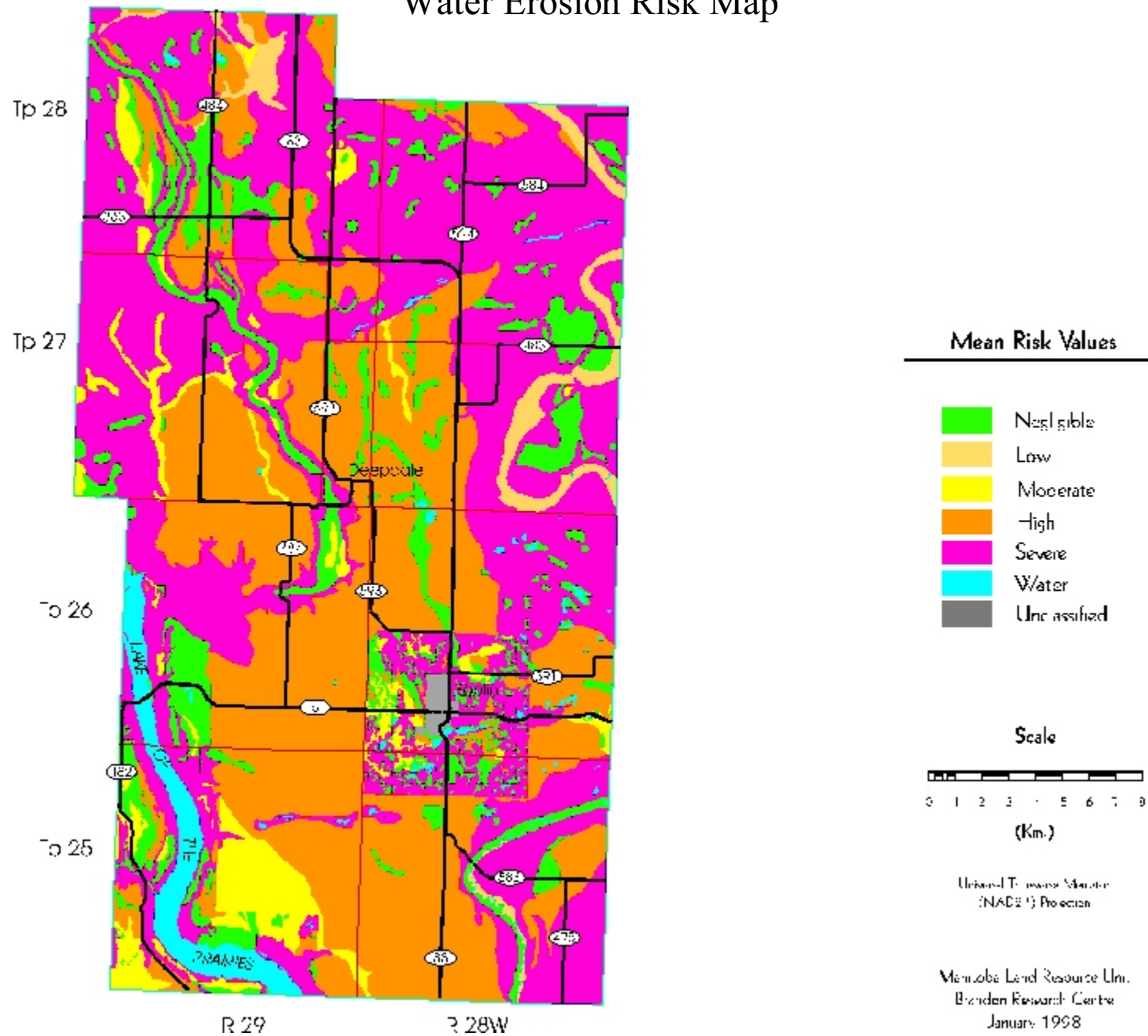
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

Table 9. Water Erosion Risk¹

Class	Area (ha)	Percent of RM
Negligible	8413	10.9
Low	1823	2.4
Moderate	4217	5.5
High	26674	34.5
Severe	33660	43.5
Unclassified	247	0.3
Water	2264	2.9
Total	77298	100.0

¹ 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.

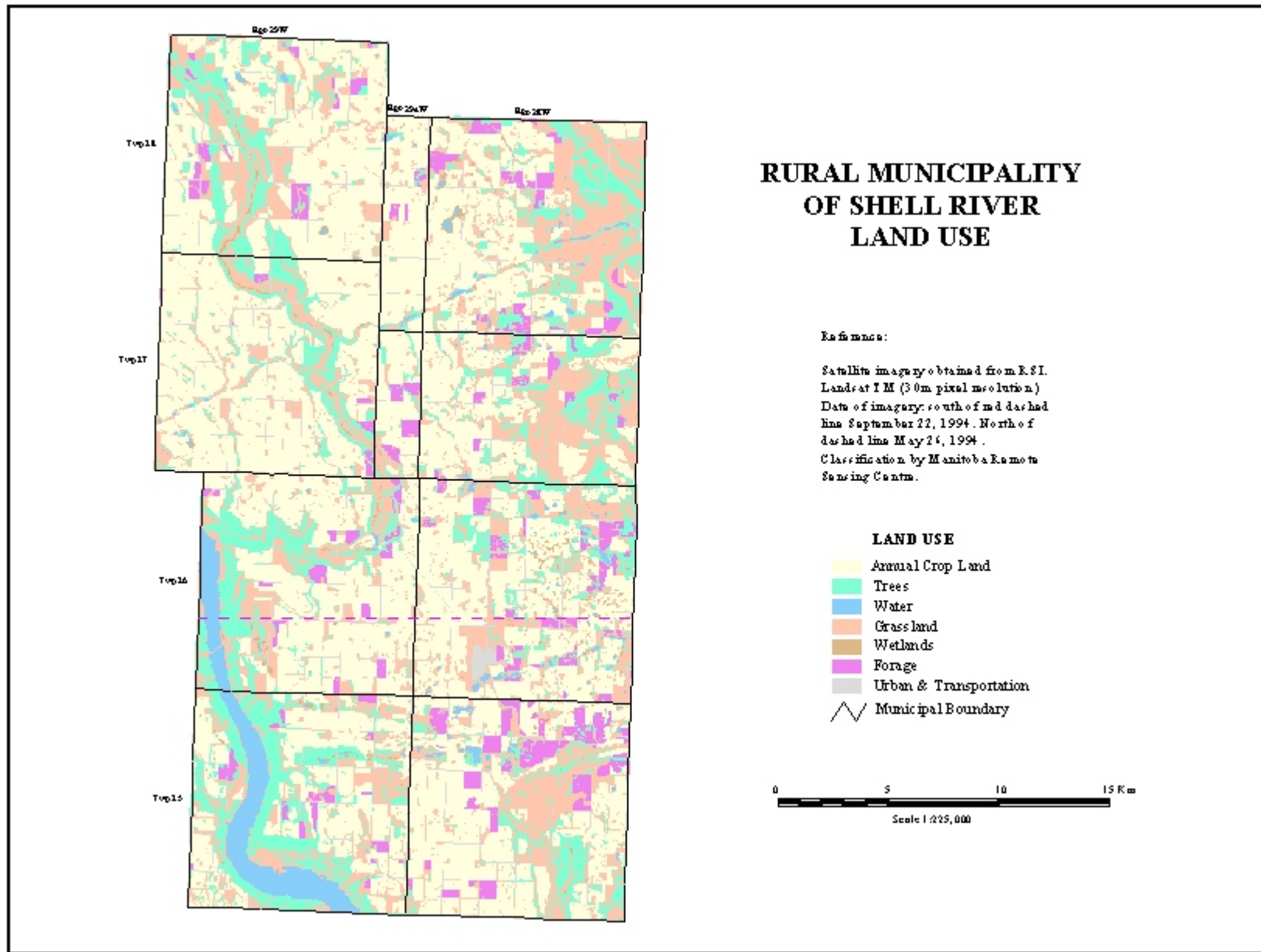
Water - open water - lakes, rivers streams, ponds, and lagoons.

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

Table 10. Land Use¹

Class	Area (ha)	Percent of RM
Annual Crop Land	39161	50.7
Forage	3586	4.6
Grasslands	18359	23.8
Trees	11334	14.7
Wetlands	494	0.6
Water	2405	3.1
Urban and Transportation	1944	2.5
Total	77283	100.0

¹ 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. Pettapeice. 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.

Michalyna W. and Fraser W.R. 1986. Soils of the Shellmouth Reservoir-North Area. Report No. D63. Canada-Manitoba Soil Survey. 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.