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Rural Municipality of Springfield

Information Bulletin 99-7

Soils and Terrain

An introduction to the land resource

Land Resource Unit
Brandon Research Centre

Canada

Rural Municipality of Springfield

Information Bulletin 99-7

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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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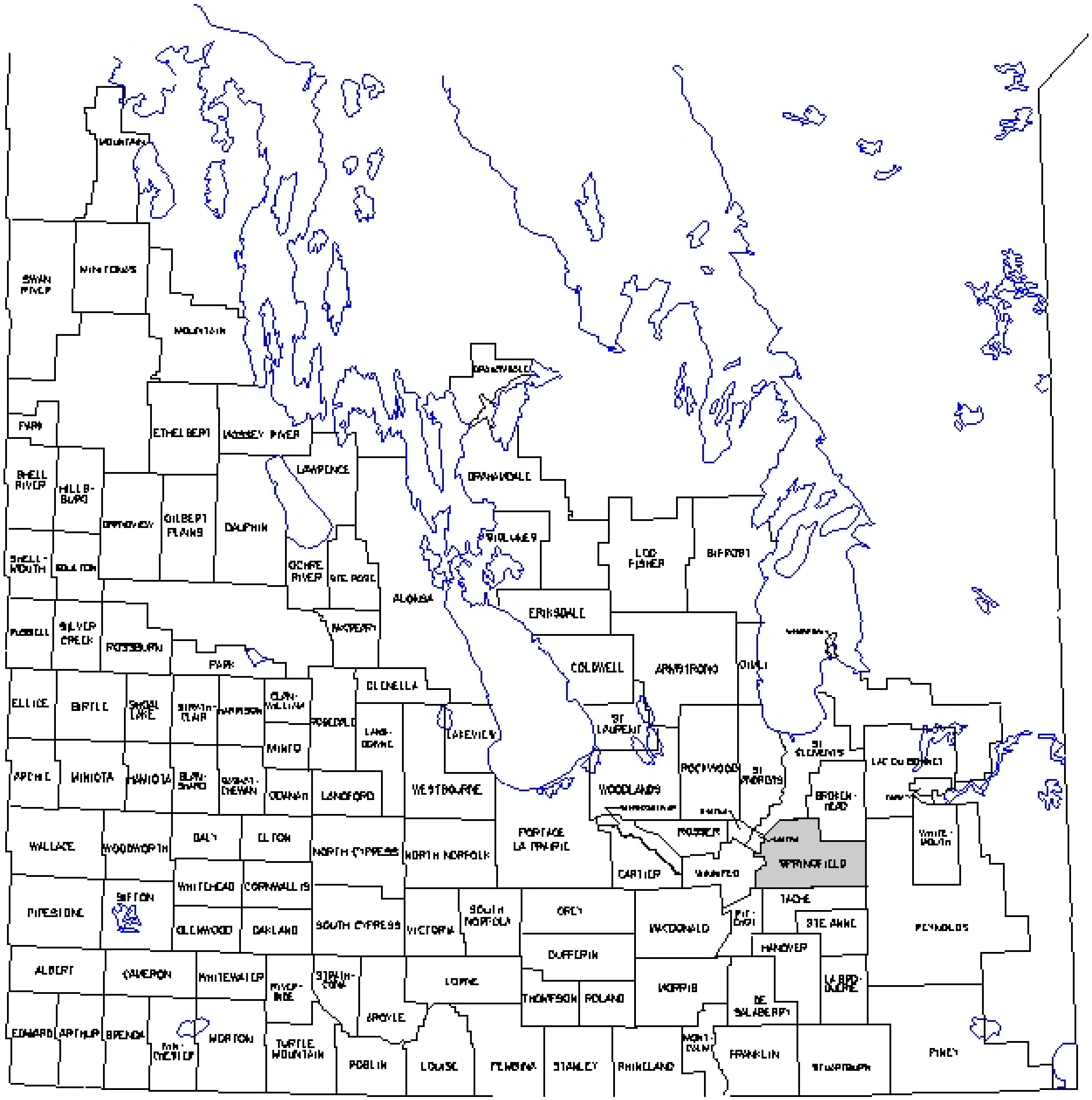


Figure 1. Rural municipalities of southern Manitoba.

INTRODUCTION

The location of the Rural Municipality of Springfield 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.

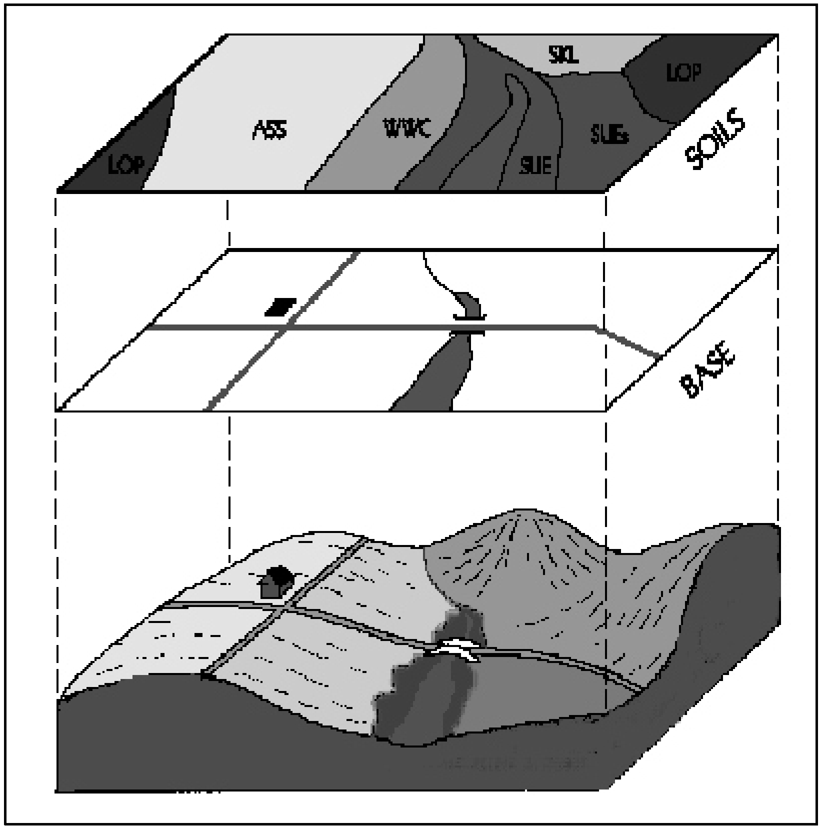


Figure 2. Soil and Base Map data.

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, 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 Springfield covers an area of approximately 11.5 townships (110 348 ha) extending east from the City of Winnipeg for a distance of 48 km (page 3). The village of Oakbank is the largest population and service centre with smaller concentrations of people resident in Dugald, Anola and Vivian. Monominto and Prairie Grove are small population centres located on the southern boundary of the municipality with the RM of Tache.

The climate in most of the area can be related to weather data from Dugald while data from Beausejour best characterize the eastern portion of the area. The mean annual temperature decreases from 1.8°C in the west to 1.6°C in the east and the mean annual precipitation ranges between 553 mm in the west and 539 mm in the east (Environment Canada, 1993). The average frost-free period is 106 days and degree-days above 5°C accumulated from May to September average 1597 (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 falls between 250 mm and 200 mm with lower deficits occurring to the east. Similarly, the estimated effective growing degree-days accumulated from May to September range between 1600 and 1500, with lower values to 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 RM of Springfield is located entirely in the Manitoba Plain and consists of two distinct landscapes divided between the level to very gently sloping Red River Valley in the west and the gently sloping, slightly ridged terrain of the Southeastern Plain in the east (Canada-Manitoba Soil Survey, 1980). Elevation of the land surface decreases from 264 metres above sea level (m asl) in the southeast corner of the municipality, to 232 m asl in the northwest. Local relief is generally under 3 metres and slopes are less than 2 percent (page 9). A prominent upland known as Birds Hill comprised of glaciofluvial outwash and glacial till rises abruptly above the level lake plain to elevations in excess of 255 m asl. The generally low surface gradients (0.7 m/km or 3.8 ft/mi) throughout most of the municipality result in poorly developed surface drainage. In addition, much of the area is characterized by high groundwater levels while very poorly drained organic terrain in the eastern part of the municipality contributes drainage waters to the area throughout the year. Surface waters drain slowly in a northwesterly direction via Cooks Creek and northerly via the Brokenhead River in the eastern portion. The Red River Floodway around the east side of Winnipeg is constructed through the municipality. Surface drainage for agricultural purposes has been improved in parts of the area by a network of man-made drains.

Soil materials in the Red River Valley were deposited during the time of glacial Lake Agassiz and consist primarily of deep, clayey lacustrine sediments. In contrast, the Southeastern Plain is characterized by thin, sandy to coarse-loamy lacustrine veneers overlying stony, loam textured glacial till. Waterworked, extremely calcareous, stony, loam till and local areas of gravelly sand outwash and beach deposits are common, particularly in the Birds Hills area. The eastern edge of the municipality is characterized by extensive organic deposits (page 11). The flat topography throughout the municipality results in the majority of soils being classified as imperfectly to poorly drained (page 13).

Soils in the municipality have been mapped at a reconnaissance level (1:126 720 scale) and published in the soil survey report for the Winnipeg and Morris map sheet areas (Ehrlich et al., 1953). Detailed 1:20 000 scale map information is available for extensive areas in the municipality (Michalyna et al., 1975). According to the Canadian System of Soil Classification (Expert Committee on Soil Survey, 1997), Humic Gleysol and Black Chernozem soils are dominant in the Red River Valley. Humic Gleysol soils with thin peaty surface layers occur in poorly drained sites in association with Dark Gray Chernozemic soils in well to imperfectly drained sites in the Southeastern Plain. Weakly developed Brunisolic soils occur on rapidly to imperfectly drained sandy materials. Gray Luvisols and Organic soils occur mainly in the eastern part of the municipality.

Soils throughout the municipality are dominantly non-saline. Major management considerations are related to texture (sandy and clayey soils) and wetness (page 15). Seasonal high water tables (at 1 to 2 metres) and saturated soils are common. Surface water ponds in poorly drained depressional areas and organic terrain throughout the area. Well drained sandy soils are subject to potential wind erosion and droughtiness. Moderately to excessively stony conditions are associated with the till soils and beach deposits throughout the area.

Thirty percent of the soils are rated in **Class 2** for agricultural capability and 38 percent are in **Class 3**. Just over 5 percent of the soils are placed in **Class 4**, primarily due to sandy texture and low moisture holding capacity and 15 percent are rated in **Class 5** due to droughtiness and excess wetness. **Class 6** soils affected by excessive stoniness and wetness occupy nearly 2 percent of the area and organic soils which have very limited capability for agriculture in their native state almost 8 percent of the area (page 17). The irrigation suitability of soils in this municipality varies from **Fair** to **Poor** in the Southeastern Plain and dominantly **Poor** (70 percent) in the Red River Valley (page 19).

One of the issues currently receiving considerable attention is the sustainability of agricultural practices and their potential impact on the soil and groundwater environment. To assist in highlighting this concern to land planners and agricultural producers, an assessment of potential environmental impact (EI) under irrigation shown on page 21 varies from **Minimal** throughout the Red River Valley to **Low**, **Moderate** and **High** in the Southeastern Plain. **High** potential risk occurs on highly permeable sandy soils with typically high watertables and in the Birds Hill area with deep sandy and gravelly soils susceptible to deep leaching. This EI map is intended to be used in association with the irrigation suitability map.

Another issue of concern to producers, soil conservationists and land use specialists is soil erosion caused by agricultural cropping and tillage practices. Areas with potential for water erosion are shown on page 23. About 66 percent of the land in the municipality is at a **Negligible** risk of degradation due to water erosion. However, the sandy soils in the municipality are at a greater risk of erosion by wind. Current management practices focus on maintaining adequate crop residues to provide sufficient surface cover to adequately protect the soils from both wind and water erosion.

Land use in the RM of Springfield consists of agriculture cropland, grassland, woodland, wetlands, and urban development and recreation. Wooded and grassland areas are most common in the Southeastern plain part of the municipality and on Birds Hill. An assessment of the status of land use in 1994, obtained through an analysis of satellite imagery, showed annual crops occupy 51 percent and forage crops 3 percent of the land in the municipality. Grassland areas at 19 percent and tree cover at 18 percent of the land area provide forage and grazing capacity as well as wildlife habitat. Wetlands occupying about 5 percent and organic soils covering nearly 7 percent of the area also provide wildlife habitat. Various non-agricultural uses such as infrastructure for urban areas, transportation and recreation occupy about 4 percent of the municipality (page 27).

The majority of soils in the RM of Springfield have moderate to moderately severe limitations for arable agriculture. However, clay textured soils require management practices which maintain adequate surface drainage, soil structure and tilth. Sandy soils require protection against wind erosion. This includes leaving adequate crop residues on the surface during the early spring period, provision of shelter belts and use of minimum tillage practices and crop rotations which include forages. A major portion of the municipality has low relief and a dominance of imperfectly to poorly drained soils. These soils are frequently saturated and subject to surface ponding and slow runoff, particularly during spring runoff or following heavy rains. Consequently, improvement and maintenance of water management infrastructure on a regional as well as watershed basis is required 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

The maps have all been reduced in size and generalized (simplified) in order to portray conditions for an entire rural municipality on one page. These generalized maps provide a useful overview of conditions within a municipality, but are not intended to apply to site specific land parcels. On-site evaluations are recommended for localized site specific land use suitability requirements.

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

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

Slope Map.

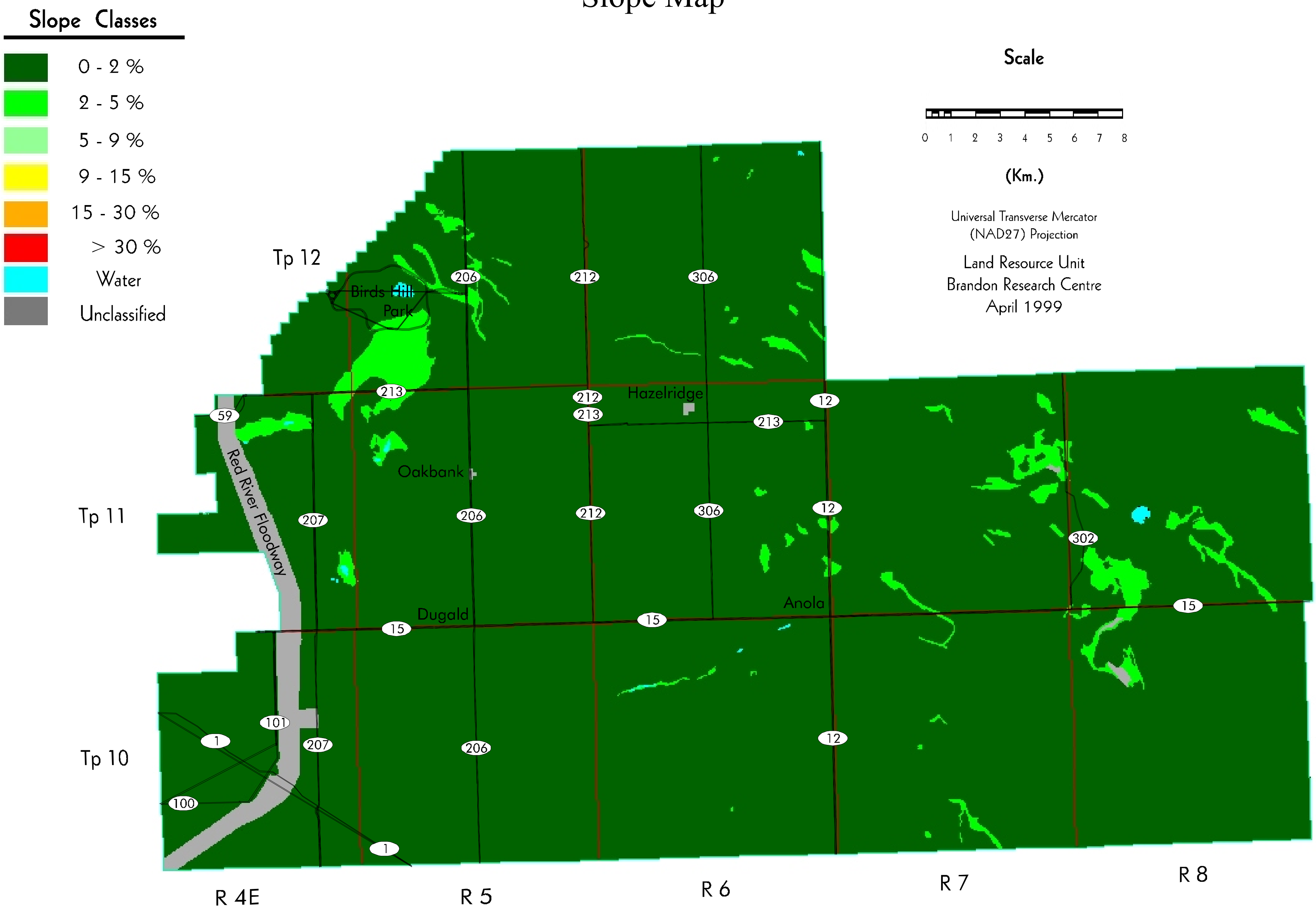
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil and terrain layer database. Specific colours are used to indicate the dominant slope class for each polygon in the RM. Additional slope classes may occur in each polygon area,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

Table 1. Slope Classes[1]

Slope Class	Area (ha)	Percent of RM
0 - 2 %	104535	94.7
2 - 5 %	3617	3.3
5 - 9 %	0	0.0
9 - 15 %	0	0.0
15 - 30 %	0	0.0
> 30 %	0	0.0
Unclassified	2111	1.9
Water	86	0.1
Total	110348	100.0

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

Slope Map


Slope Classes
0 - 2 %
2 - 5 %
5 - 9 %
9 - 15 %
15 - 30 %
> 30 %
Water
Unclassified
Scale
0 1 2 3 4 5 6 7 8
(Km.)
Universal Transverse Mercator
(NAD27) Projection
Land Resource Unit
Brandon Research Centre
April 1999
Tp 12
Tp 11
Tp 10
Birds Hill Park
Hazelridge
Oakbank
Dugald
Anola
Red River Floodway
R 4E
R 5
R 6
R 7
R 8

Generalized Soil Map.

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

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

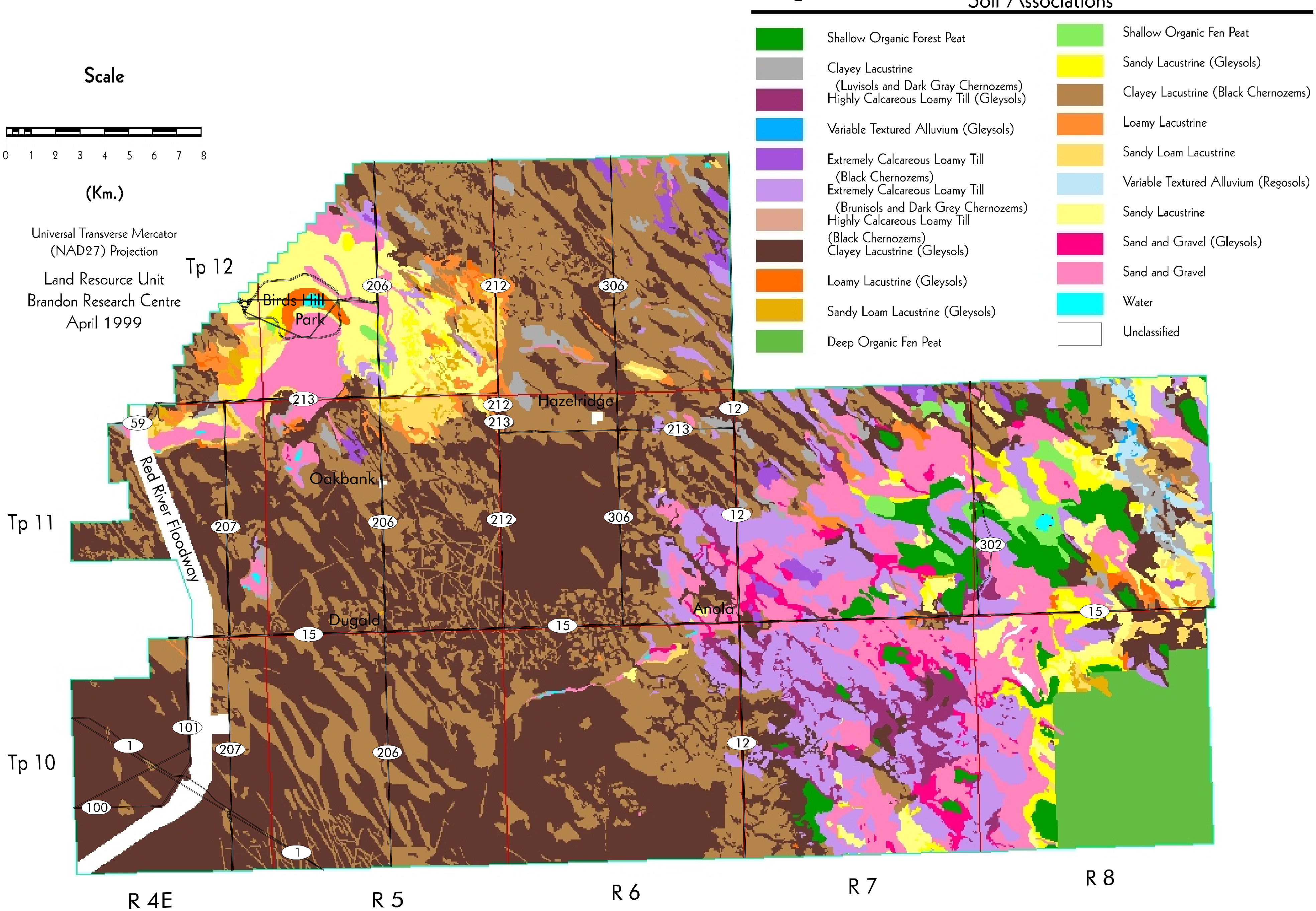
More detailed maps showing the dominant and subdominant soils in each polygon can also be produced at larger map scales.

Table 2. Generalized Soil Groups[1]

Soil Groups	Area (ha)	Percent of RM
Shallow Organic Forest Peat	2750	2.5
Clayey Lacustrine (Luvisols and Dark GraChernozems)	1525	1.4
Highly Calcareous Loamy Till (Gleysols)	1725	1.6
Variable Textured Alluvium (Gleysols)	58	0.1
Extremely Calcareous Loamy Till (Black Chernozems)	855	0.8
Extremely Calcareous Loamy Till (Brunisols and Dark Gray Chernozems)	8792	8.0
Highly Calcareous Loamy Till (Black Chernozems)	9	0.0
Clayey Lacustrine (Gleysols)	37237	33.7
Loamy Lacustrine (Gleysols)	394	0.4
Sandy Loam Lacustrine (Gleysols)	577	0.5
Deep Organic Fen Peat	4731	4.3
Shallow Organic Fen Peat	725	0.7
Sandy Lacustrine (Gleysols)	1815	1.6
Clayey Lacustrine (Black Chernozems)	26912	24.4
Loamy Lacustrine	1410	1.3
Sandy Loam Lacustrine	2051	1.9
Variable Textured Alluvium (Regosols)	320	0.3
Sandy Lacustrine	5162	4.7
Sand and Gravel (Gleysols)	1142	1.0
Sand and Gravel	9965	9.0
Water	86	0.1
Unclassified	2111	1.9
Total	110348	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. Five drainage classes plus three land classes are shown on this map.

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

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

Poor, drained - Water is removed slowly in relation to supply and the soil remains wet for a significant portion of the growing season. Although these soils may retain characteristics of poor internal drainage, extensive surface drainage improvements enable these soils to be used for annual crop production.

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

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

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

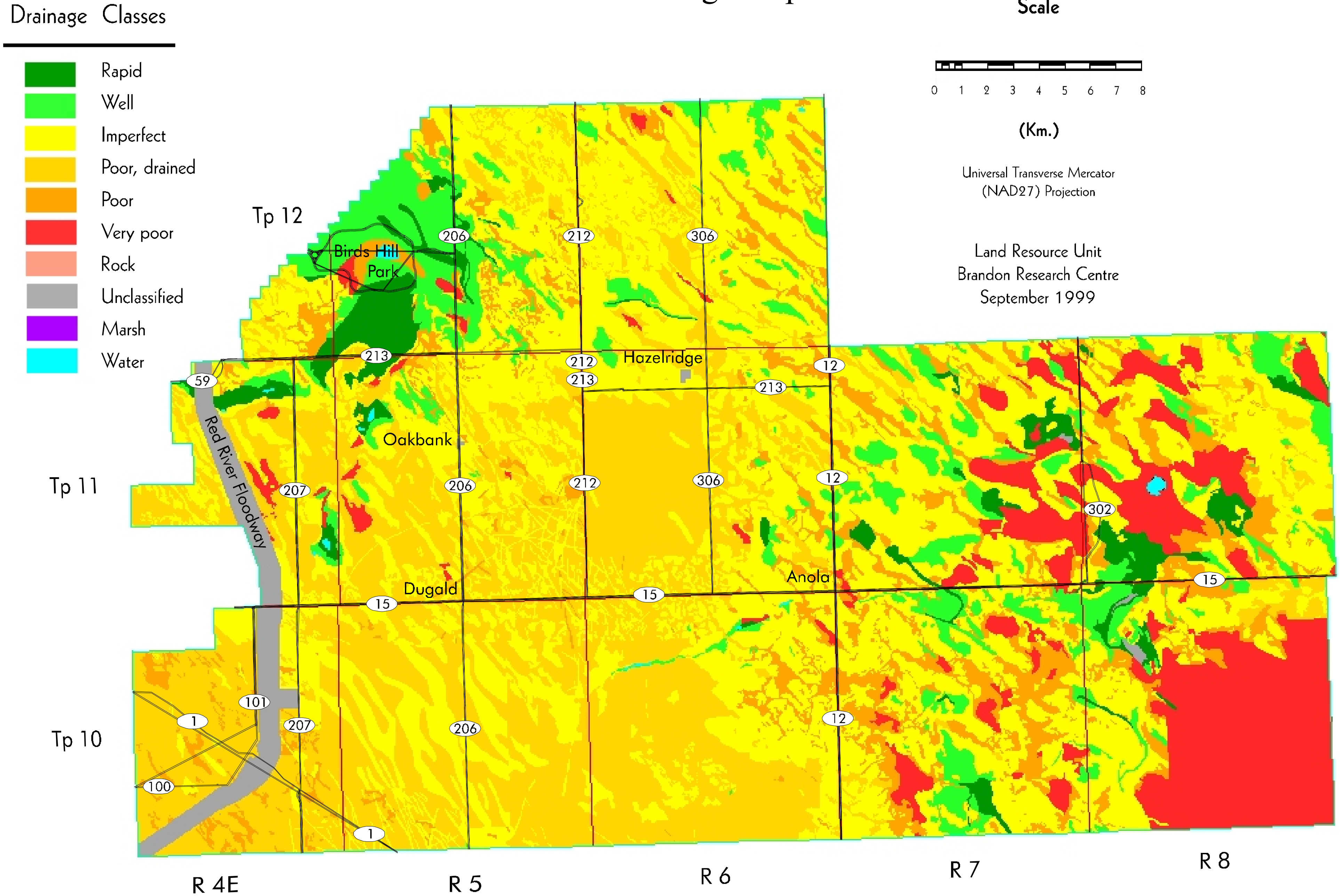
Drainage classification is based on the dominant soil series within each individual soil polygon.

Table 3. Drainage Classes[1]

Drainage Class	Area (ha)	Percent of RM
Very Poor	10181	9.2
Poor	10187	9.2
Poor, drained	30785	27.9
Imperfect	45413	41.2
Well	8235	7.5
Rapid	3352	3.0
Rock	0	0.0
Marsh	0	0.0
Unclassified	2111	1.9
Water	86	0.1
Total	110348	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.

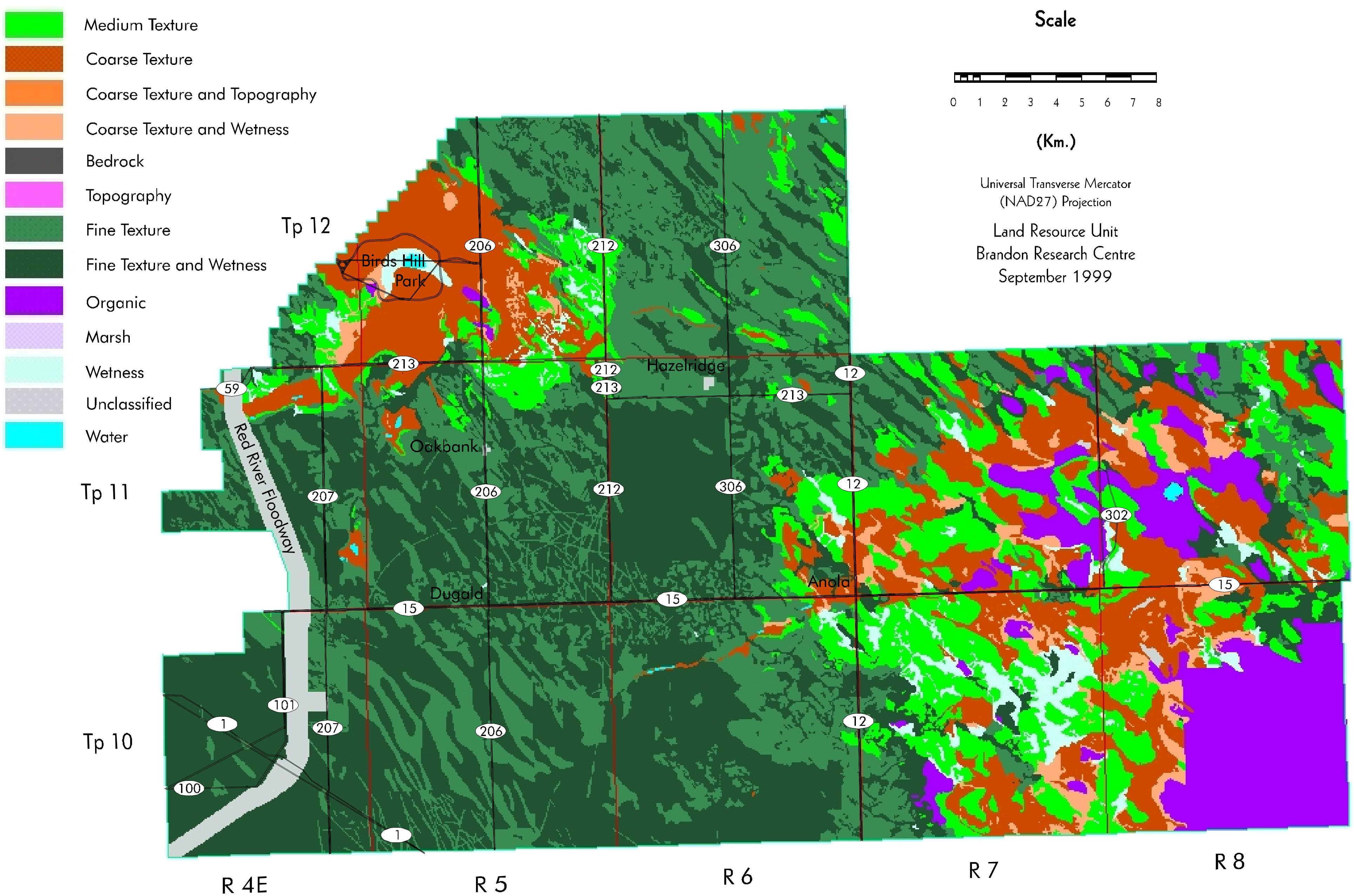
R = Bedrock - soil landscapes that have shallow depth to bedrock (< 50 cm) and/or exposed bedrock which may prevent the use of some or all tillage practices as well as the range of potential crops. They require special cropping and management practices to sustain agricultural production.

Table 4. Management Considerations[1]

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	28437	25.8
Fine Texture and Wetness	37237	33.7
Fine Texture and Topography	0	0.0
Medium Texture	13428	12.2
Coarse Texture	15126	13.7
Coarse Texture and Wetness	2957	2.7
Coarse Texture and Topography	0	0.0
Topography	0	0.0
Bedrock	9	0.0
Wetness	2753	2.5
Organic	8206	7.4
Marsh	0	0.0
Unclassified	2111	1.9
Water	86	0.1
Total	110348	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 modifers include structure and/or permeability (D), erosion (E), inundation (I), moisture limitation (M), salinity (N), stoniness (P), consolidated bedrock (R), topography (T), excess water (W) and cumulative minor adverse characteristics (X).

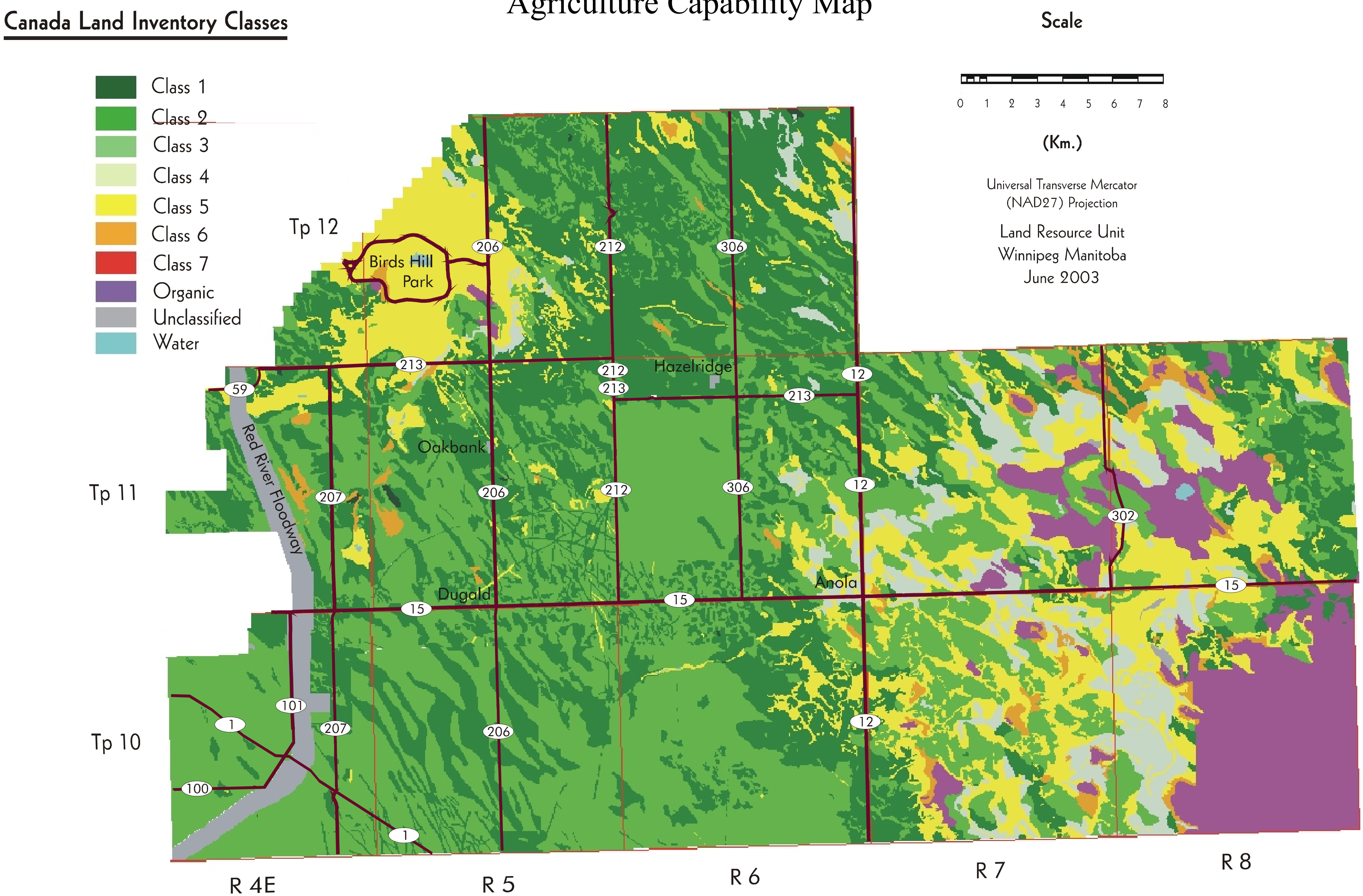
This generalized interpretive map is based on the dominant soil series and phases for each soil polygon. The CLI subclass limitations cannot be portrayed at this generalized map scale.

Table 5. Agricultural Capability[1]

Class Subclass	Area (ha)	Percent of RM
1	**82**	**0.1**
2	**39948**	**30.1**
2D	531	0.5
2DP	195	0.2
2DW	46	0.0
2I	26	0.0
2M	1791	1.6
2T	1	0.0
2W	30391	27.9
2WP	194	0.2
2X	73	0.1
3	**41884**	**38.0**
3D	8607	7.8
3I	293	0.3
3M	942	0.9
3N	75	0.1
3NW	1967	1.8
3P	31	0.0
3W	29970	27.2
4	**5630**	**5.1**
4DP	969	0.9
4M	4652	4.2
4R	9	0.0
5	**16903**	**15.3**
5M	7937	7.2
5P	21	0.0
5W	8887	8.1
5WI	58	0.1
6	**1844**	**1.7**
6P	44	0.0
6W	1800	1.6
Unclassified	**2081**	**1.9**
Water	**86**	**0.1**
Organic	**8540**	**7.7**
Total	**110298**	**100.0**

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

Agriculture Capability Map



Irrigation Suitability Map.

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

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

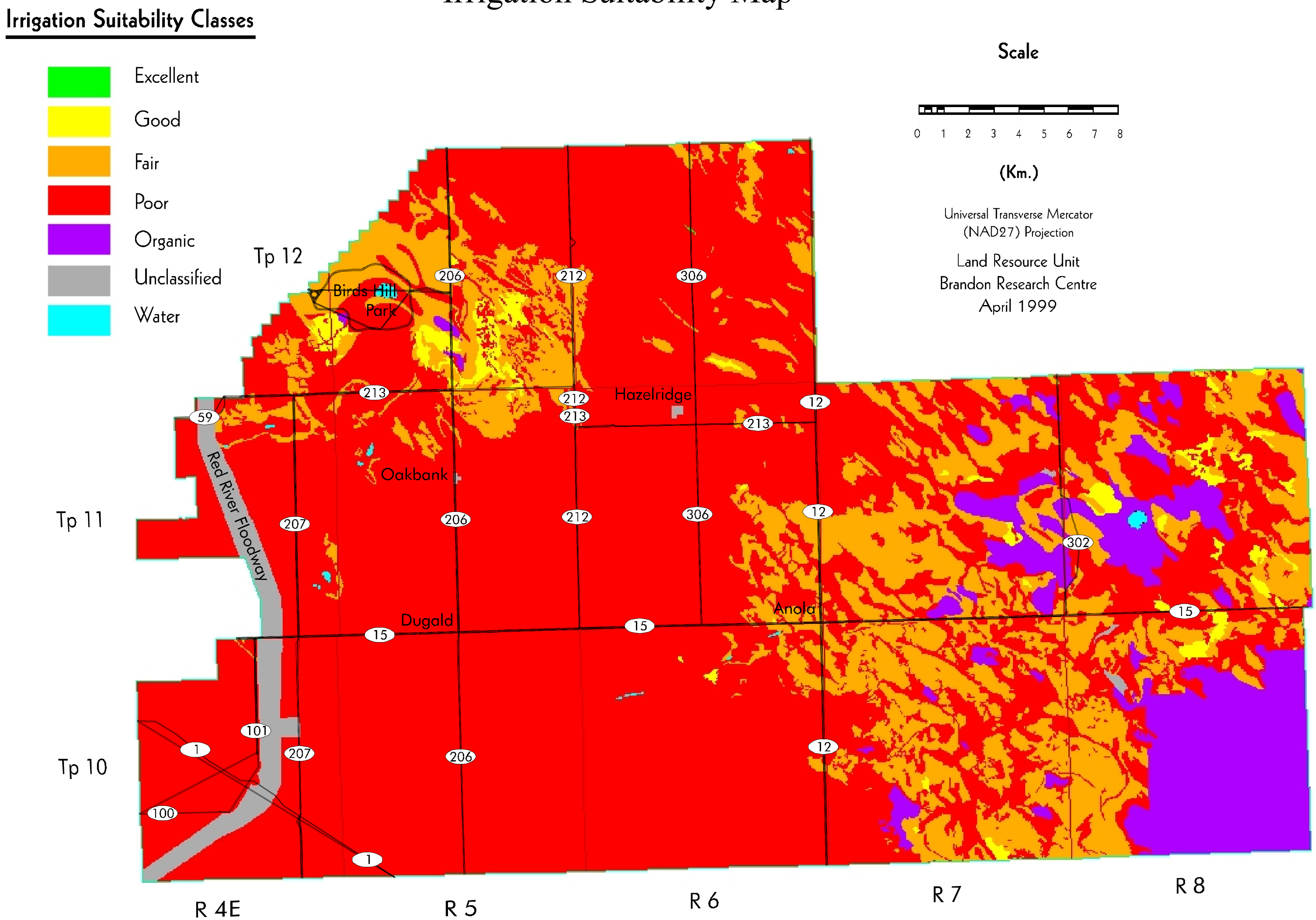
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

Table 6. Irrigation Suitability[1]

Class	Area (ha)	Percent of RM
Excellent	4	0.0
Good	1601	1.5
Fair	21113	19.1
Poor	77229	70.0
Organic	8206	7.4
Unclassified	2111	1.9
Water	86	0.1
Total	110348	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.

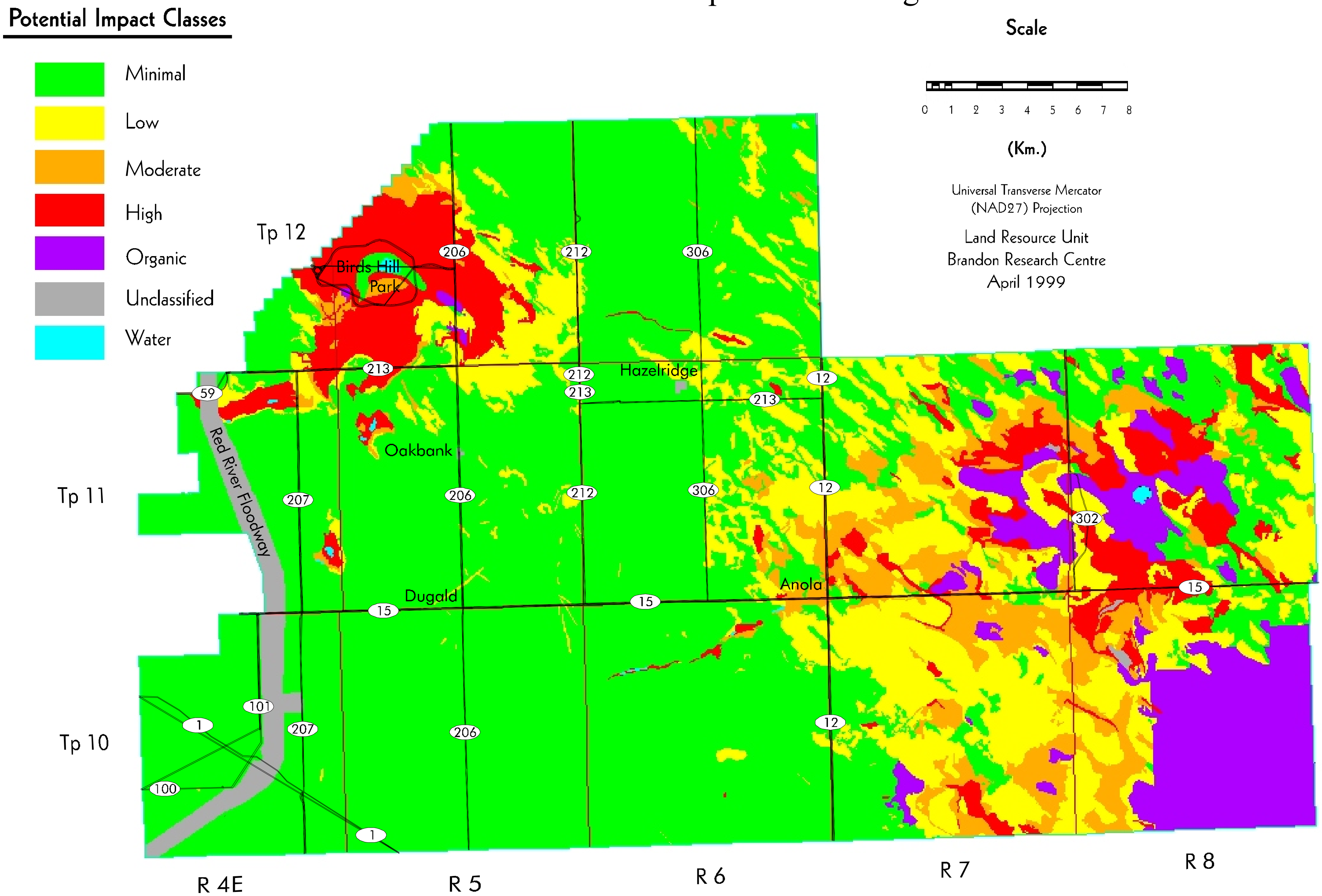
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 7. Potential Environmental Impact Under Irrigation[1]

Class	Area (ha)	Percent of RM
Minimal	**64511**	**58.5**
Low	**19465**	**17.6**
Moderate	**7419**	**6.7**
High	**8663**	**7.9**
Organic	**8093**	**7.3**
Unclassified	**2111**	**1.9**
Water	**86**	**0.1**
Total	**110348**	**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, slope length, slope gradient, vegetation cover, management practices, and soil erodibility. The map shows 5 classes of soil erosion risk based on bare unprotected soil:

negligible
low
moderate
high
severe

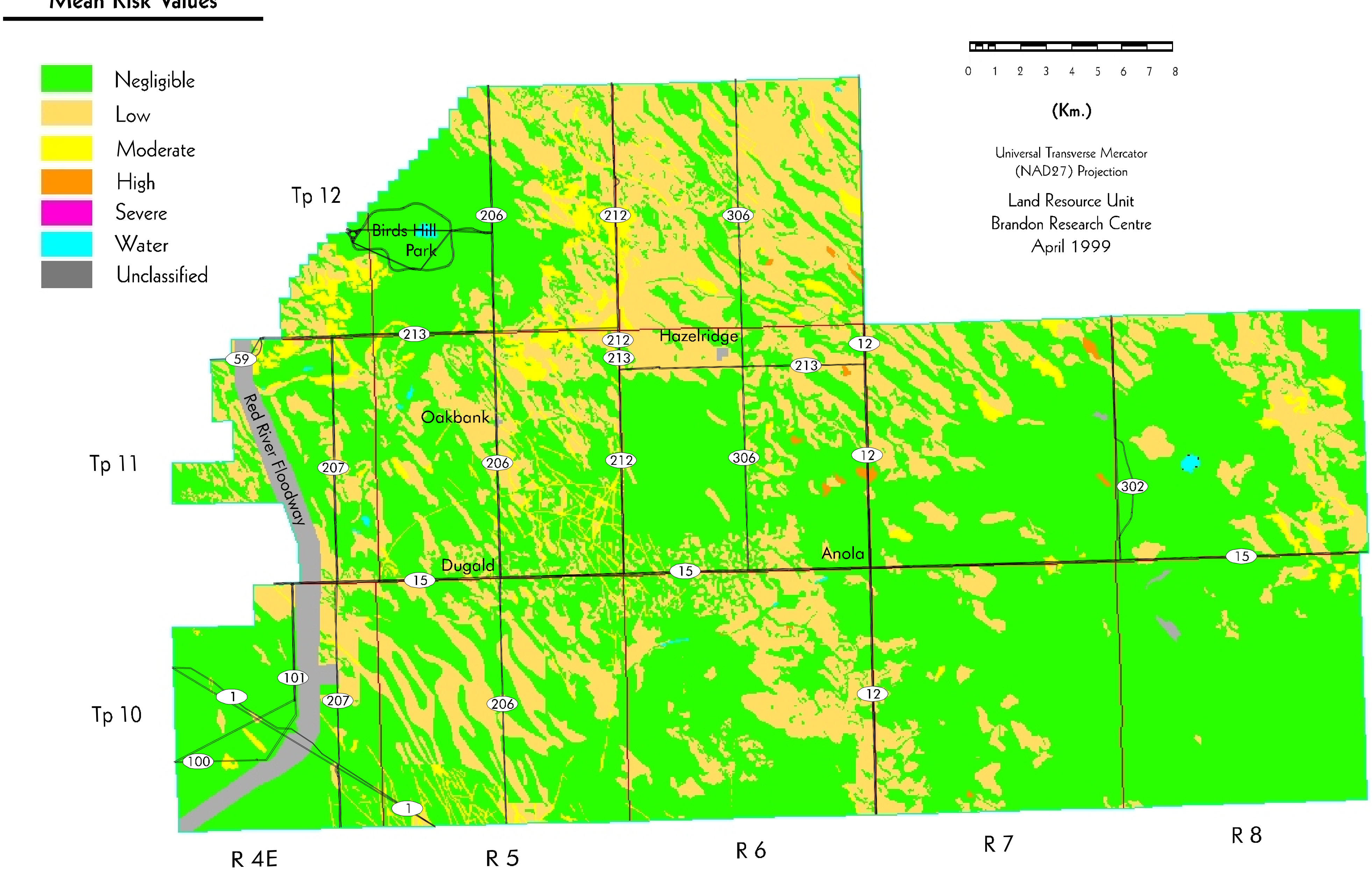
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

Table 8. Water Erosion Risk[1]

Class	Area (ha)	Percent of RM
Negligible	**73435**	**66.5**
Low	**30217**	**27.4**
Moderate	**4343**	**3.9**
High	**158**	**0.1**
Severe	**0**	**0.0**
Unclassified	**2111**	**1.9**
Water	**86**	**0.1**
Total	**110348**	**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.

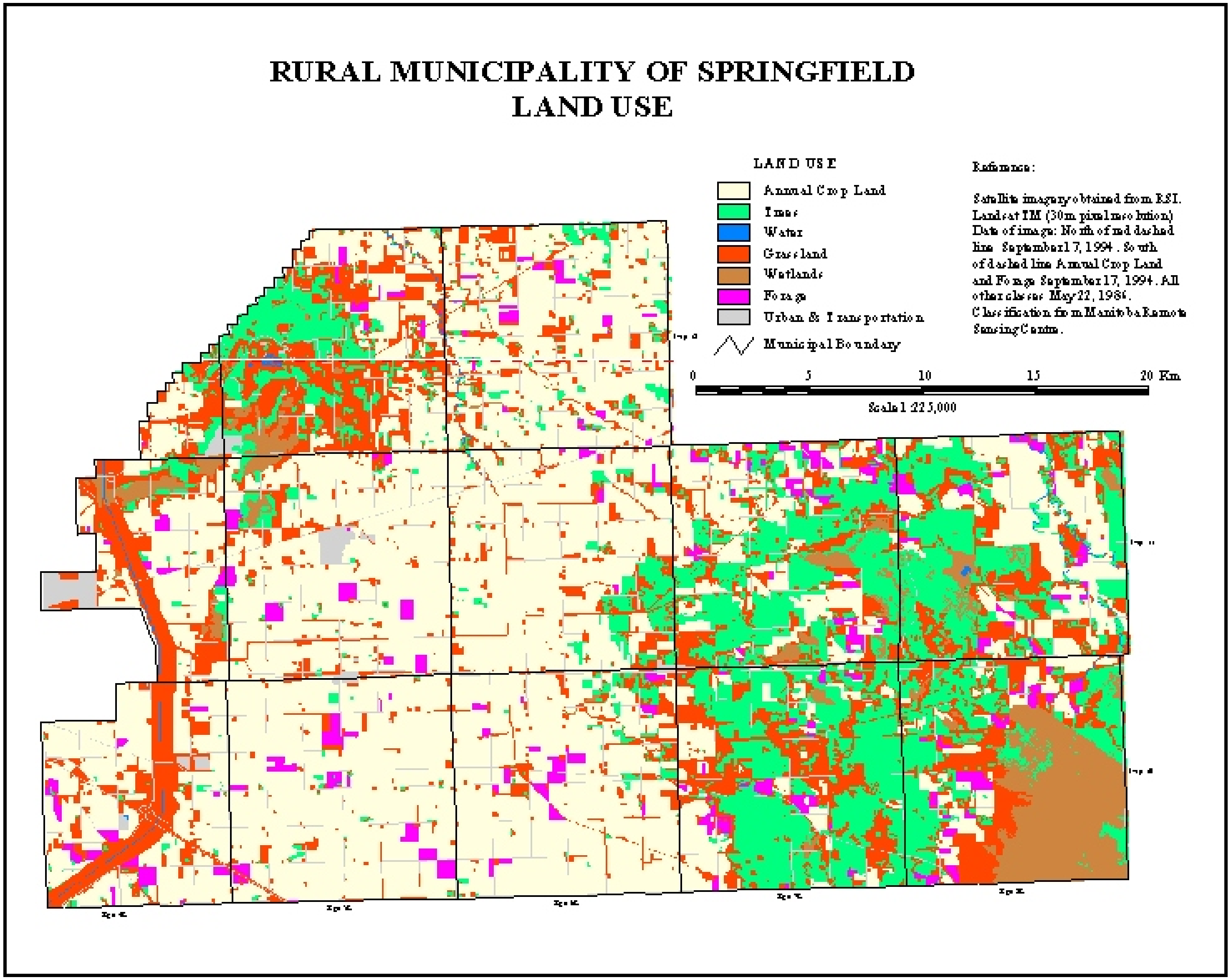
Water - open water - lakes, rivers streams, ponds, and lagoons.

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

Table 9. Land Use[1]

Class	Area (ha)	Percent of RM
Annual Crop Land	**56009**	**50.7**
Forage	**3498**	**3.2**
Grasslands	**21260**	**19.2**
Trees	**19754**	**17.8**
Wetlands	**5419**	**4.9**
Water	**287**	**0.3**
Urban and transportation	**4337**	**3.9**
Total	**110564**	**100.0**

[1] Land use information (1995) and map supplied by Prairie Farm Rehabilitation Administration. Areas may vary from previous maps due to differences in analytical procedures.


RURAL MUNICIPALITY OF SPRINGFIELD
LAND USE
LAND USE
Annual Crop Land
Trees
Water
Grassland
Wetlands
Forage
Urban & Transportation
Municipal Boundary
Reference:
Satellite imagery obtained from RSI.
Landsat TM (30m pixel resolution)
Date of image: North of red dashed
line September 17, 1994. South
of dashed line Annual Crop Land
and Forage September 17, 1994. All
other classes May 22, 1986.
Classification from Manitoba Remote
Sensing Centre.
0
5
10
15
20 Km
Scale 1:225,000

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