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## Rural Municipality of St Clements

### Information Bulletin 99-9

## Soils and Terrain

An introduction  
to the land resource

Land Resource Unit  
Brandon Research Centre



Canada 

## **Rural Municipality of St Clements**

### **Information Bulletin 99-9**

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## PREFACE

This is one of a new series of information bulletins for individual rural municipalities of Manitoba. They serve to introduce the newly developed digital soil databases and illustrate several typical derived and interpretive map products for agricultural land use planning applications. The bulletins will also be available in diskette format for each rural municipality.

Information contained in this bulletin may be quoted and utilized with appropriate reference to the originating agencies. The authors and originating agencies assume no responsibility for the misuse, alteration, re-packaging, or re-interpretation of the information.

This information bulletin serves as an introduction to the land resource information available for the municipality. More detailed information, including copies of the primary soil and terrain maps at larger scales, may be obtained by contacting

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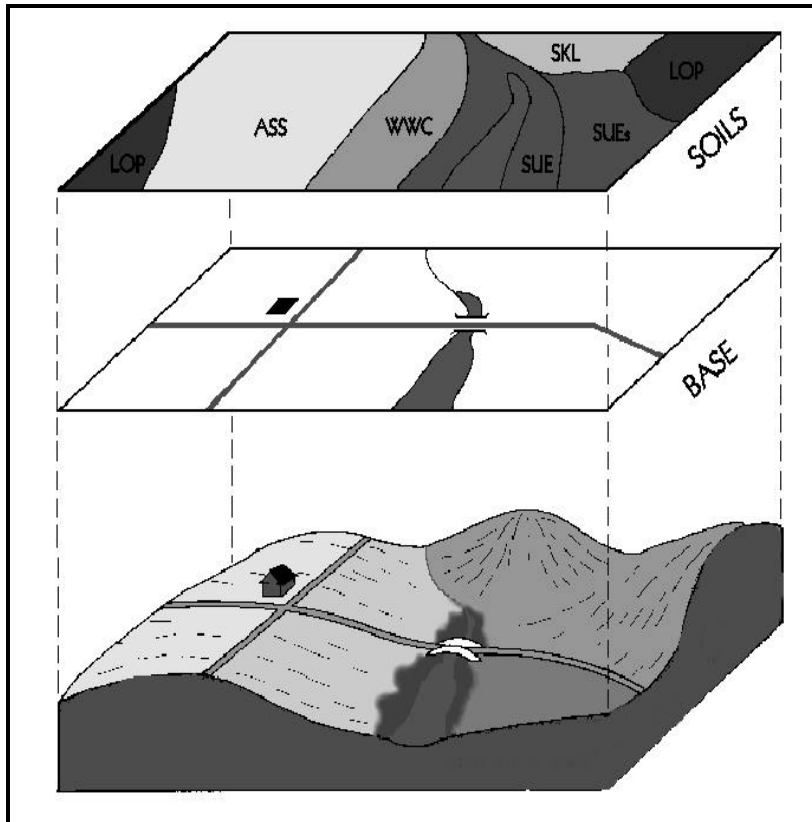
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This bulletin is available in printed or digital format. The digital bulletin is a Windows based executable file which offers additional display options, including the capability to print any portion of the bulletin.

## LAND RESOURCE DATA

The soil and terrain information presented in this bulletin was compiled as part of a larger project to provide a uniform level of land resource information for agricultural and regional planning purposes throughout Agro-Manitoba. This information was compiled and analysed in two distinct layers as shown in Figure 2.



**Figure 2.** Soil and Base Map data.

## Base Layer

Digital base map information includes the municipality and township boundaries, along with major streams, roads and highways. Major rivers and lakes from the base layer were also used as common boundaries for the soil map layer. Water bodies larger than 25 ha in size were digitized as separate polygons.

## Soil Layer

The most detailed soil information currently available was selected as the data source for the digital soil layer for each rural municipality.

Comprehensive detailed soil maps (1:20 000 to 1:50 000 scale) have been published for many rural municipalities. Where they were available, the individual soil map sheets were digitized and compiled as a single georeferenced layer to match the digital RM base. Map polygons have one or more soil series components, as well as slope and stoniness classes. Soil database information was produced for each polygon, to meet national standards (MacDonald and Valentine, 1992). Slope length classes were also added, 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 St. Clements covers an area of 86 533 ha (approximately 9.4 townships) located at the south end of Lake Winnipeg. It includes a narrow strip of land extending along the east side of the Red River to within 8 kilometres of the City of Winnipeg (page 3). The Towns of Birds Hill and East Selkirk are the largest population and service centres with smaller concentrations of people resident in Garson, Grand Marais, Beaconsia and the Brokenhead Reserve and the hamlets of Grand Beach, Balsam Bay, Libau, Glenmoor and Greenwall. Grand Beach Provincial Park on the east shore of Lake Winnipeg and a portion of Birds Hill Provincial Park are located in the municipality.

The climate in the area can be related to weather data from Selkirk. The mean annual temperature is 2.5°C (Environment Canada, 1993) and the mean annual precipitation is 507 mm (Environment Canada, 1981). The average frost-free period is 128 days and degree-days above 5°C accumulated from May to September average 1685 (Ash, 1991). An evaluation of growing conditions in this region of Manitoba can be related to estimates of seasonal moisture deficit and effective growing degree-days (EGDD) above 5°C. The seasonal moisture deficit calculated between May and September decreases from 250 mm in the south to 200 mm in the north. The estimated effective growing degree-days accumulated from May to September range from 1600 to less than 1500, with lower values to the north and 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 St. Clements is located mainly in the Southeastern Plain. A small part of the Red River Valley forms the western boundary of the area while the northern end of the municipality is in the Lac du Bonnet Plain. The Red River Valley is a level to very gently sloping area whereas the Southeastern Plain consists of gently undulating, slightly ridged terrain. The Lac du Bonnet Plain consists of prominent upland area at Grand Beach on the Lake Winnipeg shoreline (Canada-Manitoba Soil Survey, 1980). Elevation of the land surface decreases from 240 metres above sea level (m asl) in the south to 217 m asl in the north on Lake Winnipeg. Local relief is generally under 3 metres and slopes are less than 2 percent although two prominent upland areas of glaciofluvial outwash

at Birds Hill and Grand Beach rise above the level lake plain to elevations in excess of 255 m asl. These uplands are characterized by higher local relief and slopes between 2 and 5 percent (page 9). The generally low surface gradients (0.7 m/km or 8.5 ft/mi) throughout most of the municipality result in poorly developed surface drainage. Much of the area is affected by high groundwater levels and the Lake Winnipeg shoreline is characterized by extensive marshes. Surface drainage is via the Brokenhead River in the north and Cooks and Devils Creeks in the south. Surface drainage for agricultural purposes has been improved in parts of the area by man-made drains.

Soil materials in the municipality were deposited during the time of glacial Lake Agassiz. The Southeastern Plain in this area is characterized by thin, clayey lacustrine sediments underlain by loam textured, stony glacial till. Waterworked, extremely calcareous, stony, loam till and local areas of gravelly sand outwash and beach deposits are common. The Lac du Bonnet Plain is characterized by sandy to clayey sediments and areas of deep sand to gravel glaciofluvial outwash and loamy till deposits. The Red River Plain consists of deep clayey lacustrine sediments (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) and the Lac du Bonnet area (Smith et al., 1967). Detailed 1:20 000 scale map information is available for selected areas in the municipality (Michalyna et al., 1975). According to the Canadian System of Soil Classification (Expert Committee on Soil Survey, 1997), Black Chernozemic soils in imperfectly drained sites and Humic Gleysol soils in poorly drained sites are dominant in the south (Red River, Marquette, Zora and Semple associations). In the northern part of the area, Dark Gray Chernozemic soils are common (Arnes, Libau, Thalberg and Pine Valley series). Humic Gleysol soils, many with thin peaty surface layers in poorly drained sites occur throughout the north. Weakly developed Brunisolic soils and Gray Luvisol soils are found on rapidly to imperfectly drained sandy materials. Organic soils comprised of shallow to deep deposits of forest and fen peat occur mainly in the northern part of the municipality (page 11). A more detailed and complete description of the type, distribution and textural variability of soils in the municipality is provided in the published soil surveys

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 as 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. Soils throughout the municipality are non-saline.

Forty-three percent of the soils are rated in **Class 2** for agricultural capability and 24 percent in **Class 3**. Less than 1 percent of the soils are placed in **Class 4**, primarily due to sandy texture and low moisture holding capacity and 6 percent rated in **Class 5** due to droughtiness and excess wetness. **Class 6** soils affected by excessive wetness occupy 5 percent of the area and organic soils which have very limited capability for agriculture in their native state cover 6 percent of the area (page 16). The irrigation suitability of soils in this municipality is dominantly **Poor** (67 percent) due to clayey textures and imperfect to poor drainage conditions. Local areas of better drained sandy soils are rated **Good** whereas imperfectly drained loamy soils are rated as **Fair** (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** to **Low** on level clayey soils, **Moderate** on loamy materials and **High** on areas of highly permeable sand and gravel soils. 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 44 percent of the land in the municipality is at a **Negligible** risk of degradation due to water erosion whereas about 36 percent of the area is at a **Low** risk and 11 percent of the soils are at a **Moderate** risk. Lighter textured loamy and 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.

Agriculture land use in the RM of St. Clements consists of annual crops, forage crops and grassland areas utilized for hay and pasture. Other land uses include forested areas, wetlands and urban development and recreation. An assessment of the status of land use in 1994 obtained through an analysis of satellite imagery showed annual crops occupied 33 percent and forage crops 1 percent of the land in the municipality. Grassland areas at 17 percent and tree cover at 9 percent of the land area provide forage and grazing capacity as well as wildlife habitat. Wetlands occupying about 9 percent and organic soils covering 6 percent of the area also provide wildlife habitat. Various non-agricultural uses such as infrastructure for urban areas, transportation and recreation occupy about 3 percent of the municipality (page 25).

The majority of soils in the RM of St. Clements have moderate to moderately severe limitations for arable agriculture. Clay textured soils require management practices which maintain adequate surface drainage, soil structure and tilth and 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.

Large areas of the municipality with low relief and a dominance of imperfectly to poorly drained 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 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.**

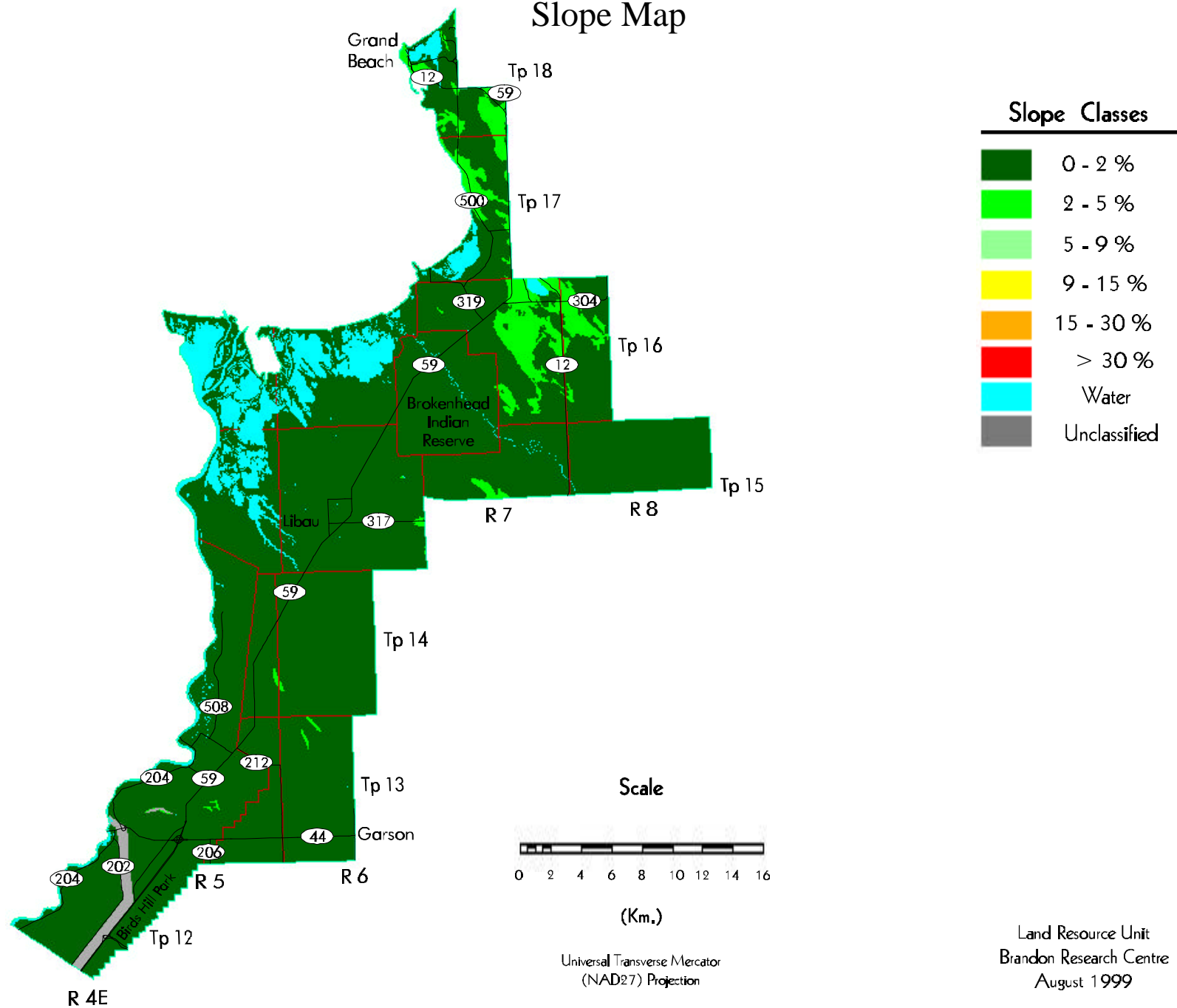
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital soil and terrain layer database. Specific colours are used to indicate the dominant slope class for each polygon in the RM. Additional slope classes may occur in each polygon area,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

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

<b>Slope Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>0 - 2 %</b>	<b>73678</b>	<b>85.1</b>
<b>2 - 5 %</b>	<b>4605</b>	<b>5.3</b>
<b>5 - 9 %</b>	<b>0</b>	<b>0.0</b>
<b>9 - 15 %</b>	<b>0</b>	<b>0.0</b>
<b>15 - 30 %</b>	<b>0</b>	<b>0.0</b>
<b>&gt; 30 %</b>	<b>0</b>	<b>0.0</b>
<b>Unclassified</b>	<b>790</b>	<b>0.9</b>
<b>Water</b>	<b>7460</b>	<b>8.6</b>
<b>Total</b>	<b>86533</b>	<b>100.0</b>

<sup>1</sup> Area has been assigned to the dominant slope in each soil polygon.

## Slope Map



### Generalized Soil Map.

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

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

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

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

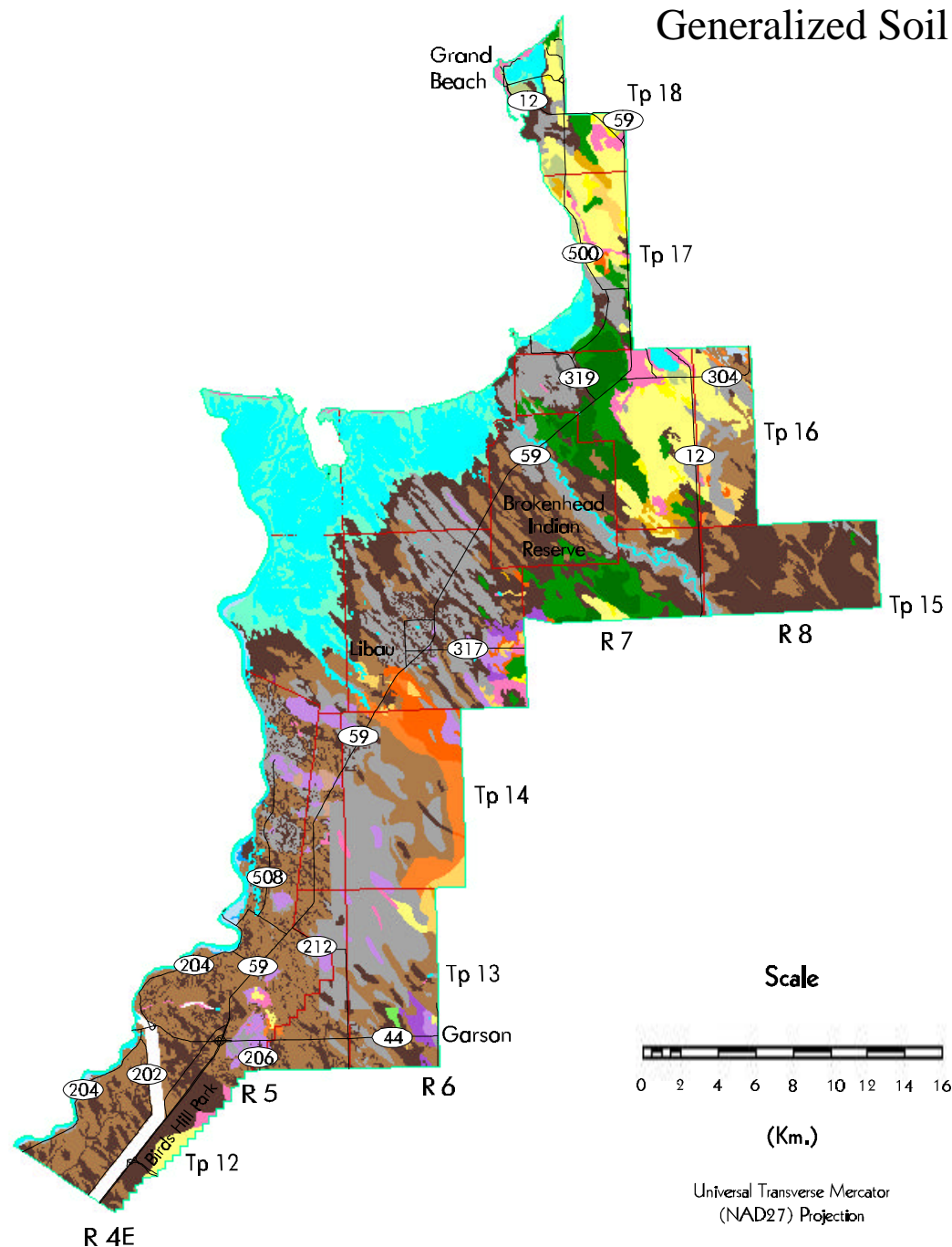
Soil Groups	Area (ha)	Percent of RM
Deep Organic Forest or Sphagnum Peat	2169	2.5
Shallow Organic Forest Peat	3001	3.5
Clayey Lacustrine (Luvisols and Dark Gray Chernozems)	14822	17.1
Clayey Lacustrine (Gleysols)	60	0.1
Highly Calcareous Loamy Till (Gleysols)	7	0.0
Variable Textured Alluvium (Gleysols)	53	0.1

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

Soil Groups	Area (ha)	Percent of RM
Extremely Calcareous Loamy Till (Black Chernozems)	455	0.5
Extremely Calcareous Loamy Till (Brunisols and Dark Gray Chernozems)	2026	2.3
Highly Calcareous Loamy Till (Black Chernozems)	127	0.1
Loamy Till (Luvisols)	615	0.7
Marsh	5280	6.1
Clayey Lacustrine (Gleysols)	19494	22.5
Loamy Lacustrine (Gleysols)	1073	1.2
Sandy Loam Lacustrine (Gleysols)	472	0.5
Shallow Organic Fen Peat	55	0.1
Sandy Lacustrine (Gleysols)	403	0.5
Clayey Lacustrine (Black Chernozems)	18314	21.2
Loamy Lacustrine	1334	1.5
Sandy Loam Lacustrine	1127	1.3
Variable Textured Alluvium (Regosols)	418	0.5
Sandy Lacustrine	5341	6.2
Sand and Gravel (Gleysols)	8	0.0
Sand and Gravel	1631	1.9
Water	7460	8.6
Unclassified	790	0.9
<b>Total</b>	<b>86533</b>	<b>100.0</b>

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

# Generalized Soil Map



## Soil Associations

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

### 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.

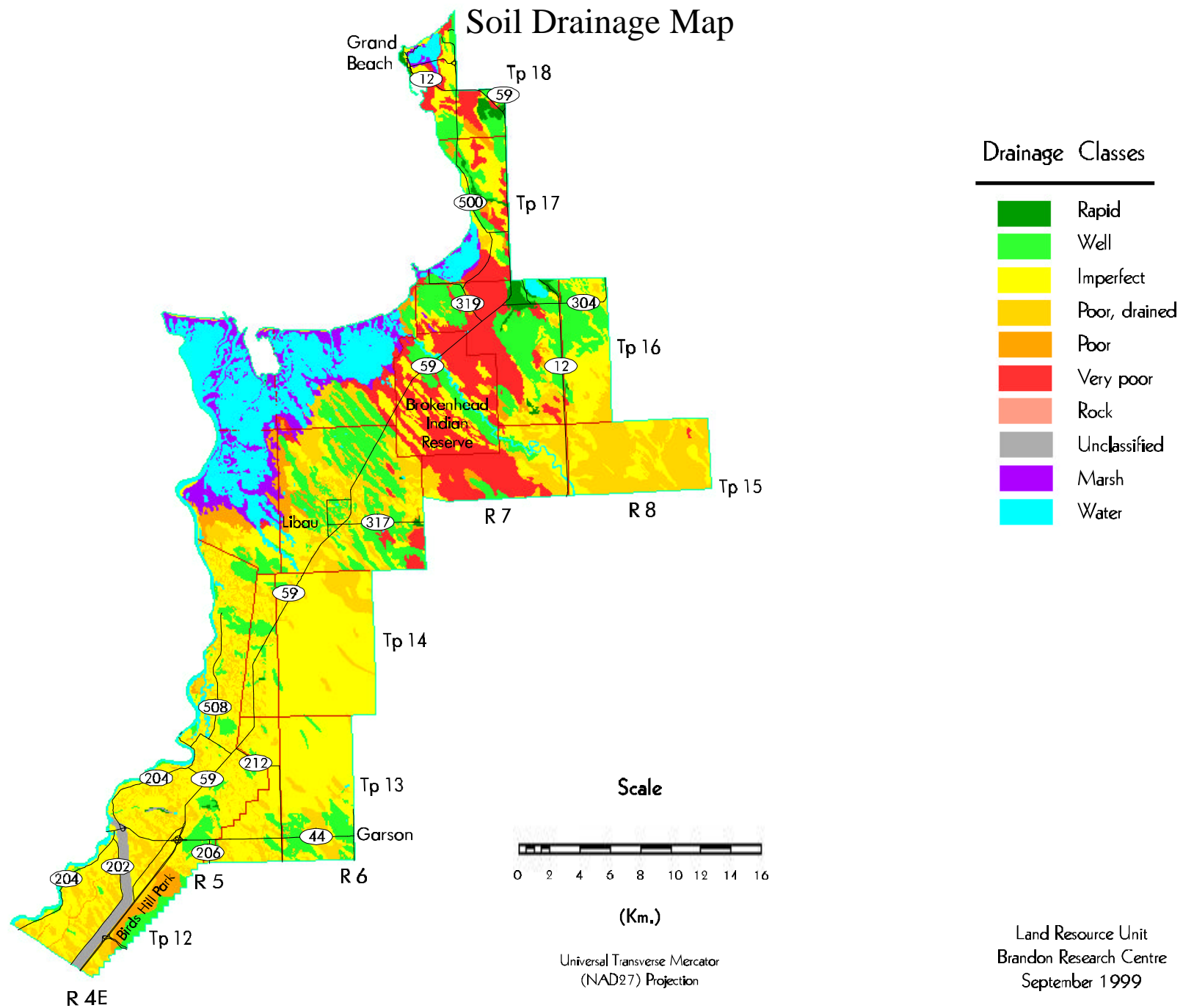
**Rapid** - Water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is pervious. Subsurface flow may occur on steep slopes during heavy rainfall.

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

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

<b>Drainage Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Very Poor</b>	<b>9221</b>	<b>10.7</b>
<b>Poor</b>	<b>2657</b>	<b>3.1</b>
<b>Poor, drained</b>	<b>14917</b>	<b>17.2</b>
<b>Imperfect</b>	<b>31697</b>	<b>36.6</b>
<b>Well</b>	<b>13695</b>	<b>15.8</b>
<b>Rapid</b>	<b>817</b>	<b>0.9</b>
<b>Rock</b>	<b>0</b>	<b>0.0</b>
<b>Marsh</b>	<b>5280</b>	<b>6.1</b>
<b>Unclassified</b>	<b>790</b>	<b>0.9</b>
<b>Water</b>	<b>7460</b>	<b>8.6</b>
<b>Total</b>	<b>86533</b>	<b>100.0</b>

<sup>1</sup> Area has been assigned to the dominant drainage class for each soil polygon.



### 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.

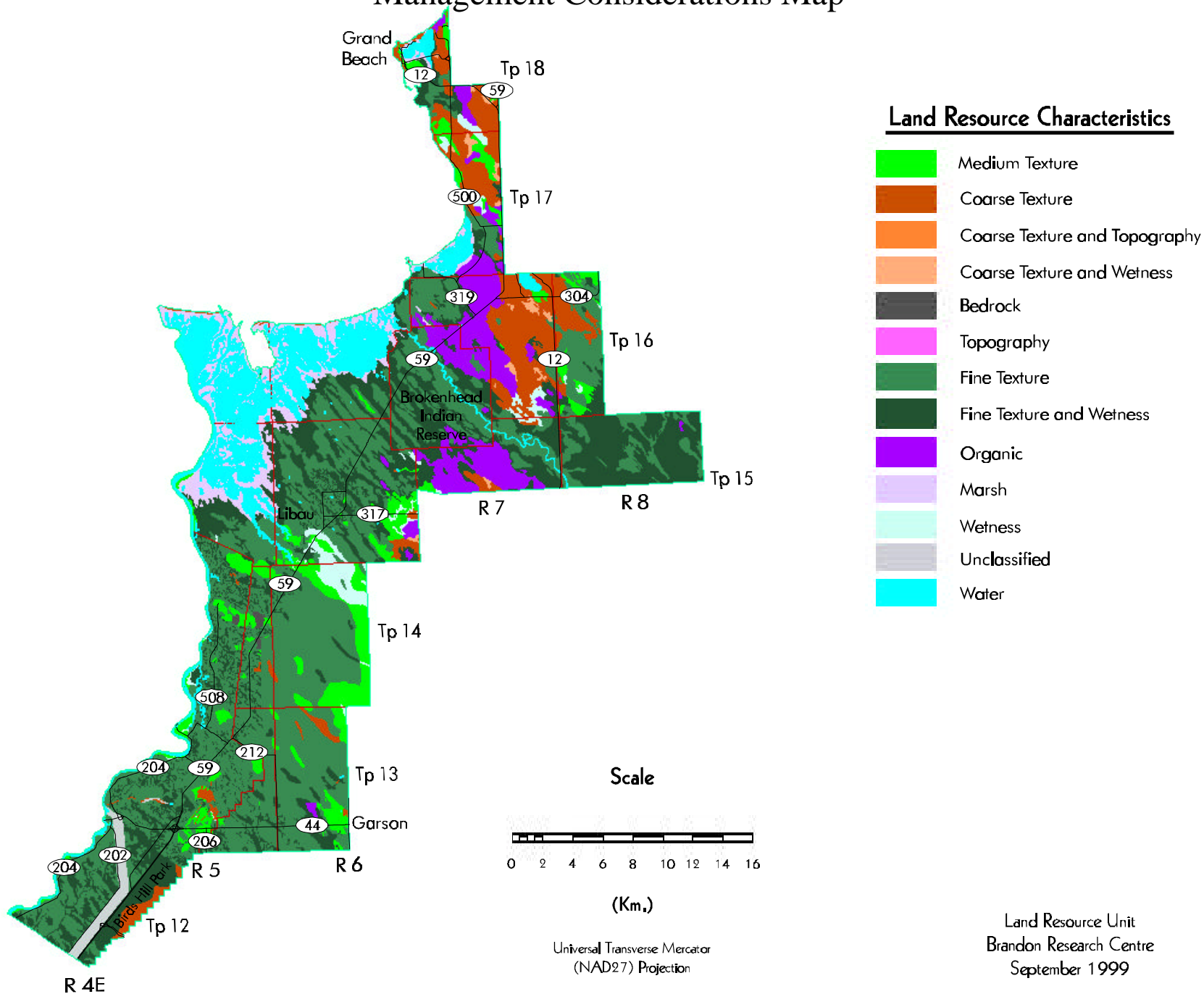
**R = Bedrock** - soil landscapes that have shallow depth to bedrock (< 50 cm) and/or exposed bedrock which may prevent the use of some or all tillage practices as well as the range of potential crops. They require special cropping and management practices to sustain agricultural production.

**Table 4. Management Considerations<sup>1</sup>**

Land Resource Characteristics	Area (ha)	Percent of RM
<b>Fine Texture</b>	<b>33136</b>	<b>38.3</b>
<b>Fine Texture and Wetness</b>	<b>19554</b>	<b>22.6</b>
<b>Fine Texture and Topography</b>	<b>0</b>	<b>0.0</b>
<b>Medium Texture</b>	<b>5974</b>	<b>6.9</b>
<b>Coarse Texture</b>	<b>6973</b>	<b>8.1</b>
<b>Coarse Texture and Wetness</b>	<b>411</b>	<b>0.5</b>
<b>Coarse Texture and Topography</b>	<b>0</b>	<b>0.0</b>
<b>Topography</b>	<b>0</b>	<b>0.0</b>
<b>Bedrock</b>	<b>127</b>	<b>0.1</b>
<b>Wetness</b>	<b>1605</b>	<b>1.9</b>
<b>Organic</b>	<b>5225</b>	<b>6.0</b>
<b>Marsh</b>	<b>5280</b>	<b>6.1</b>
<b>Unclassified</b>	<b>790</b>	<b>0.9</b>
<b>Water</b>	<b>7460</b>	<b>8.6</b>
<b>Total</b>	<b>86533</b>	<b>100.0</b>

<sup>1</sup> Based on the **dominant** soil series and slope gradient within each polygon.

## Management Considerations Map





### Agricultural Capability Map.

This evaluation utilizes the 7 class Canada Land Inventory system (CLI, 1965). Classes 1 to 3 represent the prime agricultural land, class 4 land is marginal for sustained cultivation, class 5 land is capable of perennial forages and improvement is feasible, class 6 land is capable of producing native forages and pasture but improvement is not feasible, and class 7 land is considered unsuitable for dryland agriculture. Subclass modifiers include structure and/or permeability (D), erosion (E), inundation (I), moisture limitation (M), salinity (N), stoniness (P), consolidated bedrock (R), topography (T), excess water (W) and cumulative minor adverse characteristics (X).

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

**Table 5. Agricultural Capability<sup>1</sup>**

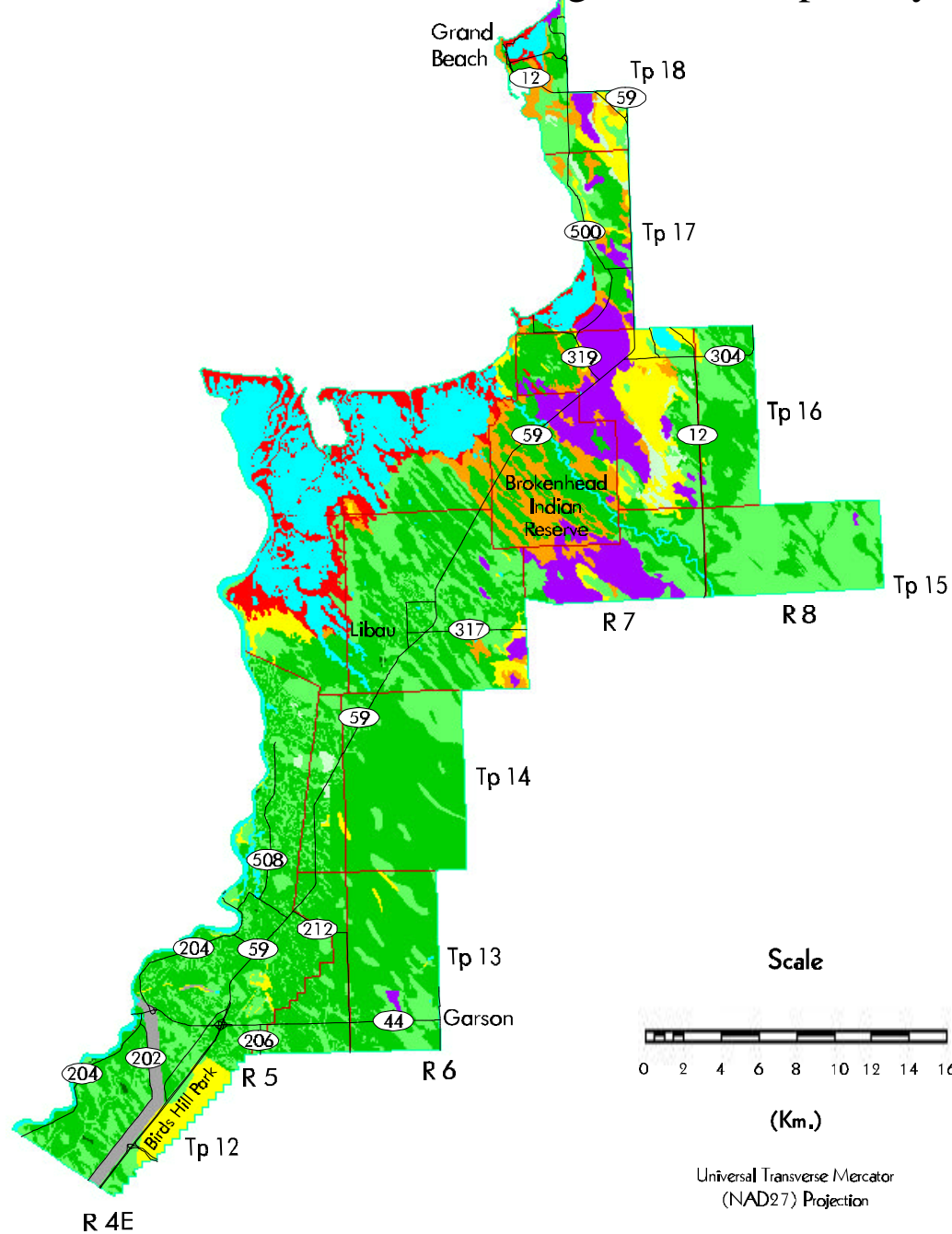
<b>Class Subclass</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>1</b>	<b>49</b>	<b>0.1</b>
<b>2</b>	<b>36804</b>	<b>42.5</b>
2D	6893	8.0
2DP	352	0.4
2DW	4257	4.9
2I	195	0.2
2IW	117	0.1
2M	1037	1.2
2MP	296	0.3
2TW	148	0.2
2W	22879	26.4
2WP	629	0.7

**Table 5. Agricultural Capability<sup>1</sup>**

<b>Class Subclass</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>3</b>	<b>20745</b>	<b>24.0</b>
3D	1452	1.7
3DP	834	1.0
3DW	18	0.0
3I	286	0.3
3M	2122	2.5
3P	693	0.8
3W	13785	15.9
3w	1554	1.8
<b>4</b>	<b>844</b>	<b>1.0</b>
4M	660	0.8
4R	127	0.1
4W	57	0.1
<b>5</b>	<b>4956</b>	<b>5.7</b>
5M	2930	3.4
5W	1973	2.3
5WI	53	0.1
<b>6</b>	<b>4216</b>	<b>4.9</b>
6P	68	0.1
6W	4148	4.8
<b>7</b>	<b>5444</b>	<b>6.3</b>
7	164	0.2
7W	5280	6.1
<b>Unclassified</b>	<b>790</b>	<b>0.9</b>
<b>Water</b>	<b>7460</b>	<b>8.6</b>
<b>Organic</b>	<b>5225</b>	<b>6.0</b>
<b>Total</b>	<b>86533</b>	<b>100.0</b>

<sup>1</sup> Based on the **dominant** soil series and slope gradient within each polygon.

## Agriculture Capability Map



### Canada Land Inventory Classes



Land Resource Unit  
Brandon Research Centre  
September 1999

### 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.

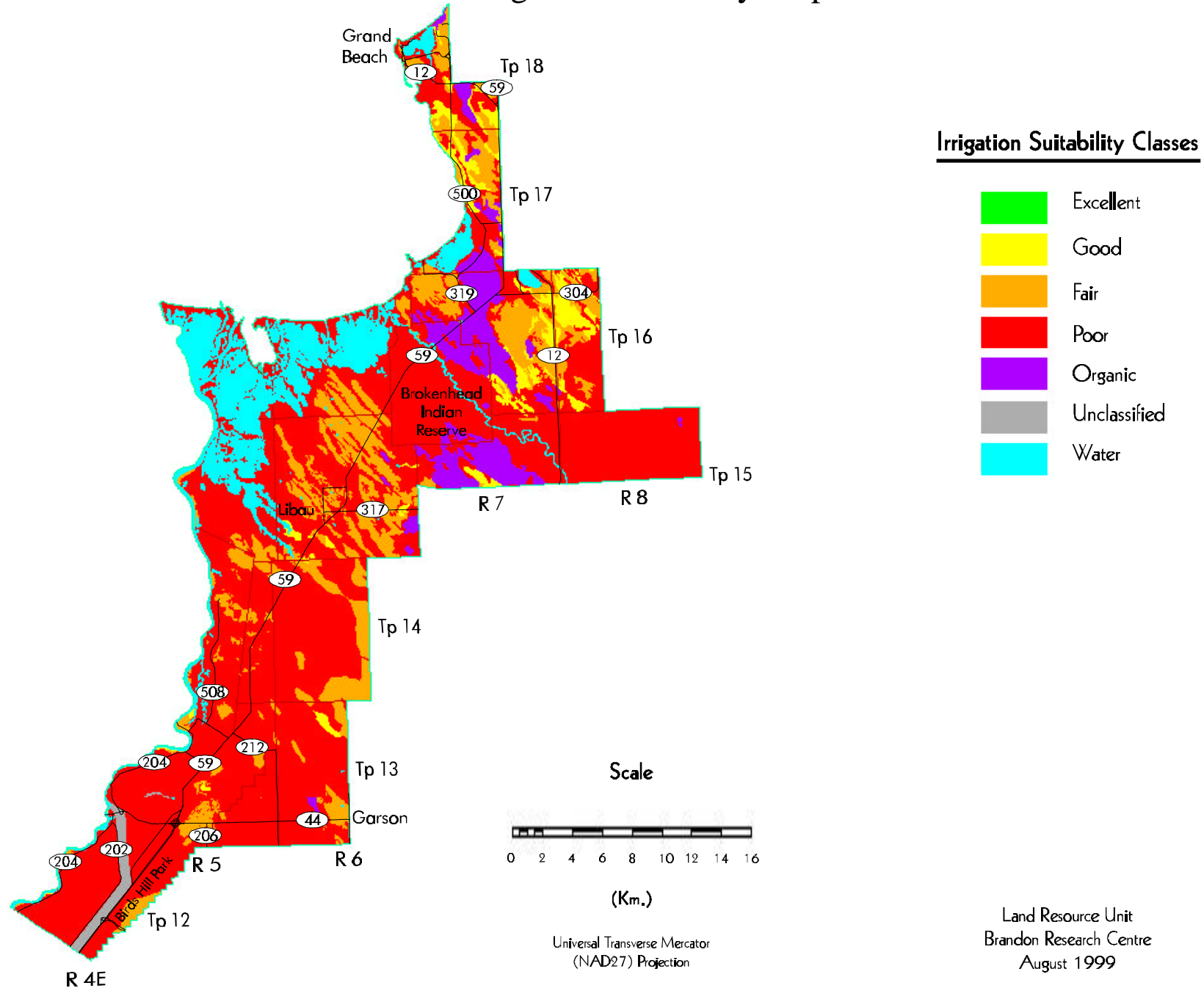
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class. The nature of the subclass limitations and the classification of subdominant components is not shown at this generalized map scale.

**Table 6. Irrigation Suitability<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>3098</b>	<b>3.6</b>
<b>Fair</b>	<b>13573</b>	<b>15.7</b>
<b>Poor</b>	<b>56388</b>	<b>65.2</b>
<b>Organic</b>	<b>5225</b>	<b>6.0</b>
<b>Unclassified</b>	<b>790</b>	<b>0.9</b>
<b>Water</b>	<b>7460</b>	<b>8.6</b>
<b>Total</b>	<b>86533</b>	<b>100.0</b>

<sup>1</sup> 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.

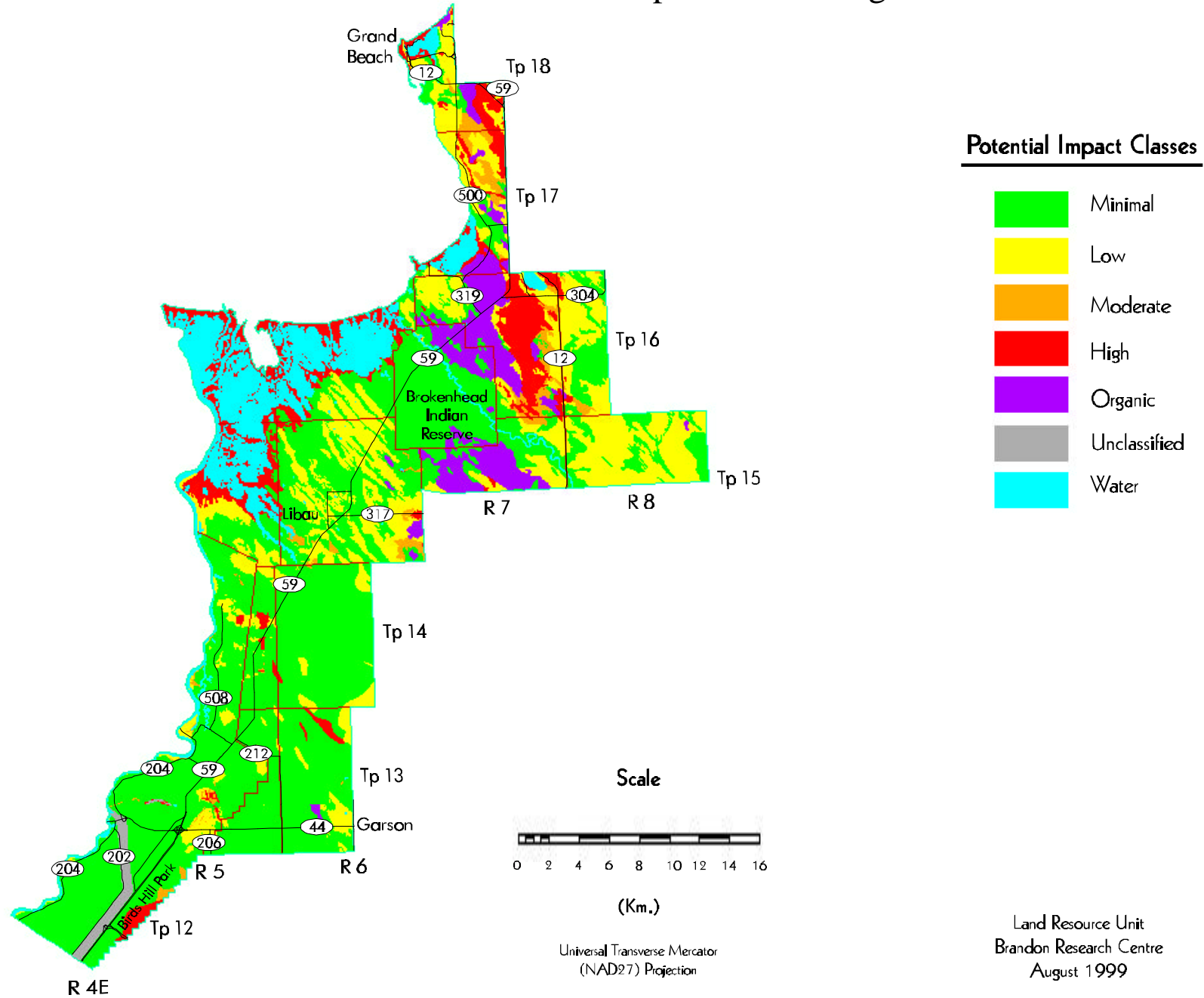
This generalized interpretive map is based on the dominant soil series and slope class for each soil polygon. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

**Table 7. Potential Environmental Impact Under Irrigation<sup>1</sup>**

<b>Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Minimal</b>	<b>44025</b>	<b>50.9</b>
<b>Low</b>	<b>17795</b>	<b>20.6</b>
<b>Moderate</b>	<b>1933</b>	<b>2.2</b>
<b>High</b>	<b>9305</b>	<b>10.8</b>
<b>Organic</b>	<b>5225</b>	<b>6.0</b>
<b>Unclassified</b>	<b>790</b>	<b>0.9</b>
<b>Water</b>	<b>7460</b>	<b>8.6</b>
<b>Total</b>	<b>86533</b>	<b>100.0</b>

<sup>1</sup> Based on the **dominant** soil series and slope gradient within each polygon.

## Potential Environmental Impact Under Irrigation



**Water Erosion Risk Map.**

The risk of water erosion was estimated using the universal soil loss equation (USLE) developed by Wischmeier and Smith (1965). The USLE predicted soil loss (tons/hectare/year) is calculated for each soil component in each soil map polygon. Erosion risk classes are assigned based on the weighted average soil loss for each map polygon. Water erosion risk factors include mean annual rainfall, average and maximum rainfall intensity, slope length, slope gradient, vegetation cover, management practices, and soil erodibility. The map shows 5 classes of soil erosion risk based on bare unprotected soil:

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

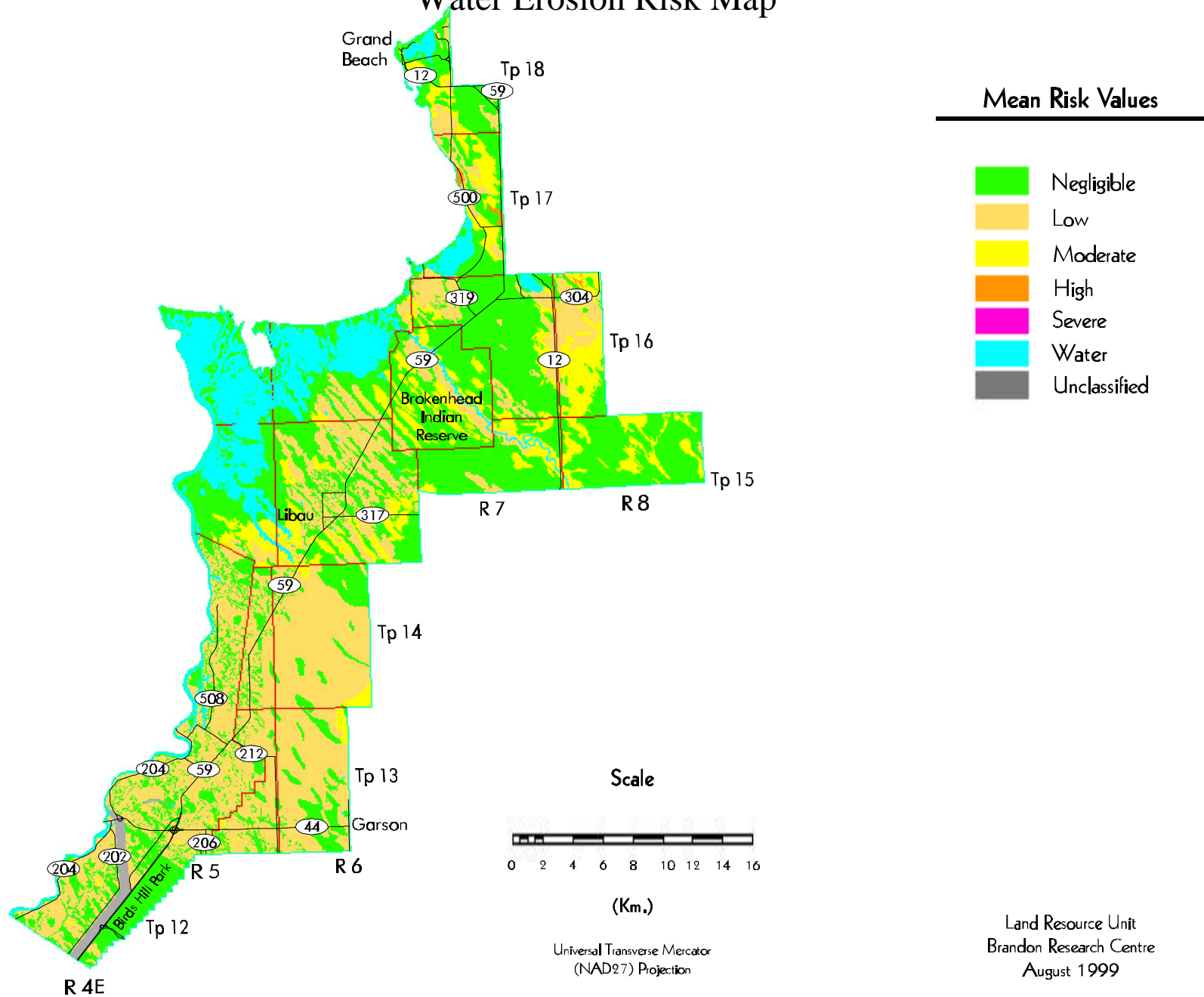
Cropping and residue management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

**Table 8. Water Erosion Risk<sup>1</sup>**

<b>Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Negligible</b>	<b>37512</b>	<b>43.3</b>
<b>Low</b>	<b>30832</b>	<b>35.6</b>
<b>Moderate</b>	<b>9797</b>	<b>11.3</b>
<b>High</b>	<b>143</b>	<b>0.2</b>
<b>Severe</b>	<b>0</b>	<b>0.0</b>
<b>Unclassified</b>	<b>790</b>	<b>0.9</b>
<b>Water</b>	<b>7460</b>	<b>8.6</b>
<b>Total</b>	<b>86533</b>	<b>100.0</b>

<sup>1</sup> 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.

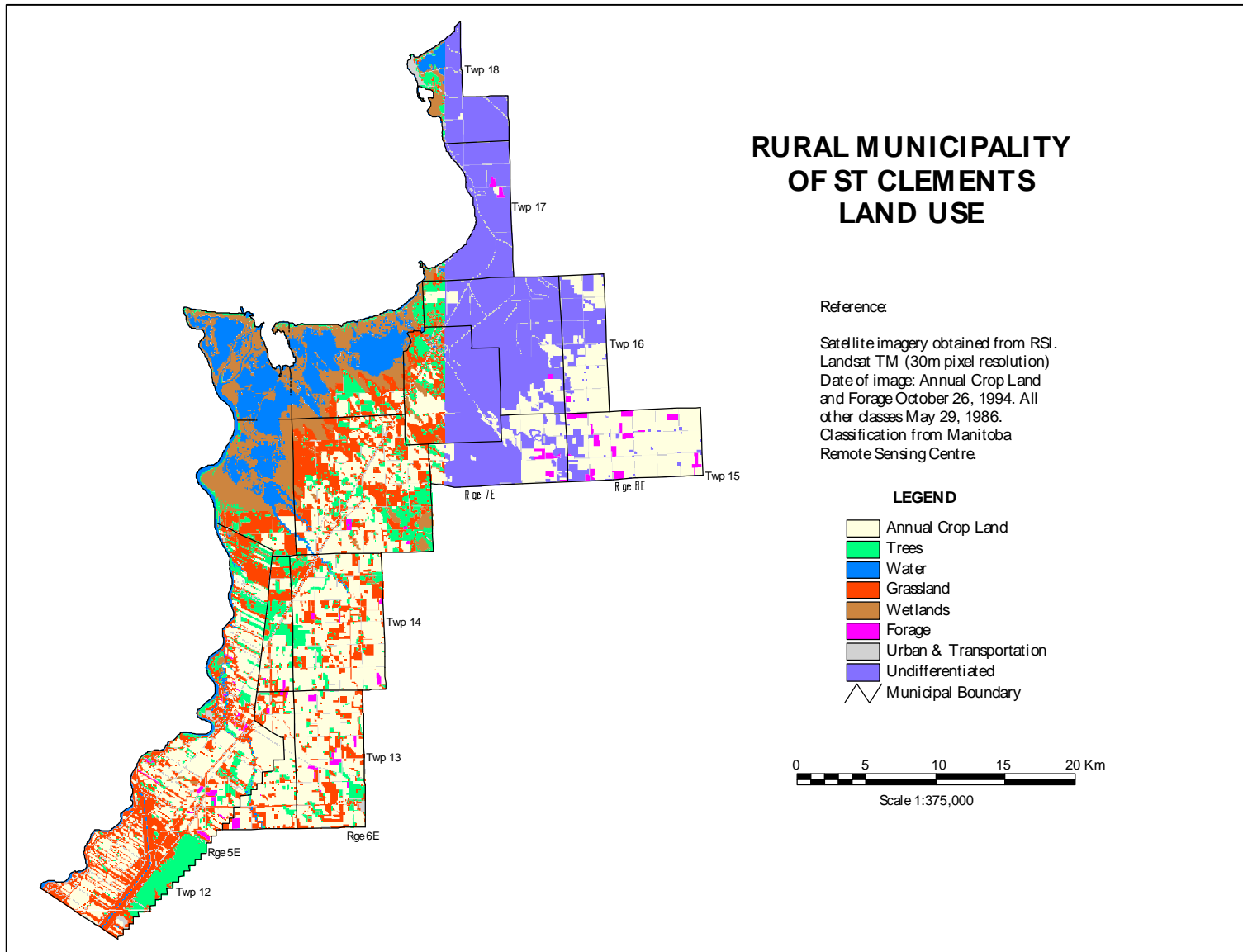
**Water** - open water - lakes, rivers streams, ponds, and lagoons.

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

**Table 9. Land Use<sup>1</sup>**

<b>Class</b>	<b>Area (ha)</b>	<b>Percent of RM</b>
<b>Annual Crop Land</b>	<b>28545</b>	<b>32.9</b>
<b>Forage</b>	<b>1032</b>	<b>1.2</b>
<b>Grasslands</b>	<b>14847</b>	<b>17.1</b>
<b>Trees</b>	<b>7415</b>	<b>8.5</b>
<b>Wetlands</b>	<b>7756</b>	<b>8.9</b>
<b>Water</b>	<b>6938</b>	<b>8.0</b>
<b>Urban and transportation</b>	<b>2778</b>	<b>3.2</b>
<b>Total</b>	<b>86866</b>	<b>100.0</b>

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



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