



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada

Rural Municipality of North Norfolk


Information Bulletin 97-23

Soils and Terrain

An introduction
to the land resource

Land Resource Unit
Brandon Research Centre



Canada 

Rural Municipality of North Norfolk

Information Bulletin 97-23

Prepared by:

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

Department of Soil Science, University of Manitoba.

Manitoba Soil Resource Section,
Soils and Crops Branch, Manitoba Agriculture.

Printed in 1997

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

Manitoba Land Resource Unit
Room 360 Ellis Bldg, University of Manitoba,
Winnipeg, Manitoba R3T 2N2
Phone: 204-474-6118 FAX: 204-275-5817.

CITATION

Manitoba Land Resource Unit, 1997. Soils and Terrain. An Introduction to the Land Resource. Rural Municipality of North Norfolk. Information Bulletin 97-23, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada

ACKNOWLEDGEMENTS

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

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

Managerial and administrative support was provided by:

R.G. Eilers, Head, Manitoba Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada.

G.J. Racz, Head, Dept. of Soil Science, University of Manitoba.

F. Wilson, Manager, Manitoba Land and Soil Programs, PFRA, Agriculture and Agri-Food Canada.

G.F. Mills, Manitoba Soil Resource Section, Soils and Crops Branch, Manitoba Agriculture.

K.S. McGill, Chief, Land Utilization and Soil Survey, Soils and Crops Branch, Manitoba Agriculture.

Technical support was provided by:

G.W. Lelyk, Manitoba Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada.

J. Fitzmaurice, N. Lindberg, A. Waddell, M. Fitzgerald and S. Grift, Dept. of Soil Science, University of Manitoba.

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

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

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

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

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

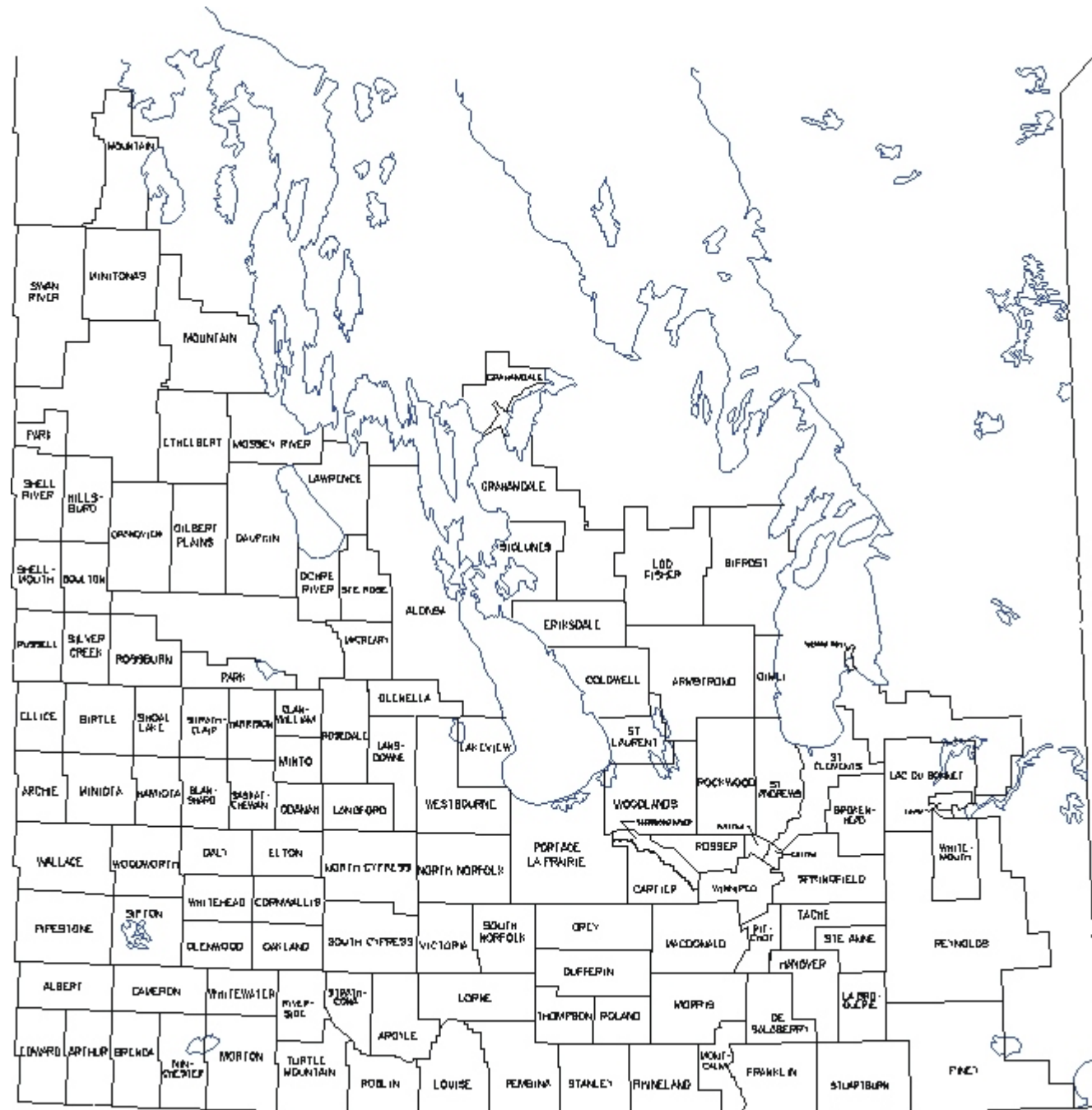


Figure 3. Rural municipalities in southern Manitoba with digital soil and terrain map information.

INTRODUCTION

The location of North Norfolk municipality is shown in Figure 1. The soil information was derived from a detailed (1:20 000 scale) survey, (Soils of the Rural Municipality of North Norfolk, Report D80, Podolsky 1991). A brief overview of the database information assembled, and general environmental conditions is presented. A set of maps derived from the data for typical agricultural land use and planning applications is also included.

The soil map and database was 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.

LAND RESOURCE DATA

The soil and terrain (landscape) 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.

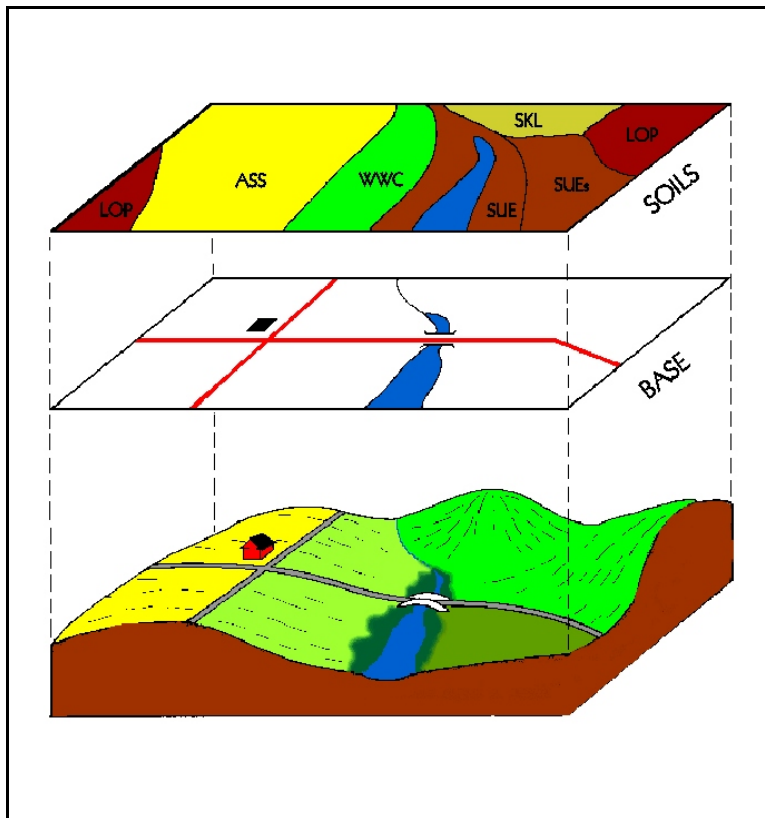


Figure 2. Soil and Base Map data.

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 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. The soil was added and aligned ("georeferenced") to the digital base map.

A comprehensive detailed (1:20 000 scale) soil map (Podolsky, 1991), was 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 erosion, slope, stoniness, and salinity classes. Soil database information was produced for each polygon, to meet national standards (MacDonald and Valentine, 1992). Slope length classes were added, based on photo-interpretation.

Each soil polygon on the map was assigned the following legend characteristics:

- soil series
- modifier codes
- soil phases
- polygon number.

The soil and modifier codes provide a link to additional databases of soil properties. In this way, soil map polygons were related to soil drainage, surface texture, and other properties to produce the generalized, derived, and interpretative maps presented in this bulletin.

LAND RESOURCE OVERVIEW

The Rural Municipality of North Norfolk covers 12.0 Townships (approximately 116 000 ha) in south-central Manitoba. The towns of MacGregor and Austin are the largest population centres in the municipality.

Soils in the municipality of North Norfolk have been recently mapped at a scale of 1:20 000 and published in *Soils of the Municipality of North Norfolk*, Report D80 (Podolsky, 1991).

There are no continuous climatic station within the RM of North Norfolk. However, there are several climatic stations within the surrounding areas. Based on climatic data from Carberry (Environment Canada, 1993), the mean annual temperature is 2.1°C; mean annual precipitation is 472.3 mm; degree days above 5°C is 1726.9; and the mean frost-free period is 117 days (Environment Canada, 1982). The seasonal moisture deficit for the period May to September is 250 mm; effective growing degree days (EGDD) above 5°C for the same period is 1500 to 1600. This parameter provides an indication of heat energy available for crop growth (Agronomic Interpretations Working Group, 1995). These conditions are generally adequate for cereal crop production.

The relief in North Norfolk Municipality ranges from 259 m (a.s.l.) in the extreme northeast corner to 373-381 m (a.s.l.) in the south-western corner. The Manitoba Escarpment transects the map area approximately along the 335 m contour trending in a southeasterly to northwesterly direction (Podolsky, 1991).

North Norfolk can be divided into three separate physiographic regions (Upper Assiniboine Delta, Lower Assiniboine Delta and the Red River Valley). The Upper Assiniboine Delta occupies the south west corner of the RM where a large area of deltaic sands were deposited where the Assiniboine River entered the former glacial lake Agassiz. The Upper Assiniboine Delta is characterized by level terrain and sandy textured fluvial outwash deposits and loamy textured deltaic and lacustrine sediments associated with Lake Agassiz. Most of the coarse sandy deposits have been modified by wind and are in the form of stabilized dunes with relief up to 20 m

and steep slopes up to 30%. The dominant soils in this portion of the RM are Black Chernozems developed on well to imperfectly drained sandy to loamy sediments. Orthic Regosols occur on the rapidly to well drained duned sands.

Within the Upper Assiniboine Delta, soils have been mainly described as Shilox, Dobbin, Halstead, and Firdale. Shilox soils (Regosols) are found in areas where duned sands are common. On wooded gently undulating landscapes adjacent to the eolian sands the Dobbin (Dark Grey Chernozem) soil series is common. Level to gently undulating lacustrine sands to loams not affected by eolian processes, are generally mapped as Halstead and Firdale series (Dark Gray Chernozems).

Gently undulating lacustrine sands within the Upper Assiniboine Delta are usually rated class 3 and 4 for dryland agriculture due to their low water holding capacity. These soils are generally rated fair to poor for irrigation due to topography and water holding capacity.

The duned areas are mainly used as park land for recreation and wildlife. Agriculture capability is class 6 and 7 and the soils are generally unsuitable for irrigation due to low water retention and steep topography. These lands are highly sensitive. They are very susceptible to wind erosion if surface vegetation is disturbed. These soils also have a high potential for adverse environmental impact under poor management.

The Upper and Lower Assiniboine Deltas are separated by the Escarpment which extends from the south east corner to the north west corner of the RM. The escarpment steeply slopes to the northeast and is dissected by many gullies which often contain small creeks or streams. The lower Assiniboine delta immediately below the escarpment, is characterized by level to gently undulating lacustrine sands overlying fine textured materials at depths of 3 to 4m. Soils in this area are dominantly imperfectly drained Black Chernozems (Almassippi, Willowcrest, St. Claude, and Neuenberg) with inclusions of poorly drained Rego Humic Gleysols (Lelant and Blumenfeld). Stream channel sediments within the lower Assiniboine delta are commonly mapped as imperfectly to poorly

drained Regosols (Gervais and Willowbend). All soils in this area are affected by high water tables.

Capability for dryland agricultural is class 3 and 4 for the imperfectly drained sites and class 5 or 6 in the poorly drained locales. The lower Assiniboine delta is generally suitable for irrigation, however, the high water tables and rapid permeability results in a high potential for adverse environmental impact from irrigation. These soils are also very susceptible to wind erosion and proper management of crop residues is needed. Stream channel soils in the lower Assiniboine delta have a agricultural capability of class 5 and 6 and generally are not suited for irrigation.

The Red River Valley occupies the extreme Northeast corner of the RM. This area is comprised of nearly level deltaic-lacustrine loams and lacustrine clays. This area is dominantly imperfectly drained Black Chernozemic loams (Graysville, and Rignold) and clays (Red River, Deadhorse, Scantbury). Poorly drained sites have been mapped as Osborne series (Rego Humic Gleysol).

Soils in this area generally have a Agricultural capability for dryland agriculture of class 2 for the imperfectly drained areas and the poorly drained areas are rated at class 3. Due to poor drainage, irrigation suitability in this region is fair to poor.

Land use in the RM of North Norfolk, is primarily agricultural with small areas of woodland, pasture, urban development and recreation. Below the Manitoba Escarpment, land use is dominantly intensive agriculture consisting of cereal grains and special crops. However, sandy deposits of lower agricultural potential are utilized for livestock, forage crops and woodlots. These considerable acreages of sandy soils are subject to wind erosion requiring conservation practises such as wind breaks, summerfallow reduction and maintenance of stubble residue to minimize soil loss (Podolsky, 1991).

Above the Escarpment, in dissected areas of this hummocky landscape, livestock, associated pasture and forage crops and woodlots are the dominant land use. In areas of more gentle relief

cereal crops as well as special crops are more common (Podolsky, 1991).

DERIVED AND INTERPRETIVE MAPS

A large variety of computer derived and interpretive maps can be generated, once the soil and landscape data are stored in digital format. 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 surface soil texture, drainage, salinity, or slope class).

Interpretive maps portray more complex land evaluations based on information presented in the legend. 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 included in this information bulletin.

Derived Maps

Slope Classes

Surface Texture

Soil Drainage

Soil Salinity

Management Considerations

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 scales 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 and complexity 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 R.M.. Additional slope classes may occur in each polygon area, but cannot be portrayed at this reduced map scale.

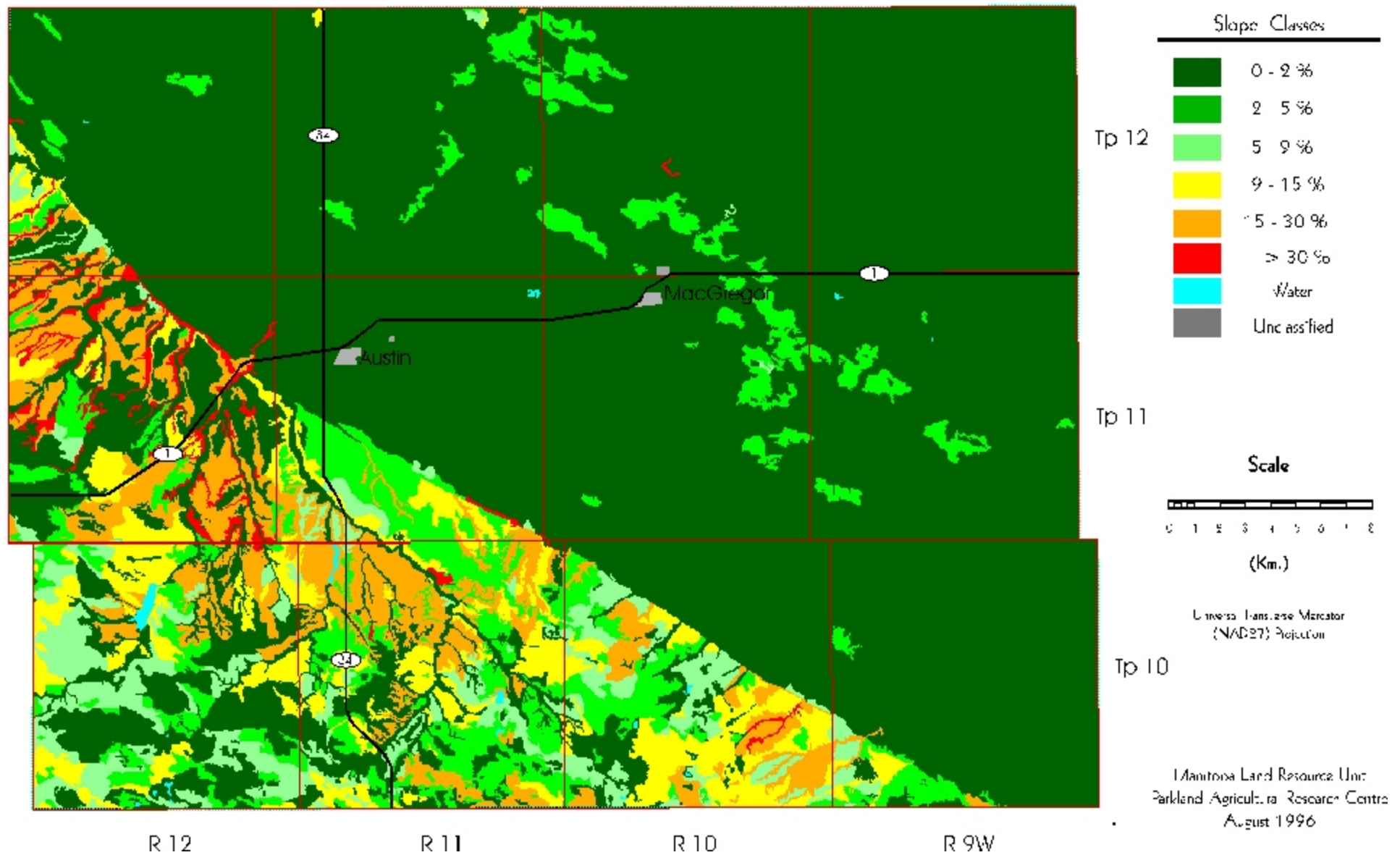
Table 1. Slope Classes¹

Slope Class	Area (ha)	Percent of RM
0 - 2 %	84586	72.8
2 - 5 %	10097	8.7
5 - 9 %	5518	4.7
9 - 15 %	6978	6.0
15 - 30 %	7677	6.6
> 30 %	1231	1.1
Unclassified	15	0.0
Water	148	0.1
Total	116251	100.0

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

Rural Municipality of North Norfolk

Slope Map



Surface Texture Map.

The soil textural class for the upper most soil horizon of the dominant soil series within a soil polygon was utilized for classification. Texture may vary from that shown with soil depth and location within the polygon.

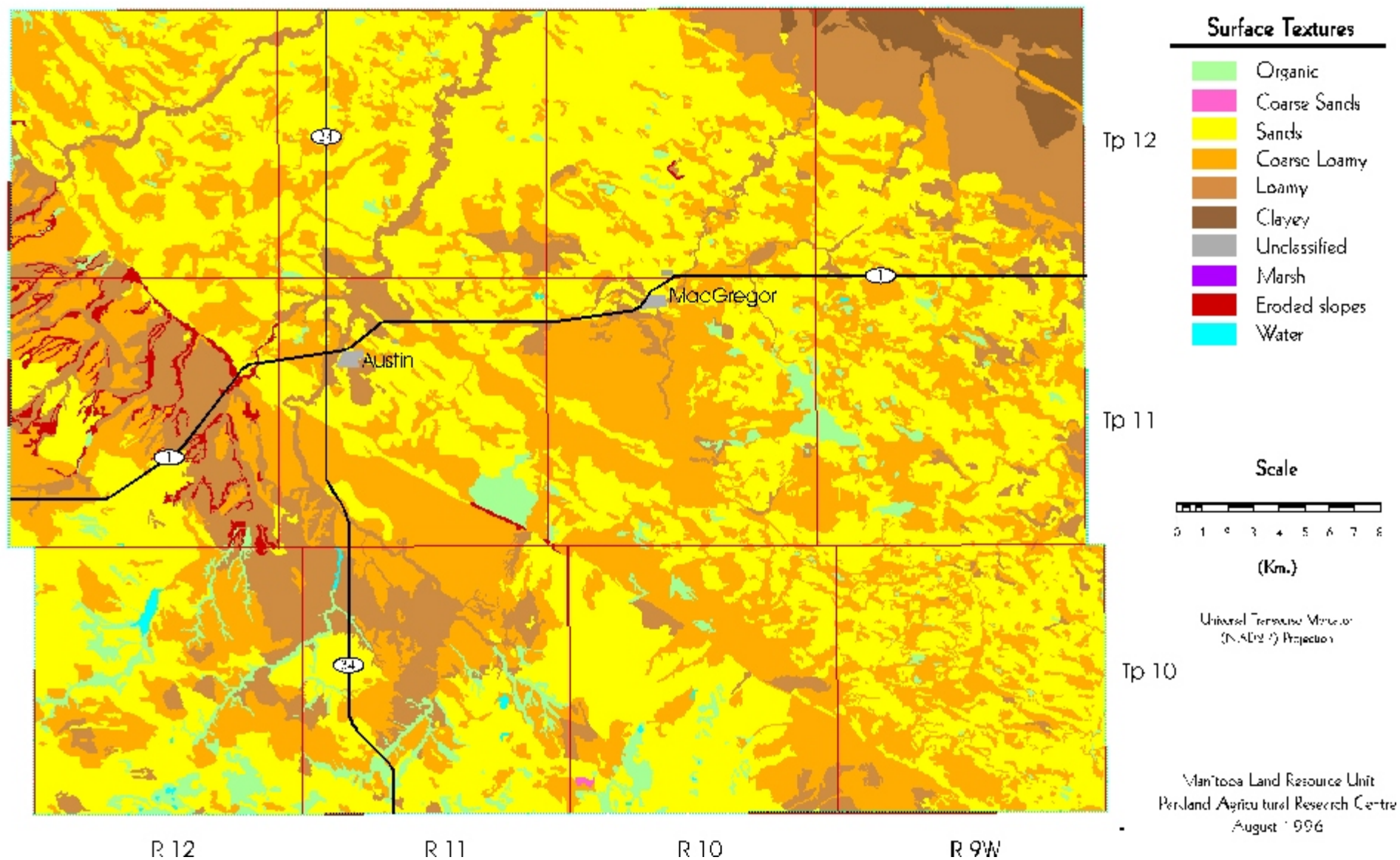
Table 2. Surface Texture¹

Surface Texture	Area (ha)	Percent of RM
Organics	3859	3.3
Coarse Sands	15	0.0
Sands	54184	46.6
Coarse Loamy	38873	33.4
Loamy	16226	14.0
Clayey	1826	1.6
Eroded Slopes	1105	1.0
Marsh	0	0.0
Unclassified	15	0.0
Water	148	0.1
Total	116251	100.0

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

Rural Municipality of North Norfolk

Surface Texture 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. Drainage classification was based upon the dominant soil series of each individual soil polygon. A description of the various soil drainage classes can be found in Soils of the Rural Municipality of North Norfolk, Report No. D80 (Podolsky, 1991).

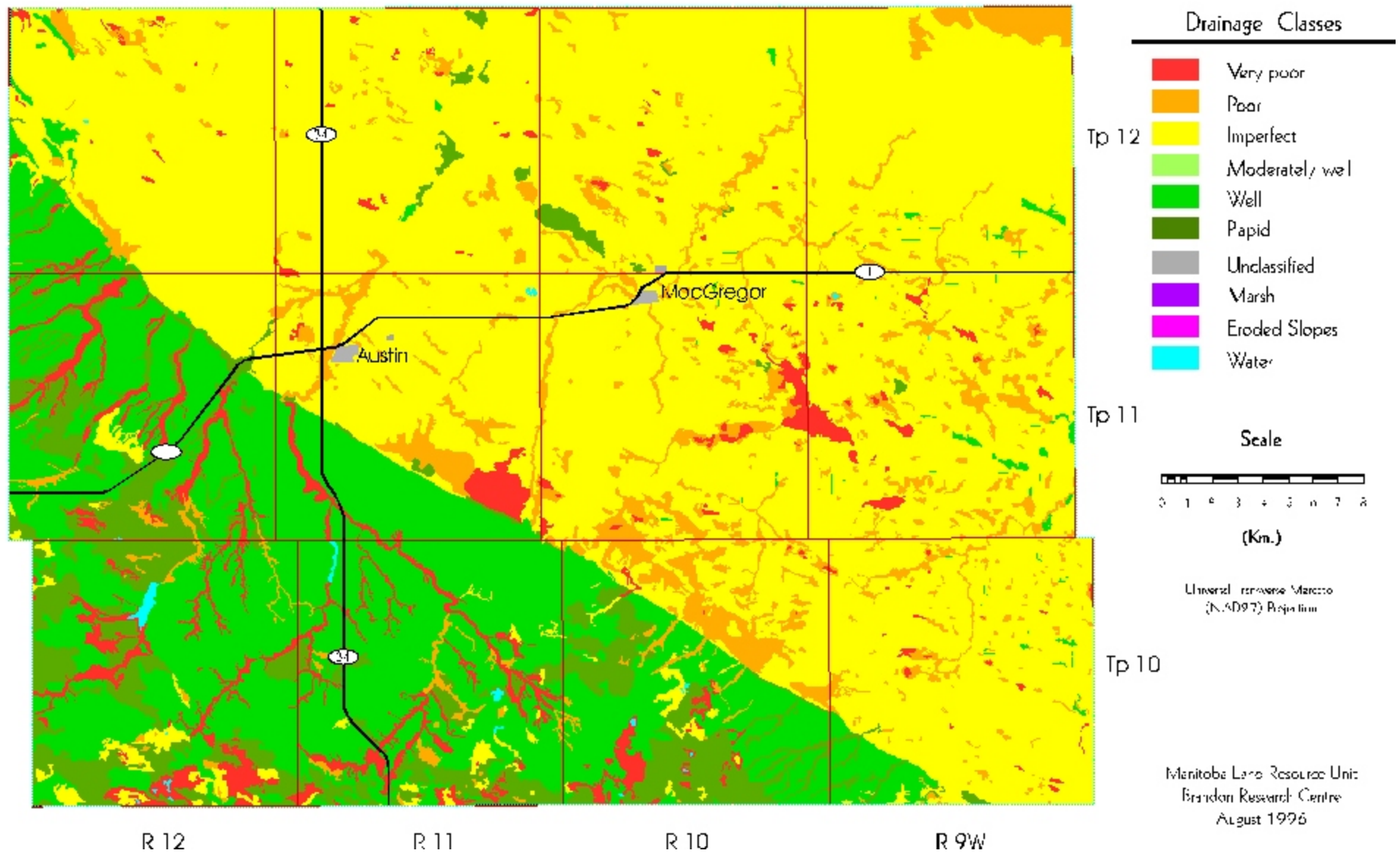
Table 3. Drainage Classes¹

Drainage Class	Area (ha)	Percent of RM
Very Poor	4941	4.3
Poor	8285	7.1
Imperfect	68485	58.9
Moderately Well	0	0.0
Well	25669	22.1
Rapid	8708	7.5
Eroded Slopes	0	0.0
Marsh	0	0.0
Unclassified	15	0.0
Water	148	0.1
Total	116251	100.0

¹ Area has been assigned to the **dominant** drainage class for each soil polygon.

Rural Municipality of North Norfolk

Soil Drainage Map



Soil Salinity Map.

A saline soil contains soluble salts in such quantities that they interfere with the growth of most crops. Soil salinity is determined by the electrical conductivity of the saturation extract in decisiemens per metre (dS/m). Approximate limits of salinity classes are:

non-saline	0 to 4 dS/m
slightly saline	4 to 8 dS/m
moderately saline	8 to 16 dS/m
strongly saline	> 16 dS/m

The salinity classification of each individual soil polygon was determined by the most severe salinity classification present within that polygon.

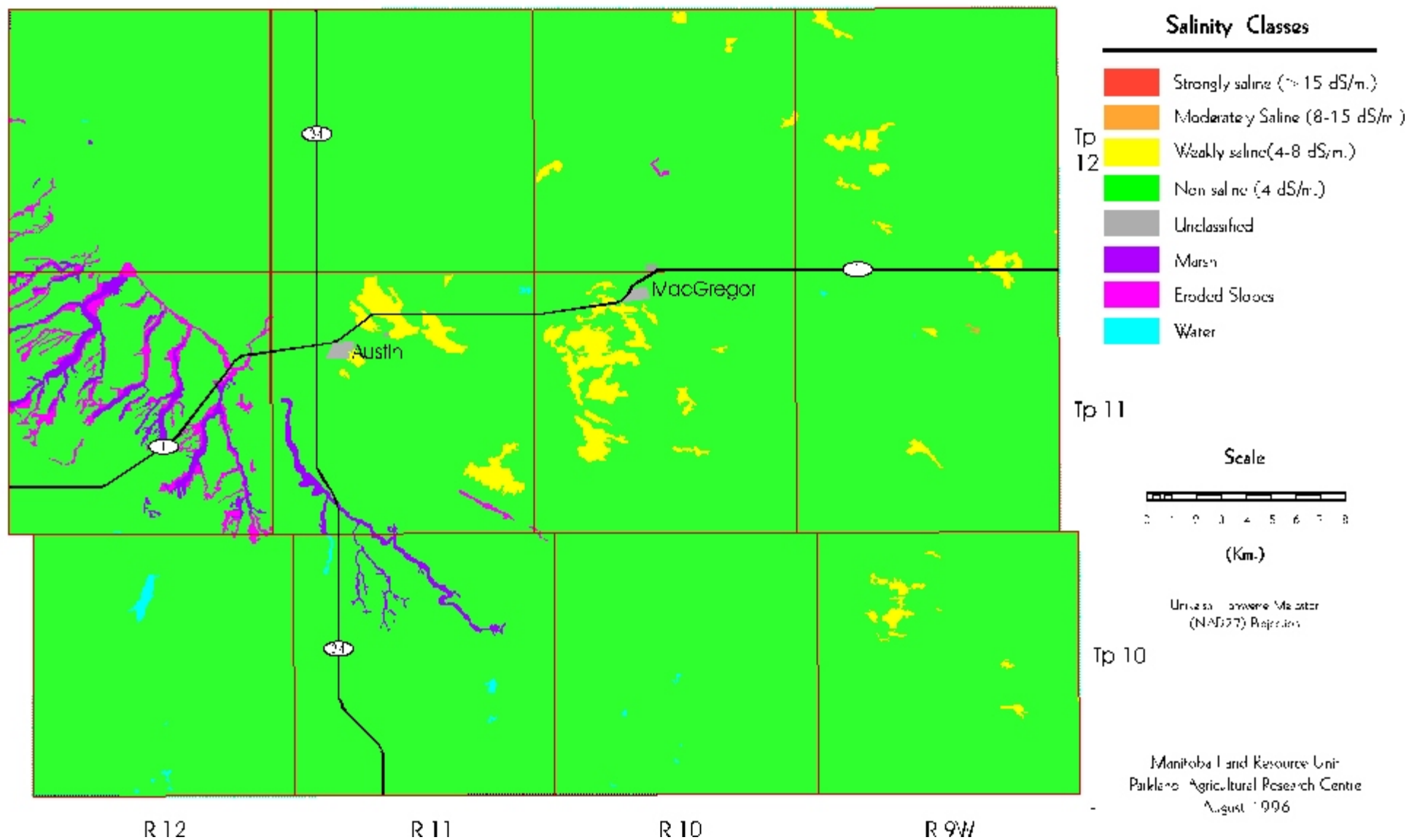
Table 4. Salinity Classes¹

Salinity Class	Area (ha)	Percent of RM
Non Saline	110227	94.8
Weakly Saline	3561	3.1
Moderately Saline	7	0.0
Strongly Saline	0	0.0
Eroded Slopes	1105	1.0
Marsh	1188	1.0
Unclassified	15	0.0
Water	148	0.1
Total	116251	100.0

¹ Area has been assigned to the dominant salinity class for each soil polygon.

Rural Municipality of North Norfolk

Soil Salinity 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 that have **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 crops. They require special cropping and management practices to sustain agricultural production.

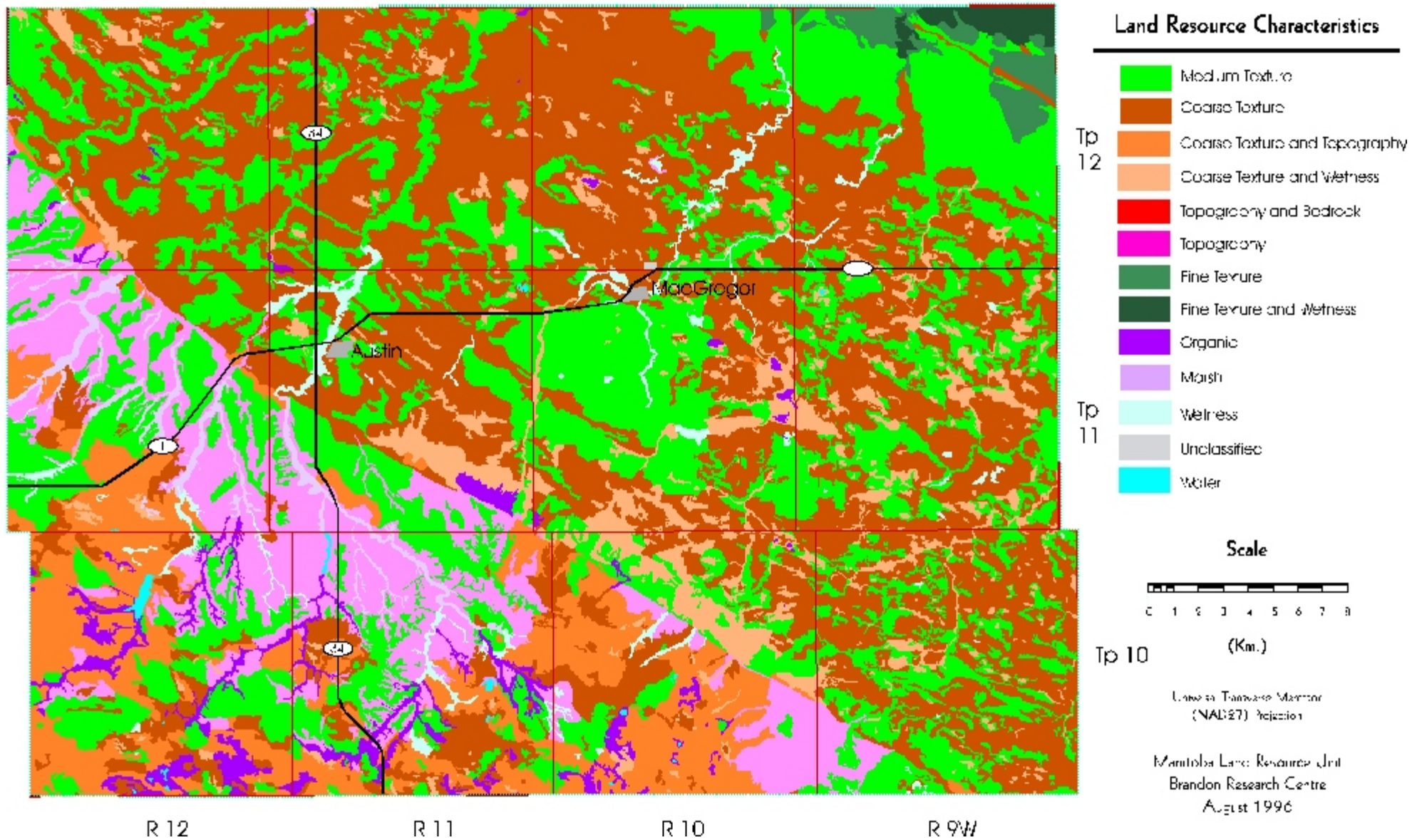
Table 5. Management Considerations¹

Land Resource Characteristics	Area (ha)	Percent of RM
Fine Texture	1241	1.1
Fine Texture and Wetness	585	0.5
Fine Texture and Topography	0	0.0
Fine Texture, Wetness and Topography	0	0.0
Medium Texture	35014	30.1
Coarse Texture	45202	38.9
Coarse Texture and Wetness	7215	6.2
Coarse Texture and Topography	10489	9.0
Coarse Texture, Wetness and Topography	0	0.0
Topography	10916	9.4
Topography and Bedrock	0	0.0
Wetness	1772	1.5
Wetness and Topography	0	0.0
Bedrock	0	0.0
Organic	2466	2.1
Marsh	1188	1.0
Unclassified	15	0.0
Water	148	0.1
Total	116251	100.0

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

Rural Municipality of North Norfolk

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	6379	5.5
2	9323	8.0
2I	26	0.0
2M	5165	4.4
2MT	194	0.2
2T	314	0.3
2TI	8	0.0
2TW	41	0.0
2W	3502	3.0
2X	73	0.1
3	57683	49.6
3I	1267	1.1
3M	40638	34.9
3ME	54	0.0
3MT	1157	1.0
3N	1748	1.5
3NW	111	0.1
3T	249	0.2
3TE	6	0.0
3W	12452	10.7

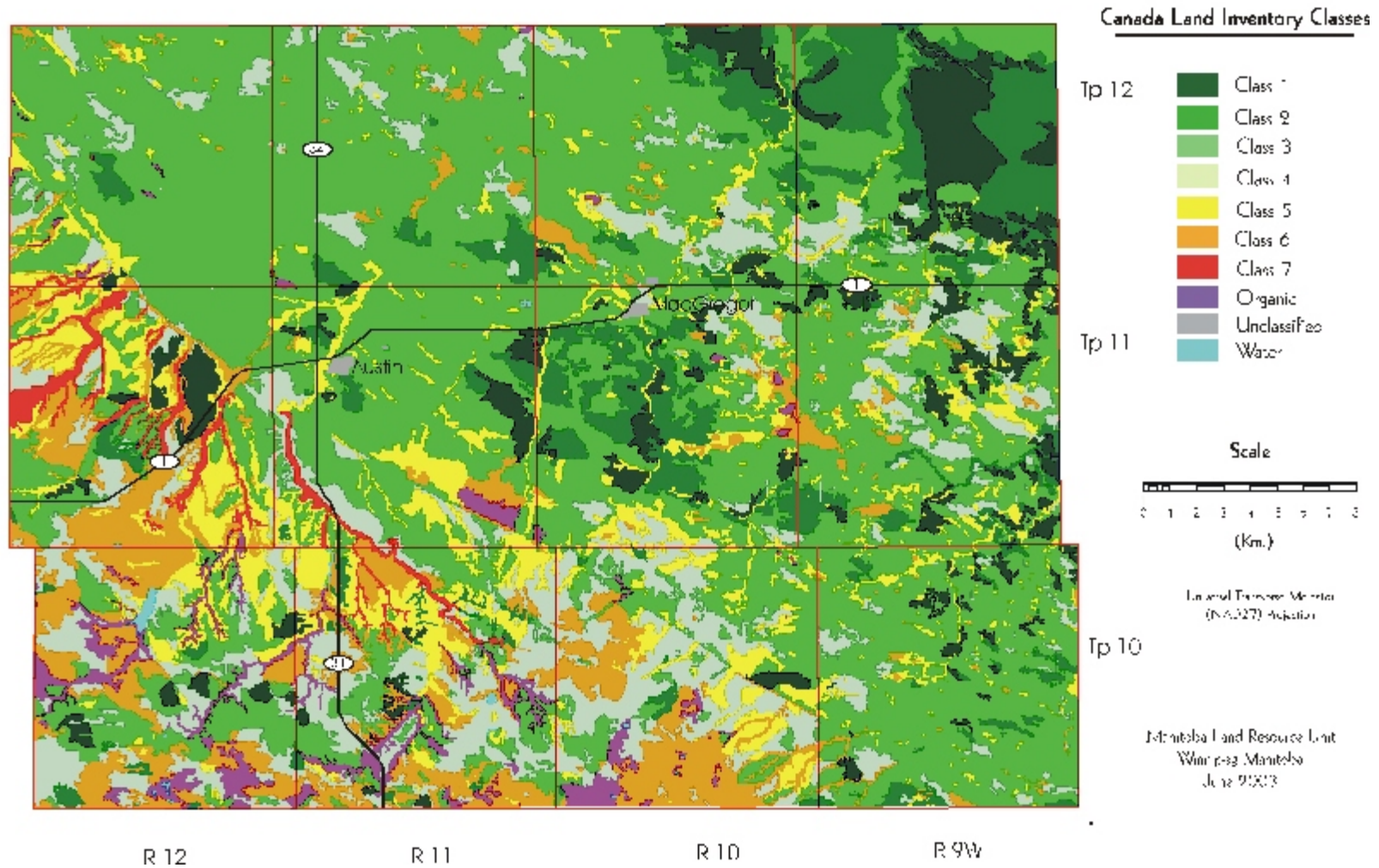
Table 6 (cont). Agricultural Capability¹

4	16079	13.8
4EM	71	0.1
4ET	8	0.0
4M	10261	8.8
4ME	1173	1.0
4MT	1156	1.0
4N	7	0.0
4T	1664	1.4
4TE	763	0.7
4TI	13	0.0
4W	962	0.8
5	12231	10.5
5	5	0.0
5EM	180	0.2
5ET	264	0.2
5M	68	0.1
5ME	79	0.1
5T	2707	2.3
5TE	2176	1.9
5W	6011	5.2
5WI	741	0.6
6	11166	9.6
6ET	832	0.7
6M	7111	6.1
6ME	48	0.0
6MT	38	0.0
6T	1785	1.5
6TE	42	0.0
6W	1309	1.1
7	907	0.8
7W	907	0.8
Unclassified	15	0.0
Water	149	0.1
Organic	2471	2.1
Total	116404	100.0

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

Rural Municipality of North Norfolk

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 limitation 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.

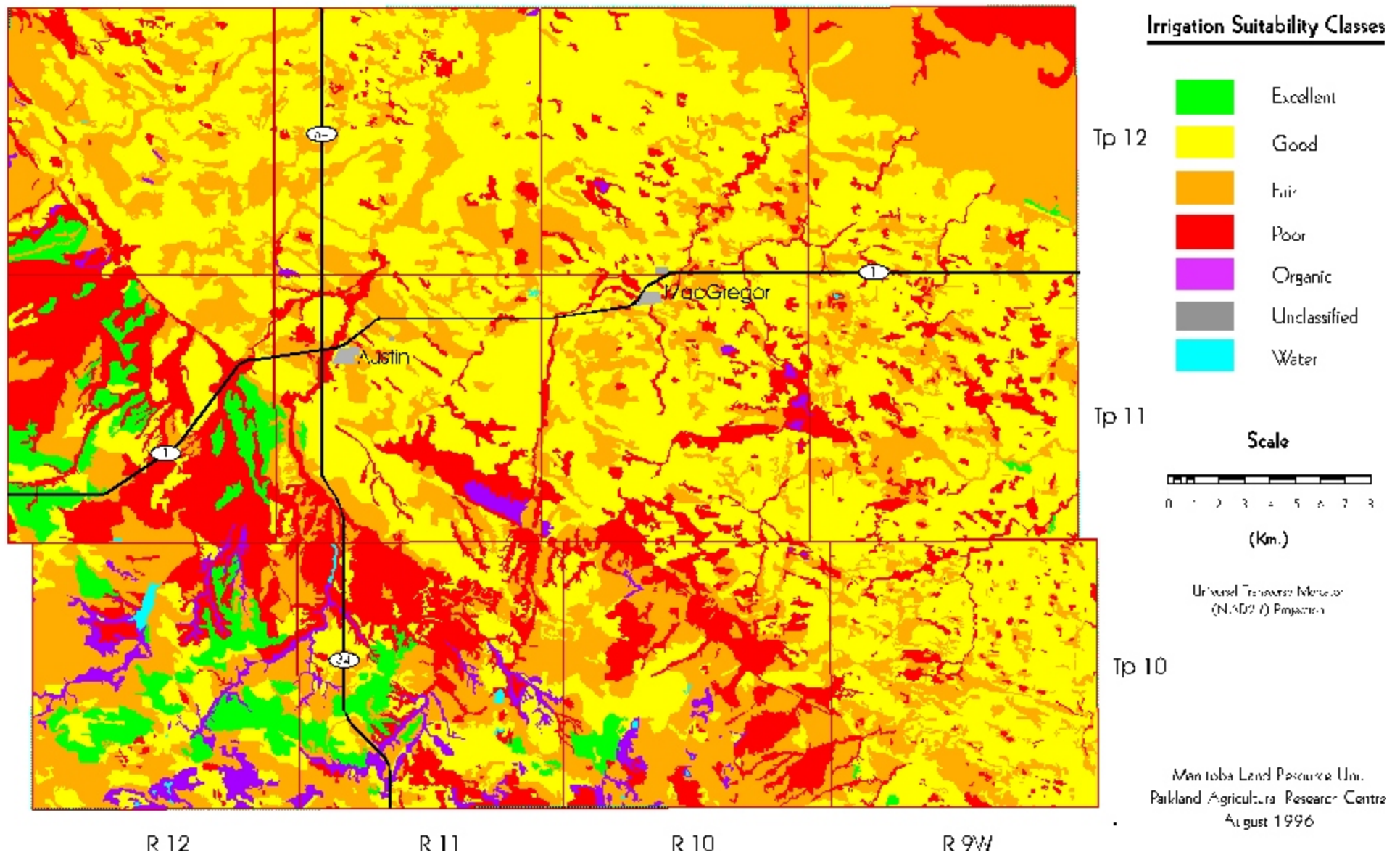
Table 7. Irrigation Suitability¹

Class	Area (ha)	Percent of RM
Excellent	4348	3.7
Good	54119	46.6
Fair	34894	30.0
Poor	20261	17.4
Organic	2466	2.1
Unclassified	15	0.0
Water	148	0.1
Total	116251	100.0

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

Rural Municipality of North Norfolk

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.

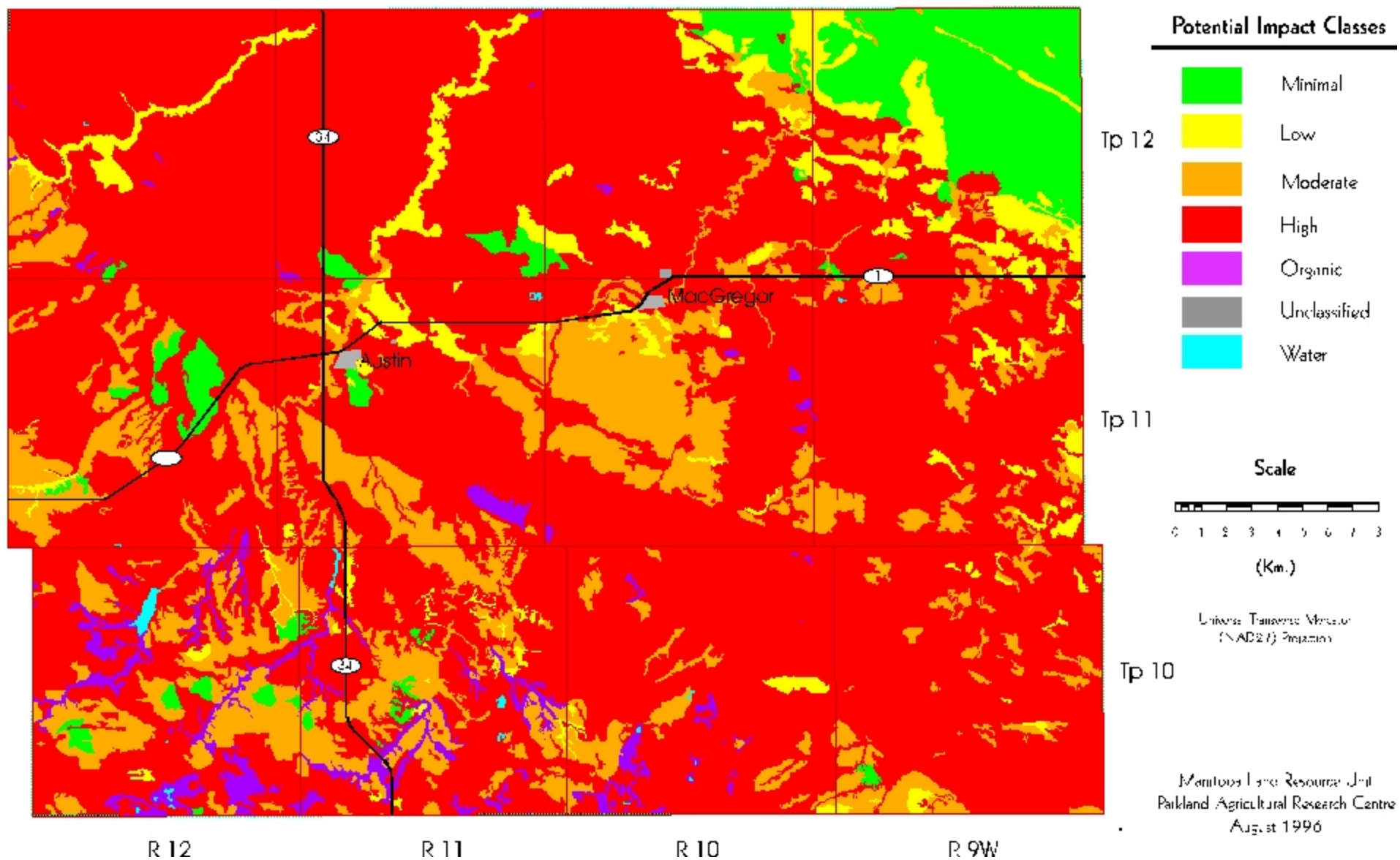
Table 8. Potential Environmental Impact Under Irrigation¹

Class	Area (ha)	Percent of RM
Minimal	6903	5.9
Low	6081	5.0
Moderate	17717	15.2
High	82922	71.3
Organic	2466	2.1
Unclassified	15	0.0
Water	148	0.1
Total	116251	100.0

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

Rural Municipality of North Norfolk

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.

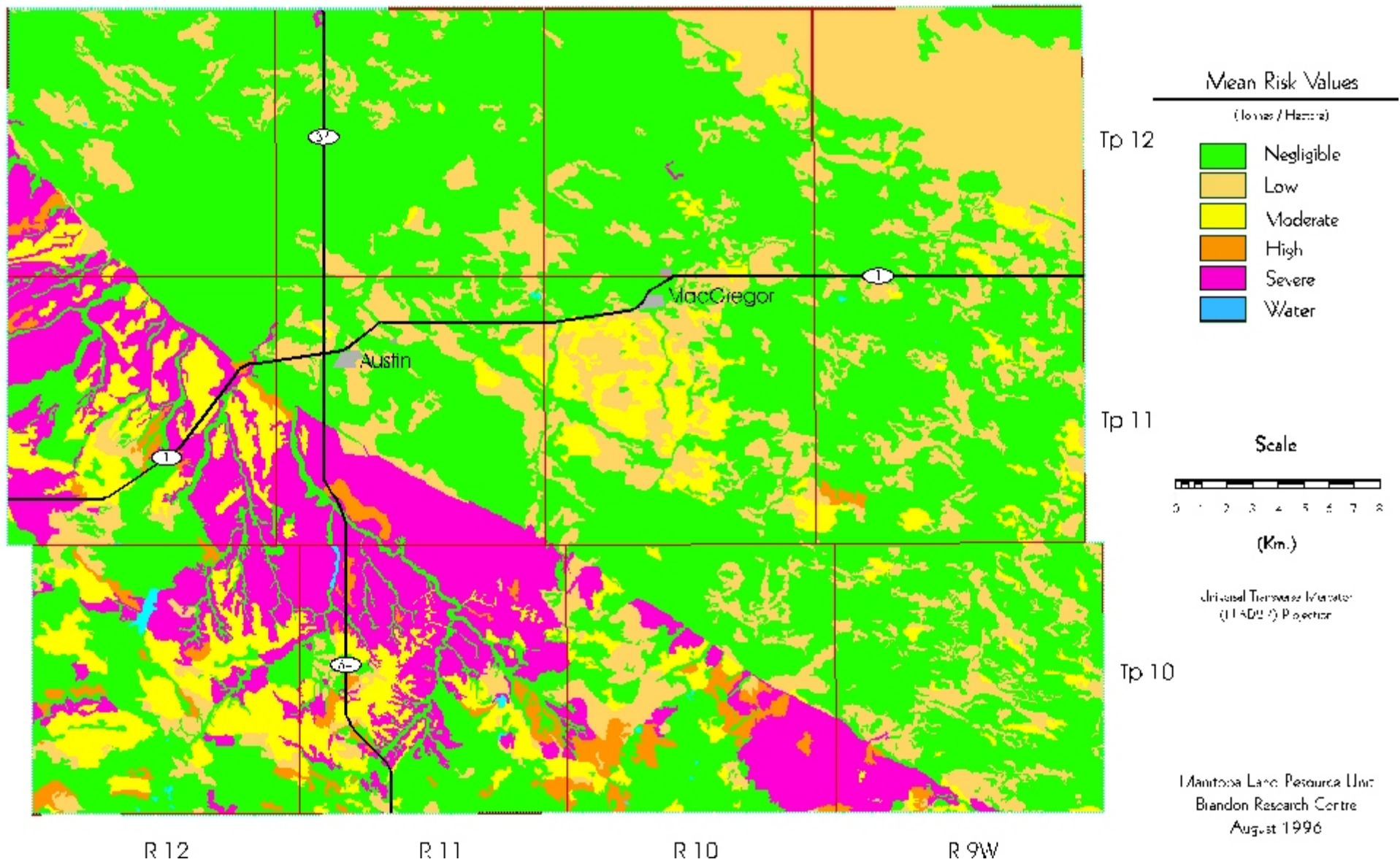
Table 9. Water Erosion Risk¹

Class	Area (ha)	Percent of RM
Negligible	65767	56.6
Low	22570	19.4
Moderate	10549	9.1
High	2479	2.1
Severe	14723	12.7
Unclassified	15	0.0
Water	148	0.1
Total	116251	100.0

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

Rural Municipality of North Norfolk

Water Erosion Risk Map



Land Use Map.

The land use classification of the R.M. 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 R.M..

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.

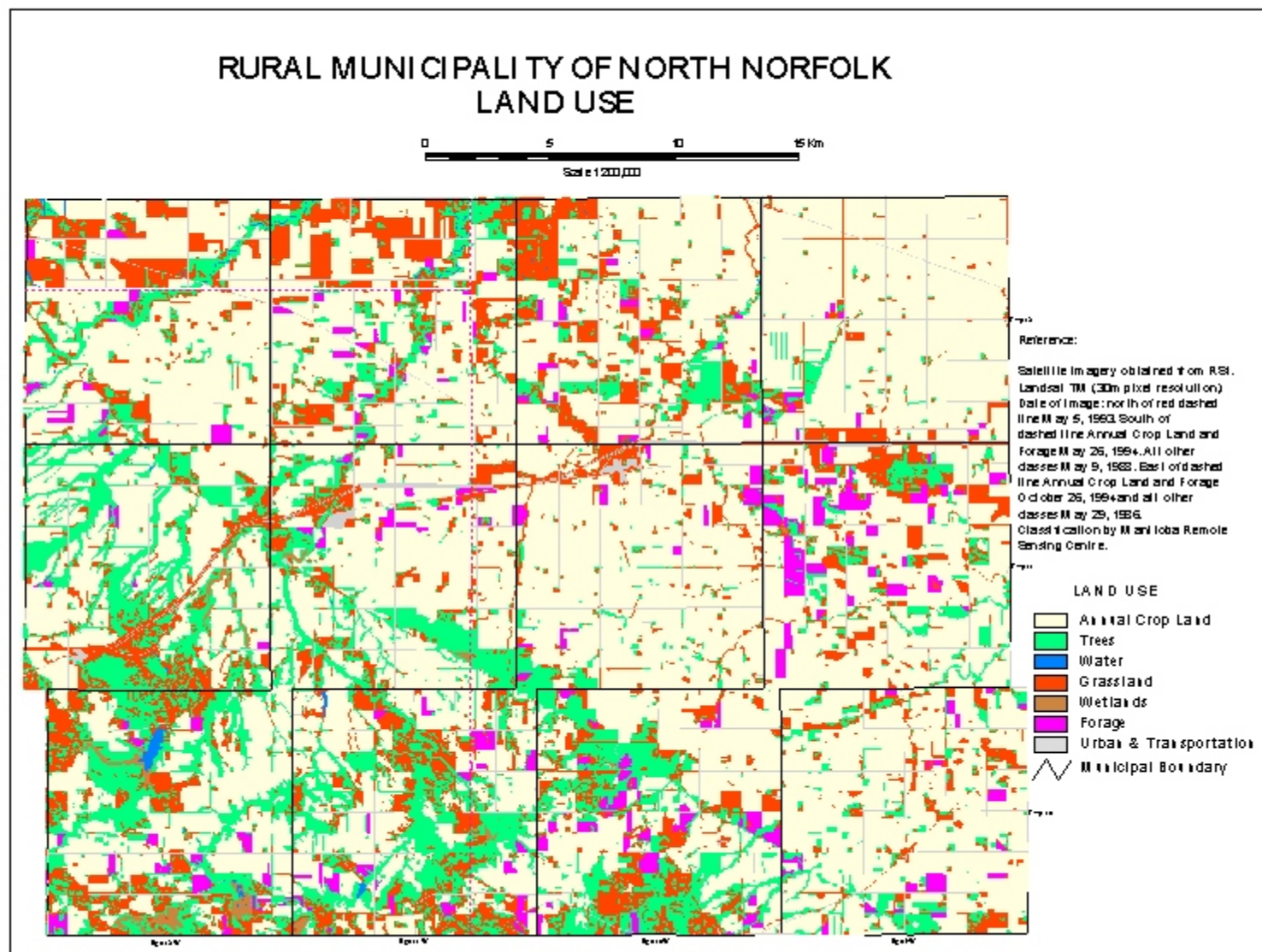
Water - open water, lakes, rivers streams, ponds, and lagoons.

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

Table 10. Land Use¹

Class	Area (ha)	Percent of RM
Annual Crop Land	71618	61.2
Forage	9264	3.2
Grasslands	43940	15.2
Trees	19073	16.3
Wetlands	582	0.5
Water	202	0.2
Urban and Transportation	4020	3.4
Total	117026	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.



REFERENCES

Agronomic Interpretations Working Group. 1995. Land Suitability Rating System for Agricultural Crops: 1. Spring-seeded Small Grains. Edited 1992 Working Document. Centre for Land and Biological Resources Research, Agric. Can., Ottawa. 84 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.

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. 1996. Soil and Terrain Classification System Manual. In preparation. Ellis Bldg. University of Manitoba. Winnipeg.

Podolsky I. G., 1991. Soils of the Rural Municipality of North Norfolk. Report No. D80. 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.

