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Rural Municipality of Woodworth

Information Bulletin 96-13

Soils and Terrain

An introduction
to the land resource

Land Resource Unit
Brandon Research Centre

Canada

Rural Municipality of Woodworth

Information Bulletin 96-13

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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 and terrain databases, and illustrate several typical derived map products for agricultural land use planning applications. The bulletins will also be available in diskette format for selected rural municipalities.

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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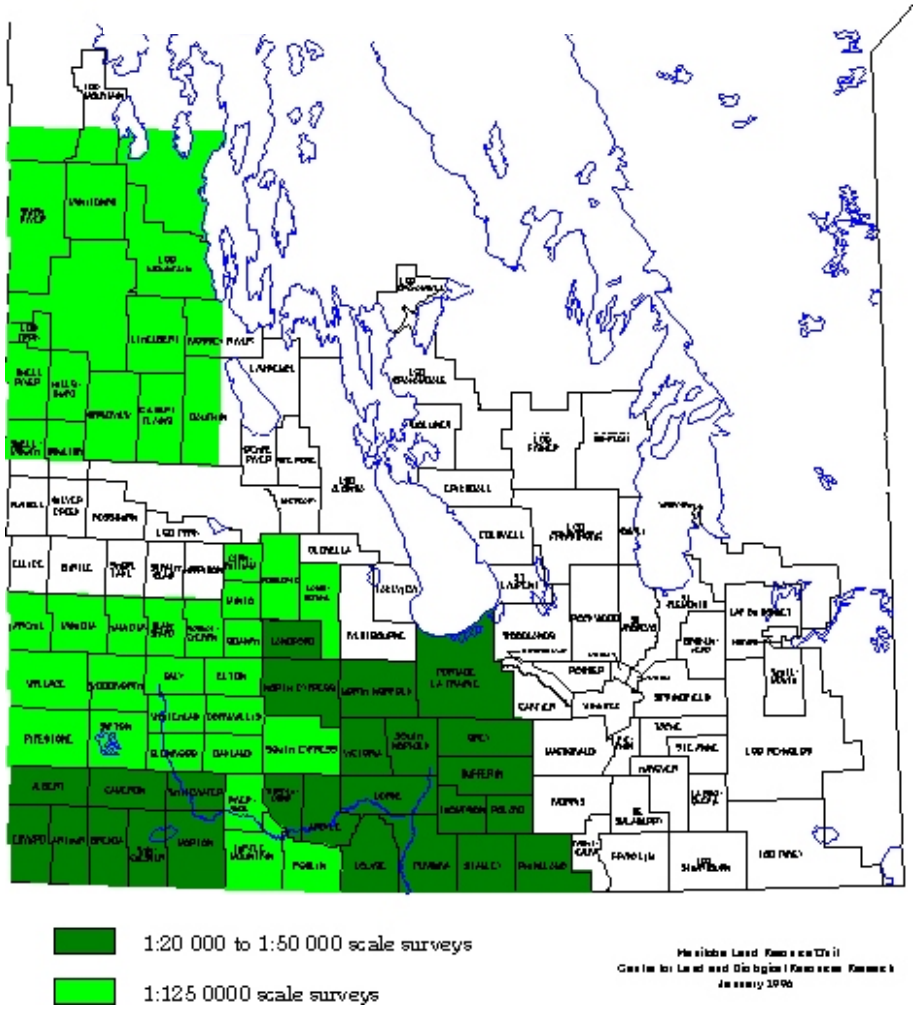


Figure 3. Rural municipalities in southern Manitoba with digital soil and terrain map information (1996).

INTRODUCTION

This information bulletin is one of a new series prepared for selected rural municipalities in southern Manitoba (Figure 1). A brief overview of the soil and terrain database information assembled for each municipality is presented, as well as a set of maps derived from the data for typical agricultural land use and planning applications.

The soil and terrain maps and databases were compiled and registered using the computerized Geographic Information System (GIS) facilities of the Manitoba Land Resource Unit. These GIS databases were used to create the generalized interpretive maps and statistics contained in this report.

LAND RESOURCE DATA

The soil and terrain (landscape) information were obtained 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 analyzed in digital form, using Geographic Information System (GIS) techniques. Three distinct layers of information were used, as shown in Figure 2.

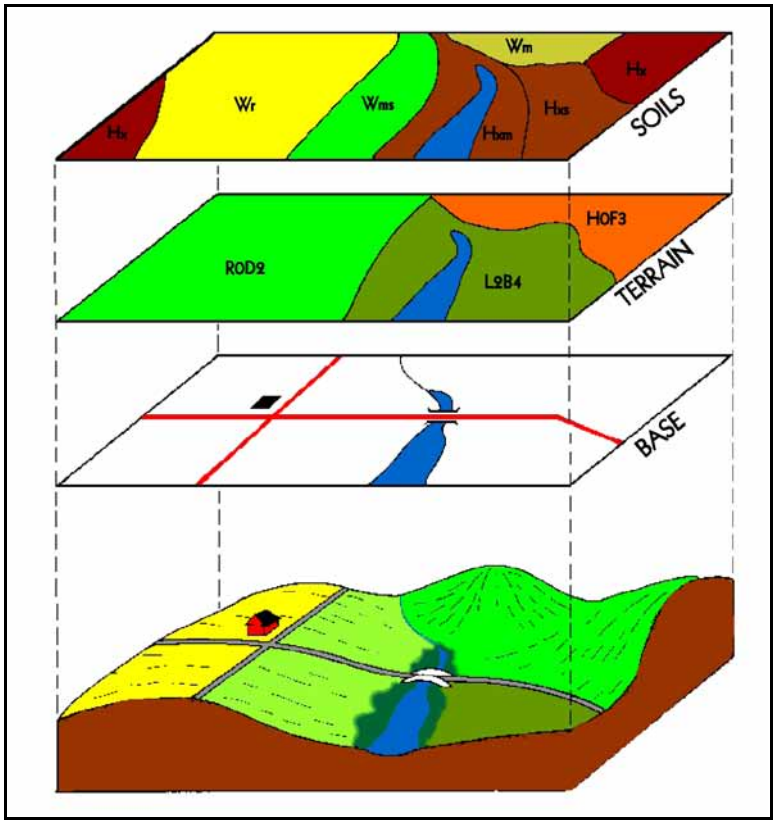


Figure 2. Soil, Terrain, and Base Map data.

Base Layer

Digital base map information includes the municipality and Township boundaries, and major streams, roads and highways. The soil and terrain layers were added and aligned ("georeferenced") to the digital base map. Major rivers and lakes from the base layer were also used as common boundaries for the soil and terrain map layers. Water bodies larger than 25 ha in size were digitized as separate polygons.

Terrain Layer

A separate terrain layer was produced for municipalities for which only reconnaissance scale soil map coverage was available. This was compiled by aerial photo-interpretation techniques, using recent 1:50 000 scale stereo airphoto coverage. The terrain information was transferred from the photographs onto the standard RM base and digitized in the GIS. Where the soil and terrain boundaries coincided, such as along prominent escarpments and eroded stream channels, the new terrain line was used for both layers. The terrain line, delineated from modern airphoto interpretation, was considered more positionally accurate than the same boundary portrayed on the historical reconnaissance soil map. Each digital terrain polygon was assigned the following legend characteristics:

Surface form
Slope class
Slope length class
Percent wetlands
Wetland size
Erosional modifiers
Extent of eroded knolls
Polygon number

The first four legend fields are considered differentiating, that is, a change in any of these classes defines a new polygon.

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. Each polygon digitized from the reconnaissance soil map was assigned the following legend characteristics;

Map symbol and modifier (overprinted symbol)
Soil Association or Complex name
Soil series and modifier codes
Polygon number

A modern soil series that best represents the soil association was 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.

SOIL AND TERRAIN OVERVIEW

The Rural Municipality (RM) of Woodworth covers 9 Townships (approximately 87 000 ha) in southwestern Manitoba. The Town of Kenton is the largest population centre. Land use is predominantly agriculture.

Soils for the Rural Municipality of Woodworth have been mapped (1:126 720 scale) previously in the Reconnaissance Soil Survey of the Rossburn and Virden Map Sheet Areas (Ehrlich et al., 1956).

Based on climatic data from Hamiota (Environment Canada, 1982), the mean annual temperature is 1.6°C; mean annual precipitation is 426 mm; frost-free period is 110 days; and degree days above 5°C is 1626. The seasonal moisture deficit for the period May to September is 250 to 300 mm; effective growing degree days (EGDD) above 5°C for the same period is approximately 1400. 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.

Portions of the Newdale Plain, Antler River-Lake Souris Plain, Brandon Lakes Plain and St. Lazare Plain (Newdale Till Plain, Lake Souris Basin and Brandon Lakes Plain in published soil reports) occur in the municipality. The Arrow Hills and the Assiniboine Valley are major physiographic features within the RM. The valley is 1.6 to 3.2 km wide and has an approximate depth of 85 to 90 m in this area. The Newdale Till Plain in the north eastern part of the RM has an elevation generally above 470 masl. Surface deposits below 470 m are mainly glaciofluvial and lacustrine sediments ranging in texture from gravelly sands to clay. Relief is variable with slopes generally less than 9% with some areas of steeper slopes. Surface forms are mainly hummocky or undulating, with significant areas of ridged, inclined, and steep surface forms in the Arrow Hills and along the sides of the Assiniboine Valley and its tributaries.

The soils of the RM are dominantly Orthic Black Chernozems, with Gleyed Black Chernozems in imperfectly drained level and lower slope positions. Depressional areas of poorly drained soils with high water tables are classified as Rego Humic Gleysols. Cumulic

Regosol soils are associated with recent alluvial deposits in the Assiniboine valley.

Soils of the Newdale Association, represented by Newdale smooth phase, occur in the northeast corner of the RM. Newdale soils are developed on strongly calcareous loam to clay loam glacial till derived from local shale bedrock, limestone, and granitic rock material. These soils are dominantly well drained, but localized areas of saline meadow soils occur in depressions. Newdale soils generally range in agriculture capability from 2 to 3, with topography being the most common limiting factor. Local areas of capability class 5 to 7 are restricted to areas of severe soil erosion or wetness. Irrigation suitability ranges from good to poor, due to variable topography, salinity, and wetness. The potential for environmental impact under irrigation is low to moderate. Water erosion risk on the Newdale soils varies from moderate to severe depending upon slope gradients.

Lacustrine soils in the Lake Souris Plain and the Brandon Lakes Plain and glaciofluvial deposits associated with the Assiniboine River Valley (St. Lazare Plain) and the Arrow Hills are described according to major parent material and textural characteristics for each soil association.

Lenore soils developed from shaly till or shaly fluvial deposits over till occur extensively in the central portion of the RM. The till has a higher content of lime carbonate than the Newdale till, and a variable soluble salt content. They are dominantly well to imperfectly drained; saline phases are common in these soils. Agriculture capability varies from class 2 to class 4 depending on the topography, drainage, or salinity level. Local areas of poorly drained soils are rated in agriculture capability class 5W. Irrigation suitability of Lenore soils is poor, due to topography, drainage and variable levels of salinity; the potential for environmental impact is high. Risk of water erosion is moderate to severe depending on the topography.

The Arrow Hills soils associated with prominent NW-SE trending esker-like ridged landforms occur in the central portion of the RM. Soil materials are typically coarse shaly gravel, underlain by shaly till of the Lenore Association. Agriculture capability is 5T to 7T, and irrigation suitability is poor, due to steep slopes.

Soils of the Eastbank Association occur on upper terraces of the Assiniboine Valley. They consist of loamy lacustrine sediments, underlain by shaly glaciofluvial sand and gravel. These are well drained soils with rapid permeability and a variable, low to moderate water retention capacity. Agriculture capability varies from class 4M to 5M. Irrigation suitability is fair to poor and the risk of potential environmental impact ranges from moderate to high. Risk of water erosion is low. Land use is mainly forage and grazing, with some cereal production.

Soils of the Carroll Association are developed on loam to clay loam lacustrine deposits. These soils are dominantly well drained and salinity is a minor problem in some imperfectly drained and poorly drained sites. Agriculture capability is class 1 to 2 on the better drained soils (depending on topography), class 2 to 3 on the imperfectly drained soils (depending on the level of salinity), and class 5W in the poorly drained positions. Irrigation suitability is good on well drained, level Carroll soils, and poor in poorly drained areas. Potential environmental impact is minimal to low. Risk of water erosion is moderate to severe on the well drained sites depending on the degree of slope.

Soils of the Harding Association are developed on well drained, clay textured lacustrine deposits. They occur extensively in the eastern portion of the RM. Numerous waterways cross the Harding soil area in well defined drainage channels. Agriculture capability is dominantly class 2, with moderately sloping areas rated in class 3. Irrigation suitability is poor, due to the clay texture. Risk of water erosion is moderate to severe, depending on the topography. The numerous waterways across this area require stabilization under grass or tree cover to prevent further erosion.

A small area of Souris soils occurs in the southern portion of the RM. These soils are dominantly imperfectly drained with loamy fine sand surface textures and a sandy subsoil. Local areas of better drained soils, poorly drained soils and duned phases occur. Agriculture capability is dominantly 3M on the imperfectly drained

soils, class 4M on the better drained soils and class 6W on the poorly drained soils; the duned areas are rated in class 6. Irrigation suitability is good on the imperfectly to well drained soils and poor on the duned phase and in areas of poorly drained soil. The potential for environmental impact on these soils under irrigation is high. Risk of water erosion is low, but risk of erosion by wind is high on the imperfectly to well drained members if the surface is left uncovered.

Soils of the Miniota Association consist of a variable mantle of sandy sediments over coarse sand or gravelly sand. These soils occur throughout the RM and have rapid permeability and low water retention capacity. Agriculture capability is dominantly 5M, but may be class 4 if the overlying surface layers are thicker or finer in texture. Irrigation suitability is poor (class 4) and the potential for environmental impact under irrigation is high. Risk of water erosion is low but the risk of erosion by wind is high if the surface cover is minimal. Land use is mainly forage production and grazing. The Miniota shaly phase soils are similar to normal Miniota soils except the underlying coarse materials have a high shale content.

Soils of the Eroded Slopes Complex occur on the steeply sloping valley walls of the Assiniboine valley. Agriculture capability is class 6 and 7T, and land use is mainly native woodland, wildlife habitat and limited grazing. The soils in the bottom lands of the valley are mapped as the Assiniboine Complex. Specific soil textures and drainage within the Assiniboine Complex are not delineated at the scale of the reconnaissance soil map. Soil textures vary from sandy loam to clay. Soils are dominantly imperfectly drained and subject to periodic inundation. Agriculture capability varies from class 2 to 4 depending on the elevation of the terraces and frequency of flooding. Irrigation suitability also varies from good to poor depending on the texture and frequency of inundation. Land use is mainly cereal and forage production.

DERIVED AND INTERPRETIVE MAPS

A large variety of computer derived and interpretive maps can be generated, once the soil and terrain 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 soil texture, drainage, stoniness, or slope class).

Interpretive maps portray a more complex evaluation of information presented in the legend which was combined in a unique way to arrive at an entirely new map.

Several examples of derived and interpretive maps are included in this information bulletin. The maps have all been reduced in size and generalized (simplified), in order to portray conditions for an entire rural municipality on one page. Only interpretations based on the dominant soil and terrain conditions in each polygon are shown at such reduced scales. These generalized maps provide a useful overview of conditions within a municipality, but are not intended to apply to site specific land parcels.

The digital databases may also contain more detailed information concerning significant inclusions of differing soil and slope conditions in each map polygon, particularly where they have been derived from modern detailed soil maps. This information can be portrayed at larger map scales.

Information concerning particular interpretative maps, and the primary soil and terrain map data, can be obtained by contacting the Manitoba Land Resource Unit.

Slope Map.

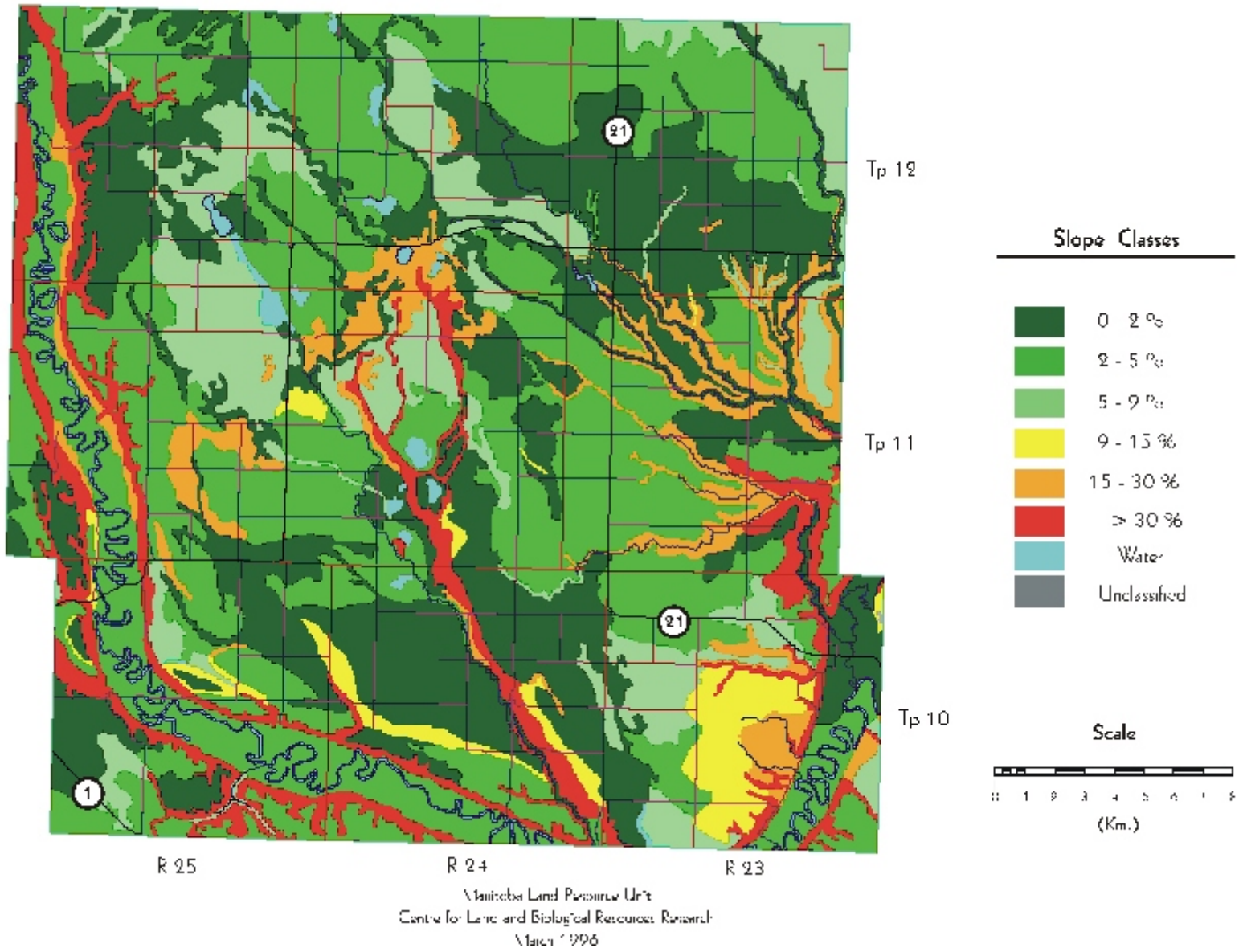
Slope describes the steepness of the landscape surface. The slope classes shown on this map are derived from the digital terrain layer database. Specific colours are used to indicate the most significant, limiting slope class for each terrain polygon in the RM. Additional slope classes can occur in each 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 %	24801	28.5
2 - 5 %	33694	38.7
5 - 9 %	11075	12.7
9 - 15 %	2720	3.1
15 - 30 %	5974	6.9
> 30 %	7230	8.3
Water	1591	1.8
Unclassified	6	0.0
Total	87091	100.0

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

Rural Municipality of Woodworth Slope Map



Surface Form Map.

Surface forms describe the overall shape of the earth's surface. The various surface forms may exhibit a regular (or irregular) pattern of convexities and concavities, and are commonly associated with characteristic ranges of slope gradients and slope lengths. They may also imply particular modes of origin. For example, scrolled and terraced surface forms are created by river and stream deposits, while undulating and hummocky surface forms are frequently associated with glacial moraines. A description of the various surface form classes are contained in a separate Soil and Terrain Classification System Manual (Manitoba Land Resource Unit, 1996).

Surface form and slope class are two key features of the digital terrain map layer. Both of these characteristics are important controlling and influencing factors to consider for sustainable land use planning and management.

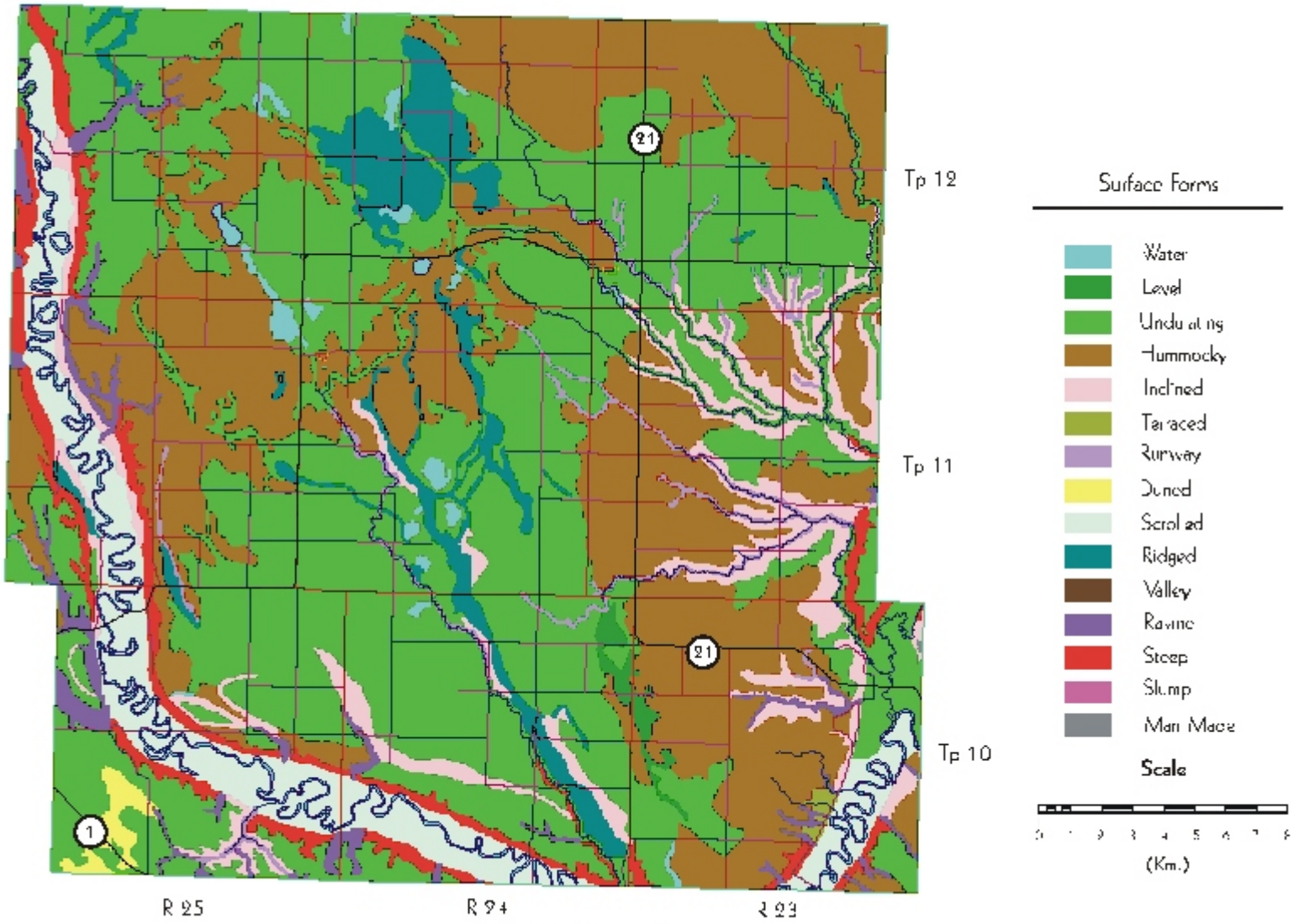
Table 2. Surface Form and Slope Classes[1]

Surface Form Slope Class	Area (ha)	Percent of RM
Scrolled	**2327**	**4.0**
C (2.0 to 5.0%)	2017	3.5
D (6.0 to 9.0%)	310	0.5
Hummocky	**8604**	**14.8**
C (2.0 to 5.0%)	5867	10.1
D (6.0 to 9.0%)	2724	4.7
E (10.0 to 15.0%)	13	0.0
Inclined	**2586**	**4.5**
C (2.0 to 5.0%)	580	1.0
D (6.0 to 9.0%)	479	0.8
E (10.0 to 15.0%)	127	0.2
F (16.0 to 30.0%)	778	1.3
H (31.0 to 70.0%)	622	1.1
Level	**1583**	**2.7**
B (0.5 to 2.0%)	1583	2.7
Ravine	**195**	**0.3**
H (31.0 to 70.0%)	166	0.3
J (> 70.0%)	30	0.1
Man Made	**3006**	**5.2**
Ridged	**1590**	**2.7**
D (6.0 to 9.0%)	425	0.7
E (10.0 to 15.0%)	77	0.1
F (16.0 to 30.0%)	430	0.7
H (31.0 to 70.0%)	648	1.1
J (> 70.0%)	11	0.0
Steep	**679**	**1.2**
J (> 70.0%)	679	1.2
Terraced	**530**	**0.9**
B (0.5 to 2.0%)	199	0.3
C (2.0 to 5.0%)	178	0.3
F (16.0 to 30.0%)	154	0.3
Undulating	**33804**	**58.2**
B (0.5 to 2.0%)	19642	33.8
C (2.0 to 5.0%)	14161	24.4
Runway	**2427**	**4.2**
C (2.0 to 5.0%)	2156	3.7
D (6.0 to 9.0%)	226	0.4
F (16.0 to 30.0%)	44	0.1
Water	**727**	**1.3**
Total	**58056**	**100.0**

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

Rural Municipality of Woodworth

Surface Form Map



Manitoba Land Resource Unit
Centre for Land and Biological Resources Research
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Generalized Soil Map.

All soil polygons on the original published reconnaissance maps were digitized to create the soil layer. In some cases, areas of overprinted symbols on the original maps were delineated as additional new soil polygons.

This generalized soil map has been reduced in size and simplified by grouping the original soil association polygons. The groups have been colour themed according to similar modes of origin, texture, and soil drainage. Soils derived from glacial till deposits (typically loam to clay loam in texture) have been assigned blue and green colours. Soils developed from glacial lake deposits are coloured yellow (sandy), orange (loam), or brown (clay). Sand and gravel deposits are coloured in pink.

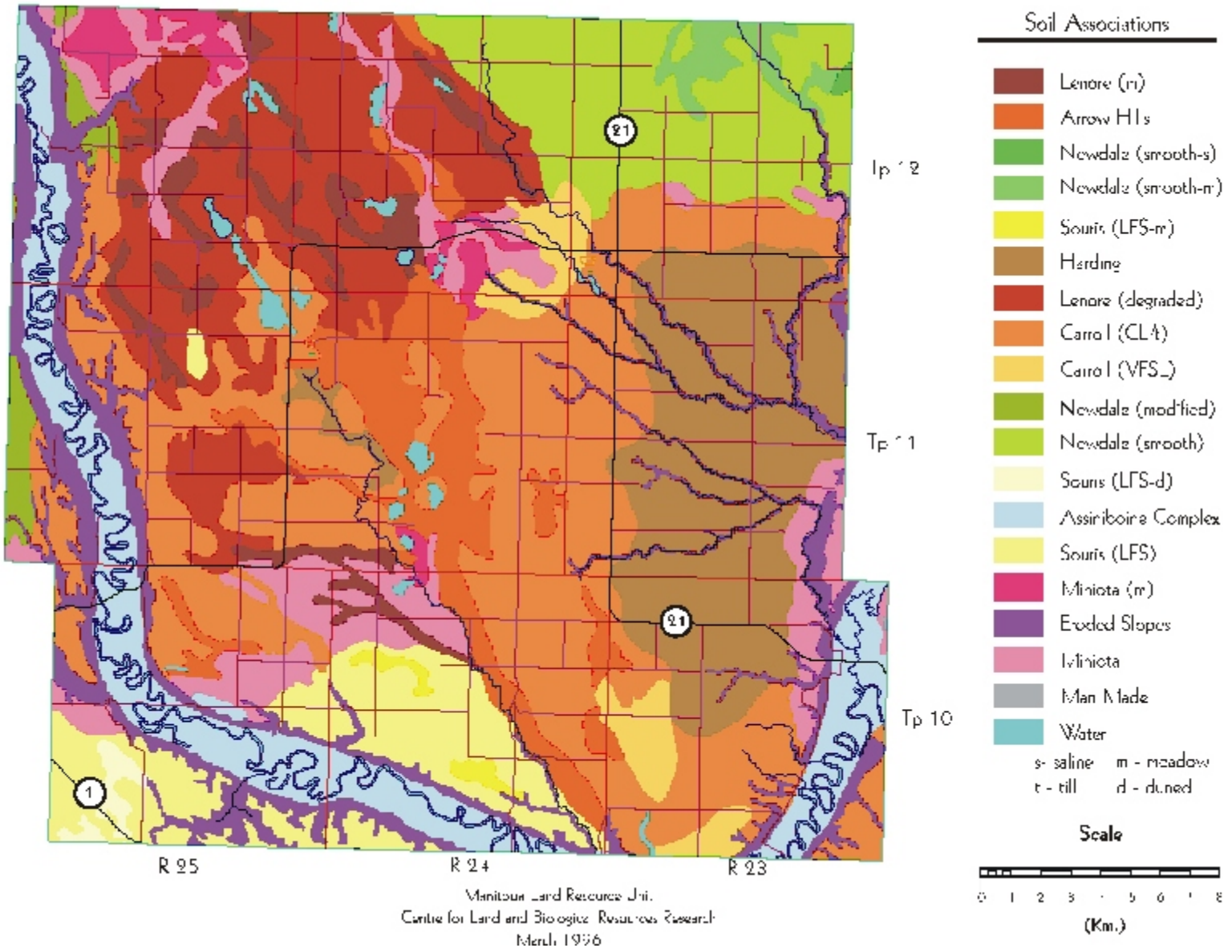
The groups have been named after the dominant soil association, and the statistics for each the groups have been summarized (in bold). The original reconnaissance map symbol types and their areal extent in the municipality are shown within each group.

Table 3. Generalized Soil Association Groups

Association Group Associate	Area (ha)	Percent of RM
Lenore (m)	**2907**	**3.3**
L (meadow)	2907	3.3
Arrow Hills	**5484**	**6.3**
Ah	3842	4.4
Ccl (meadow)	1344	1.5
Ec (meadow)	298	0.3
Newdale (smooth - s)	**60**	**0.1**
Nsp (saline)	60	0.1
Newdale (smooth - m)	**936**	**1.1**
Nsp (meadow)	936	1.1
Souris (LFS - m)	**303**	**0.3**
Slfs (meadow)	303	0.3
Harding	**9832**	**11.3**
Ccl (meadow)	360	0.4
Hc	9034	10.4
Hc (degraded)	438	0.5
Lenore (degraded)	**10194**	**11.7**
L	9672	11.1
L (degraded)	521	0.6
Carroll(CL/t)	**19283**	**22.1**
Ccl	14159	16.3
Ccl (degraded)	214	0.2
Ccl (meadow)	18	0.0
Ccl/T	950	1.1
Ec	3565	4.1
Ec (degraded)	377	0.4
Carroll (VFSL)	**2019**	**2.3**
Cl	2019	2.3
Newdale Modified	**804**	**0.9**
Nm	299	0.3
Om	506	0.6
Newdale (smooth)	**6847**	**7.9**
N	31	0.0
Nsp	6817	7.8
Souris (LFS - d)	**409**	**0.5**
Slfs (duned)	409	0.5
Assiniboine Complex	**6439**	**7.4**
As	6353	7.3
Bcx	86	0.1
Souris (LFS)	**5292**	**6.1**
Slfs	5292	6.1
Miniota (m)	**1314**	**1.5**
Msh (meadow)	1314	1.5
Eroded Slopes	**7443**	**8.5**
Er	7443	8.5
Miniota	**5930**	**6.8**
M	1051	1.2
Ma	477	0.5
Msh	4402	5.1
Man Made	**6**	**0.0**
Water	**1591**	**1.8**
Total	**87091**	**100.0**

Rural Municipality of Woodworth

Generalized Soil 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, classes 4 and 5 represent marginal lands, and classes 6 and 7 are considered unsuitable for dryland agriculture.

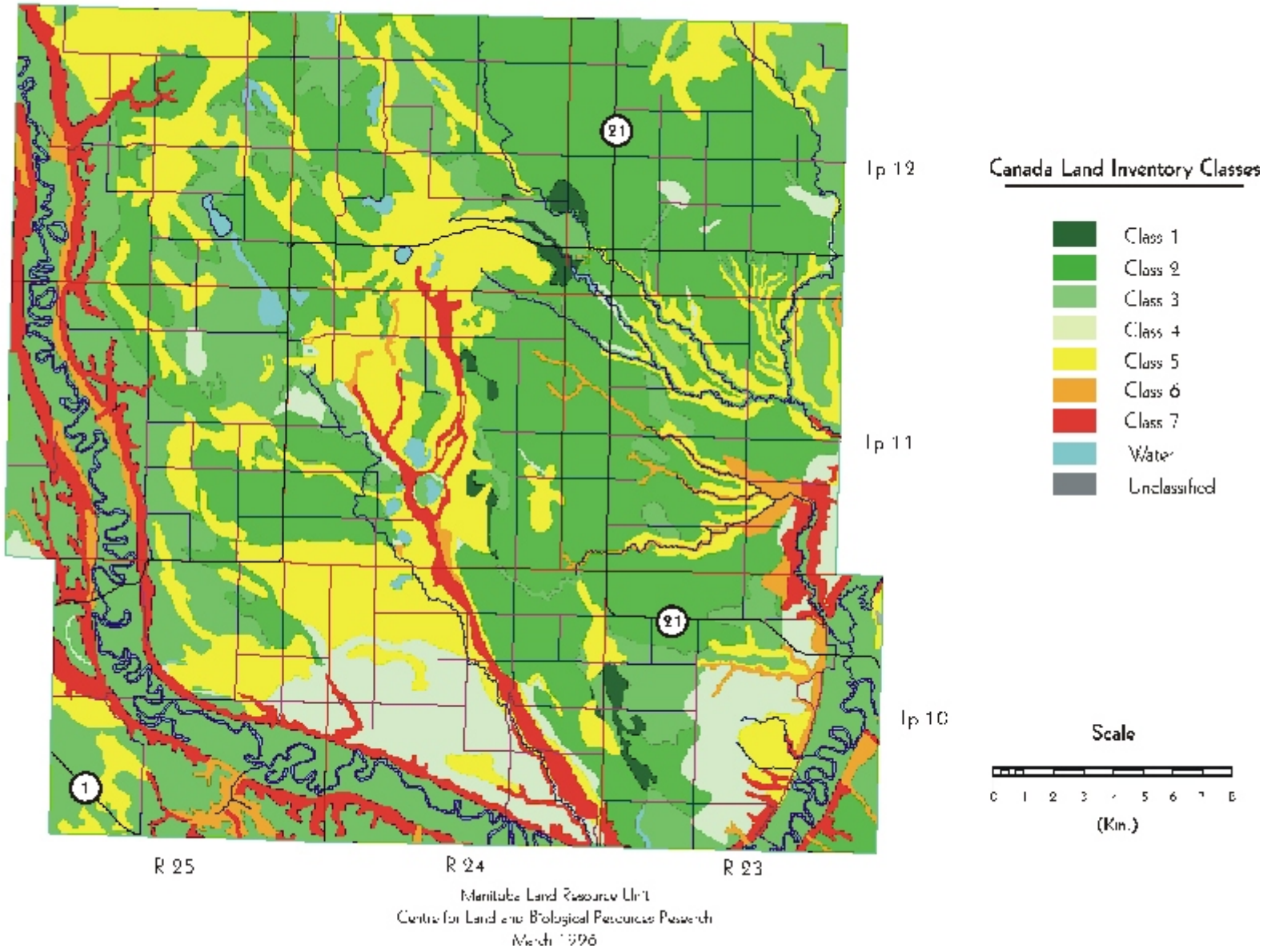
This generalized interpretive map is based on the dominant modern soil type for the soil polygon, in combination with the dominant slope class identified from the terrain polygon layer. The nature of the CLI subclass limitations and the classification of subdominant components cannot be portrayed at this generalized map scale.

Table 4. Agricultural Capability[1]

Class Subclass	Area (ha)	Percent of RM
1	**523**	**0.6**
2	**29343**	**33.6**
2M	313	0.4
2MT	13	0.0
2T	11455	13.1
2TW	6380	7.3
2W	4844	5.6
2X	6338	7.3
3	**18497**	**21.2**
3	2	0.0
3I	7285	8.3
3M	2863	3.3
3MT	7	0.0
3N	701	0.8
3T	7545	8.6
3TN	94	0.1
4	**10066**	**11.5**
4	1401	1.6
4D	515	0.6
4M	3549	4.1
4MT	504	0.6
4R	3701	4.2
4RT	70	0.1
4T	326	0.4
5	**18346**	**21.0**
5	3831	4.4
5M	6870	7.9
5MT	658	0.8
5T	1133	1.3
5W	5854	6.7
6	**3098**	**3.5**
6	615	0.7
6M	408	0.5
6T	2074	2.4
7	**5810**	**6.7**
7	83	0.1
7T	5727	6.6
Unclassified	**7**	**0.0**
Water	**1569**	**1.8**
Total	**87257**	**100.0**

[1] Based on **dominant** soil and slope of the respective soil and terrain maps.

Rural Municipality of Woodworth Agriculture Capability Map



Irrigation Suitability Map.

Irrigation suitability is a four class rating system. Classes are **Excellent, Good, Fair, and Poor**. 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.

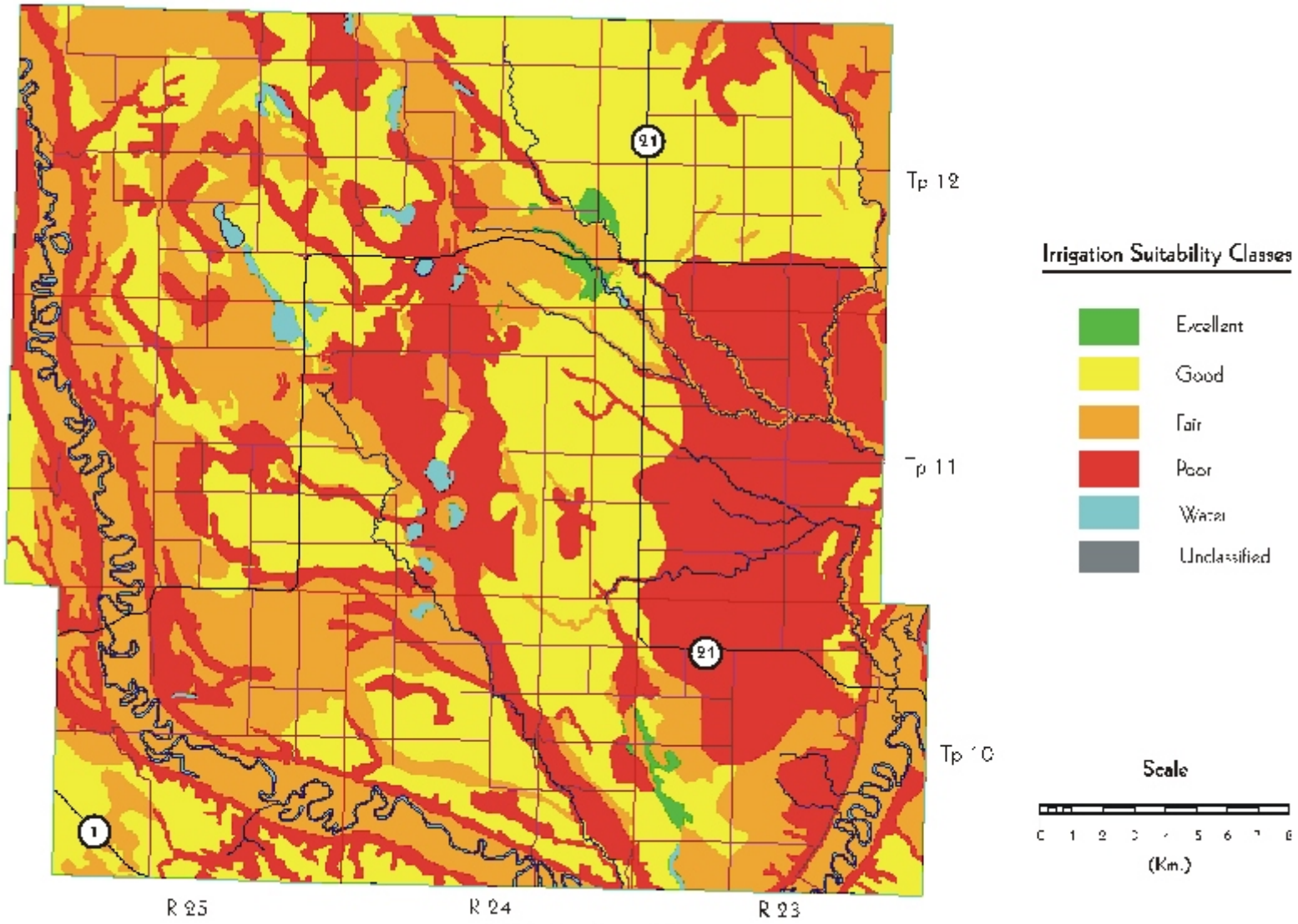
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class from the terrain layer database. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 5. Irrigation Suitability[1]

Class	Area (ha)	Percent of RM
Excellent	456	0.5
Good	30276	34.8
Fair	26050	29.9
Poor	28712	33.0
Organic	0	0.0
Water	1591	1.8
Unclassified	6	0.0
Total	87091	100.0

[1] Based on **dominant** soil and slope of the respective soil and terrain maps.

Rural Municipality of Woodworth Irrigation Suitability Map



Potential Environmental Impact Under Irrigation.

A major concern for land under irrigated crop production is the possibility that surface and/or groundwater 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. Specifically considered are: soil texture, hydraulic conductivity, salinity, geological uniformity, depth to watertable and topography. The risk of altering surface and subsurface soil drainage regimes, soil salinity or the potential for runoff, erosion or 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.

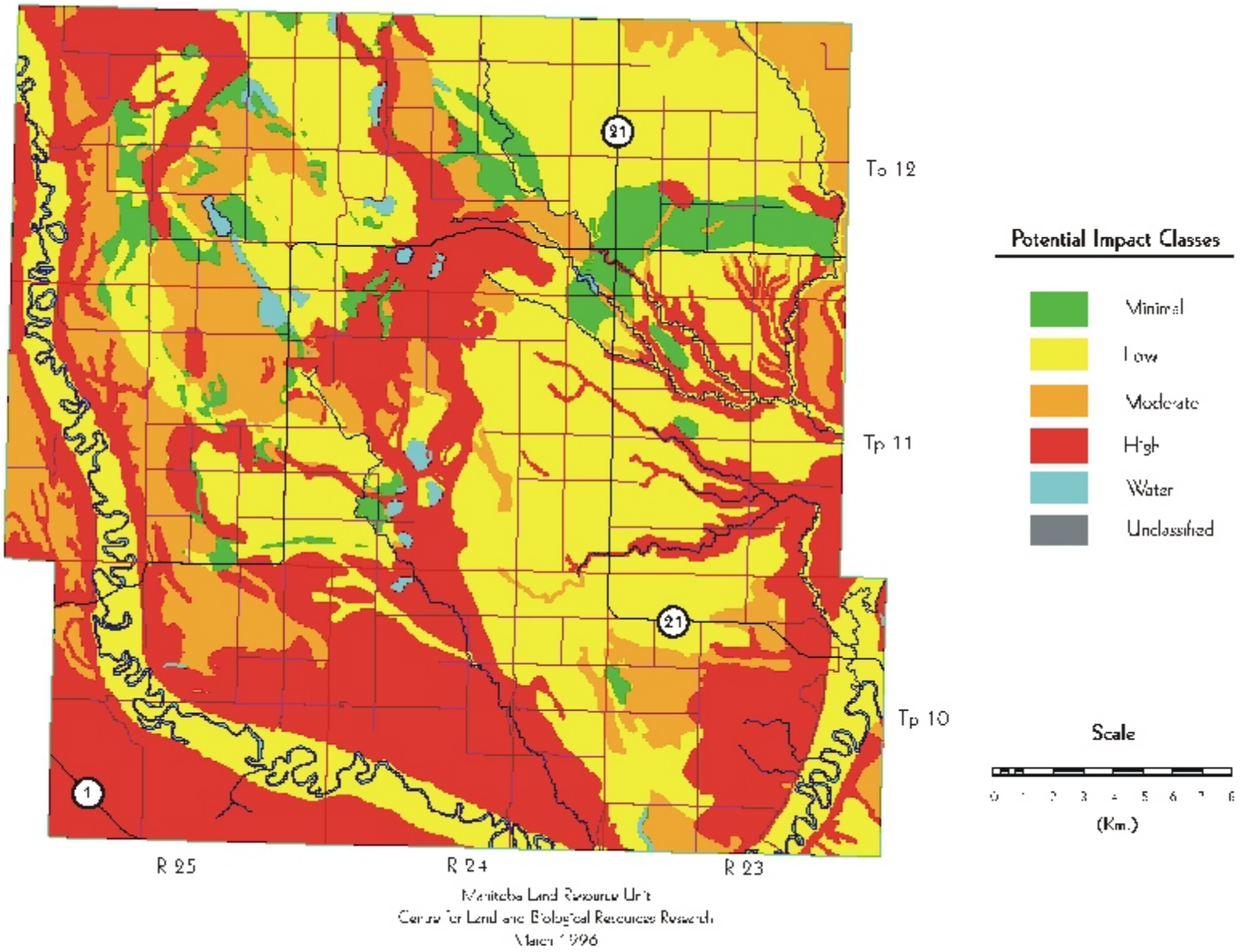
This generalized interpretive map is based on the dominant soil series for each soil polygon, in combination with the dominant slope class from the terrain layer database. The nature of the subclass limitations, and the classification of subdominant components is not shown at this generalized map scale.

Table 6. Potential Environmental Impact Under Irrigation[1]

Class	Area (ha)	Percent of RM
Minimal	4492	5.2
Low	37427	43.0
Moderate	13600	15.6
High	29975	34.4
Organic	0	0.0
Water	1591	1.8
Unclassified	6	0.0
Total	87091	100.0

[1] Based on **dominant** soil, slope gradient, and slope length of the respective soil and terrain maps.

Rural Municipality of Woodworth 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

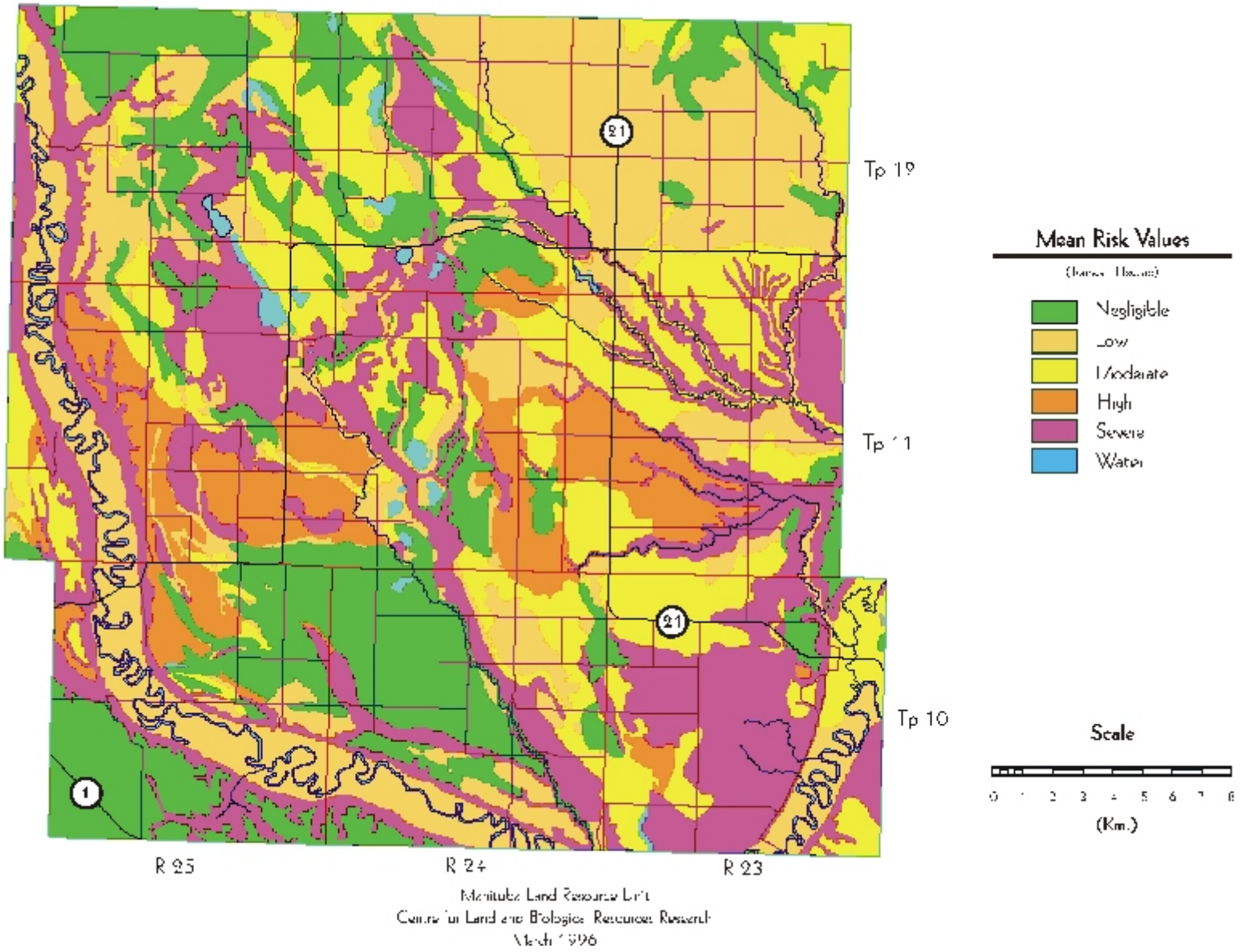
Cropping and management practices will significantly reduce this risk depending on crop rotation program, soil type, and landscape features.

Table 7. Water Erosion Risk[1]

Class	Area (ha)	Percent of RM
Negligible	**17311**	**19.9**
Low	**21346**	**24.5**
Moderate	**17608**	**20.2**
High	**7376**	**8.5**
Severe	**21854**	**25.1**
Water	**1591**	**1.8**
Unclassified	**6**	**0.0**
Total	**87091**	**100.0**

[1] Based on **dominant** soil, slope gradient, and slope length of the respective soil and terrain maps.

Rural Municipality of Woodworth Water Erosion Risk Map



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ADDENDUM

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 are:

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

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

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

Trees - lands that are primarily in tree cover.

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

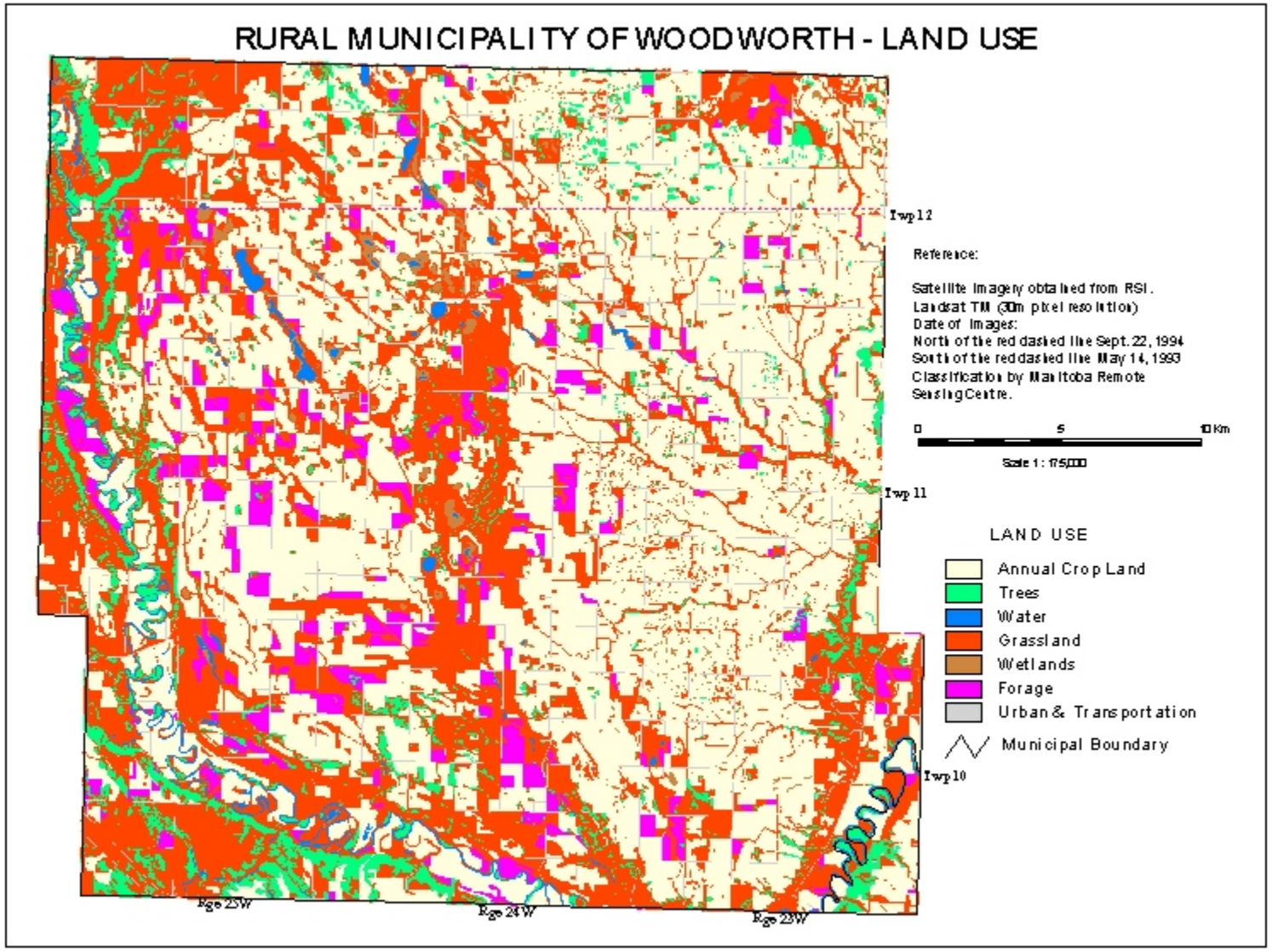
Water - open water-lakes, rivers streams, ponds, and lagoons.

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

Table 10. Land Use[1]

Class	Area (ha)	Percent of RM
Annual Crop Land	44540	50.7
Forage	4436	5.0
Grasslands	28846	32.8
Trees	5239	6.0
Wetlands	1242	1.4
Water	1194	1.4
Urban and Transportation	2351	2.7
Total	87848	100.0

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


RURAL MUNICIPALITY OF WOODWORTH - LAND USE
Twp 12
Twp 11
Twp 10
Rge 25W
Rge 24W
Rge 23W
Reference:
Satellite Imagery obtained from RSI.
Landsat TM (30m pixel resolution)
Date of Images:
North of the red dashed line Sept. 22, 1994
South of the red dashed line May 14, 1993
Classification by Manitoba Remote Sensing Centre.
0
5
10 Km
Scale 1: 175,000
LAND USE
Annual Crop Land
Trees
Water
Grassland
Wetlands
Forage
Urban & Transportation
Municipal Boundary