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Rural Municipality of Pipestone


Information Bulletin 96-1

Soils and Terrain

An introduction
to the land resource

Land Resource Unit
Brandon Research Centre



Canada 

Rural Municipality of Pipestone

Information Bulletin 96-1

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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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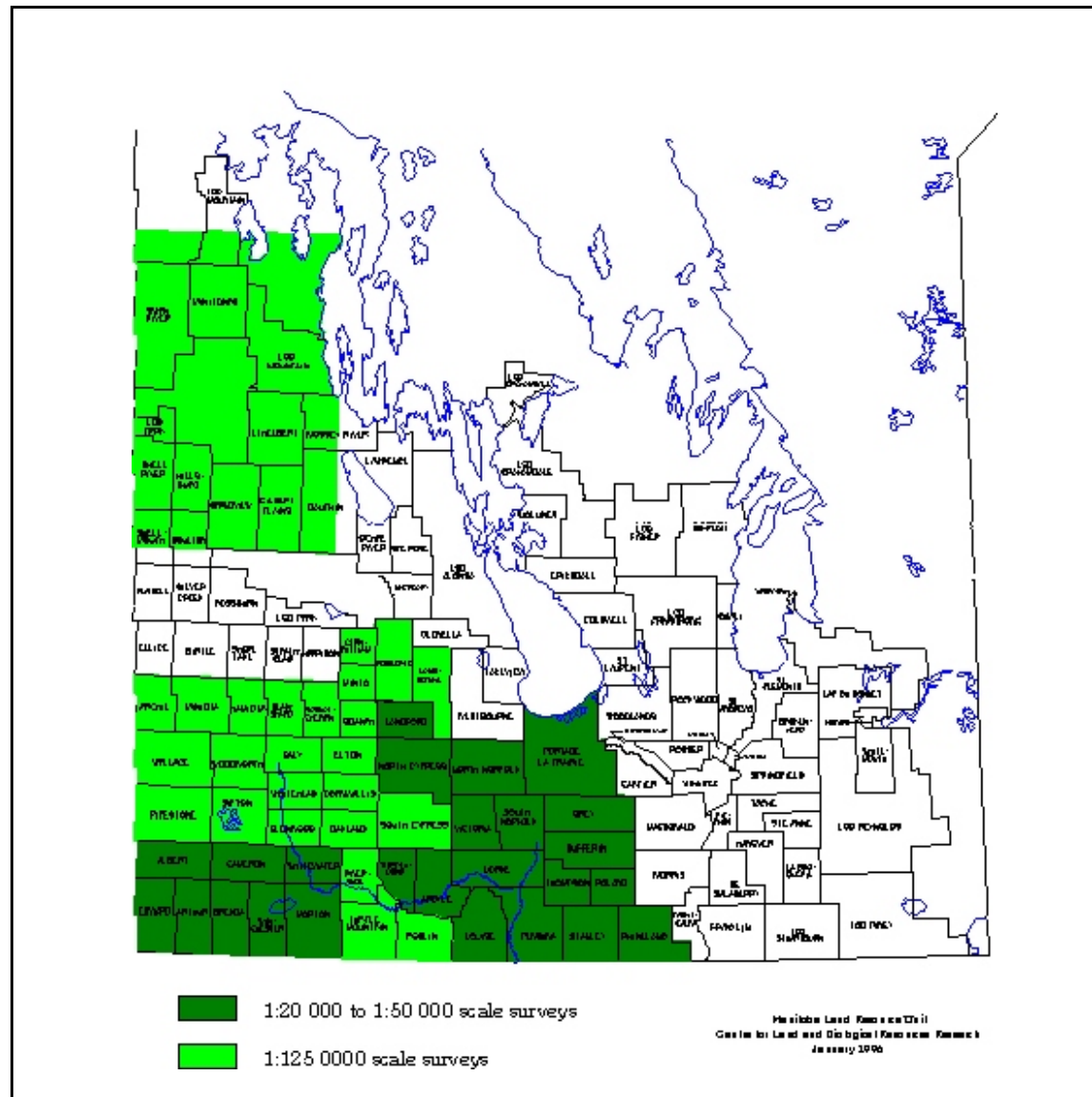


Figure 3. Rural municipalities in southern Manitoba with digital soil and terrain map information (1996).

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.

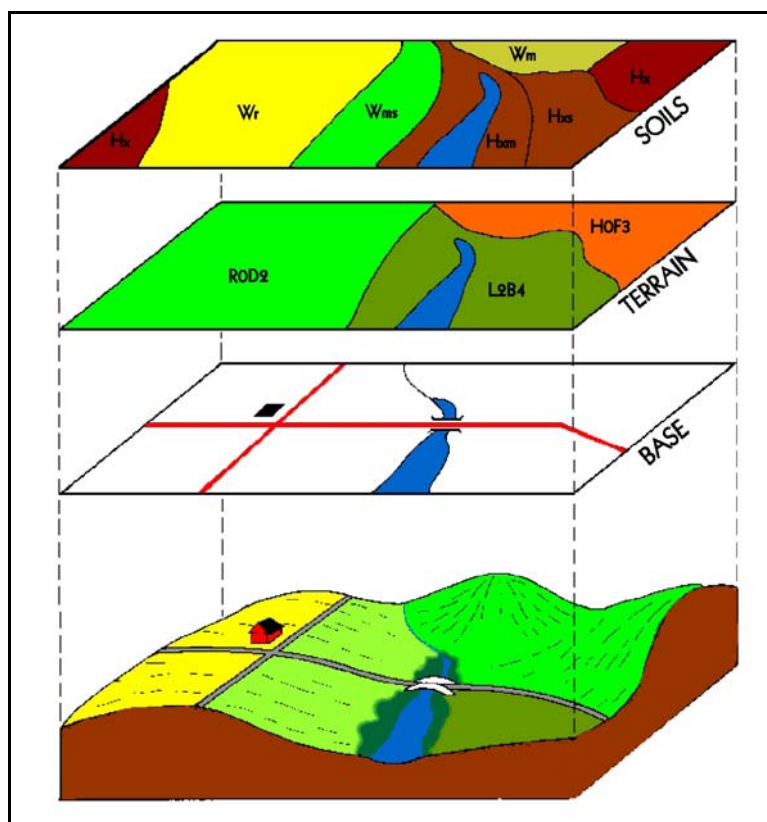


Figure 2. Soil, Terrain, and Base Map data.

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 Pipestone covers 12.0 Townships (approximately 116 000 ha) in south-western Manitoba. The town of Pipestone is the largest population centre. Land use within the rural municipality is predominantly agriculture.

Soils in the municipality have been mapped (1:126 720 scale) previously in the Reconnaissance Soil Survey of South-Western Manitoba (Ellis and Schafer, 1940) and the Reconnaissance Soil Survey of the Rossburn and Virden Map Sheet Areas (Ehrlich et al., 1956).

Based on climatic data from Virden (Environment Canada, 1982), mean annual temperature is 2.0°C; mean annual precipitation is 462 mm; average frost-free period is 120 days and growing degree days above 5°C are 1702. The seasonal moisture deficit between May to September period is 250 to 300 mm; effective growing degree days (EGDD) above 5°C accumulated from May to September are 1400 to 1500. This parameter provides an indication of heat energy available for crop growth (Agronomic Interpretations Working Group, 1992)

Two physiographic areas occur in the municipality: the Souris Plain (referred to as the Reston-Tilston Park Area or Oxbow Till Plain) occupies some 70 percent of the RM area in the western portion and the Antler River-Lake Souris Plain (Lake Souris Basin) comprises the remainder to the east. The Souris Plain ranges in elevation from approximately 550 masl in the northwest to 460 m in the east; to the east of the Souris Plain, the change in elevation is more gradual, decreasing to 435 m along the east edge of the RM. Relief in the municipality is generally less than 5 % with hummocky and undulating topography dominating the glacial till landforms of the Souris Plain whereas level to gently undulating terrain dominates the lacustrine deposits in the Antler River-Lake Souris Plain. The dominant soils in Pipestone Municipality are Black Chernozems in well to imperfectly drained areas and Humic Gleysols in depressions and level, low-lying areas affected by high water tables and poor drainage.

Soils of the Souris Plain have developed on strongly calcareous loam to clay loam glacial till derived from shale, limestone, and granitic rock materials. Most of this area is represented by the Oxbow Association comprised of Oxbow Loams, Oxbow Modified and Oxbow Channels reflecting distinct landforms. The dominant soil is Orthic Black Chernozems in well drained positions but minor inclusions of imperfectly drained Gleyed Black and poorly drained Gleysolic soils occur in lower slope and depressional positions, respectively. Generally Oxbow soils range in agricultural capability from class 2 to 3 with topography being the most common limiting factor. Localized areas of class 5 to 7 capability recognize severe soil erosion or extreme wet conditions. Much of the area is rated as good to fair for irrigation due to topographic pattern and slope. Some 75 percent of the soils are estimated to have a low to moderate risk of environmental impact under irrigation. Water erosion risk for the Oxbow soils varies from low to severe depending primarily on the degree of slope.

Soils in the Antler River-Lake Souris Plain have developed on fluvial and lacustrine deposits ranging in texture from coarse sands to gravelly sands (Bede Association), sandy (Souris Association), loam to clay loam (Carroll Association), and clayey (Pipestone Association). The Bede Association developed in well drained, coarse textured sand and gravel deposits and includes the Miniota soils in this project. The soils of this association represent about 9 percent of the RM. They have very low water retention capacity and rapid permeability and are rated as class 5M for agriculture capability. Land use is mainly the production of forage for hay and grazing. The irrigation suitability of these soils is poor (Class 4) and they have a high potential for environmental impact under irrigation. Risk of water erosion is negligible.

Soils of the Souris Association consist dominantly of imperfectly drained sandy lacustrine sediments occupying approximately 6 % of the RM. These soils have an agriculture capability of class 3 due to periodic droughtiness and wetness. Land use includes production of cereals, forages and pasture. Irrigation suitability is good to fair (class 2 and 3) and the potential for adverse environmental impact is high under irrigation.

These soils have a negligible risk for water erosion, but are very susceptible to erosion by wind if the soil surface is left bare. Areas of Souris Meadow phase are dominantly poorly drained and rated as class 5W for agriculture. Irrigation suitability is poor. Land use is mainly the production of tame forage, native hay and pasture.

The Carroll Association is developed on loam to clay loam textured lacustrine sediments. Areas mapped as the Carroll Till Substrate phase indicate that moderately stony, loam textured till is present within a depth of 1 m (approximately 3 % of RM). Agriculture capability is class 2; irrigation suitability is poor (class 4) and the potential for adverse impact from irrigation is high. Land use on the Carroll soils is mainly for cereal and oilseed production

The Pipestone Association consists of imperfectly drained clayey fluvial and lacustrine sediments covering approximately 7 % of the RM. Agriculture capability is rated as class 2 primarily due to excess moisture; irrigation suitability is poor (class 4). Land use is mainly for cereal production. The Pipestone Meadow phase soils are poorly drained and rated in agriculture capability class 5W; irrigation suitability is poor and the potential for adverse impact on the environment from irrigation is high. Land use is mainly for the production of native hay, forage and grazing.

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 is 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 interpretive 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.

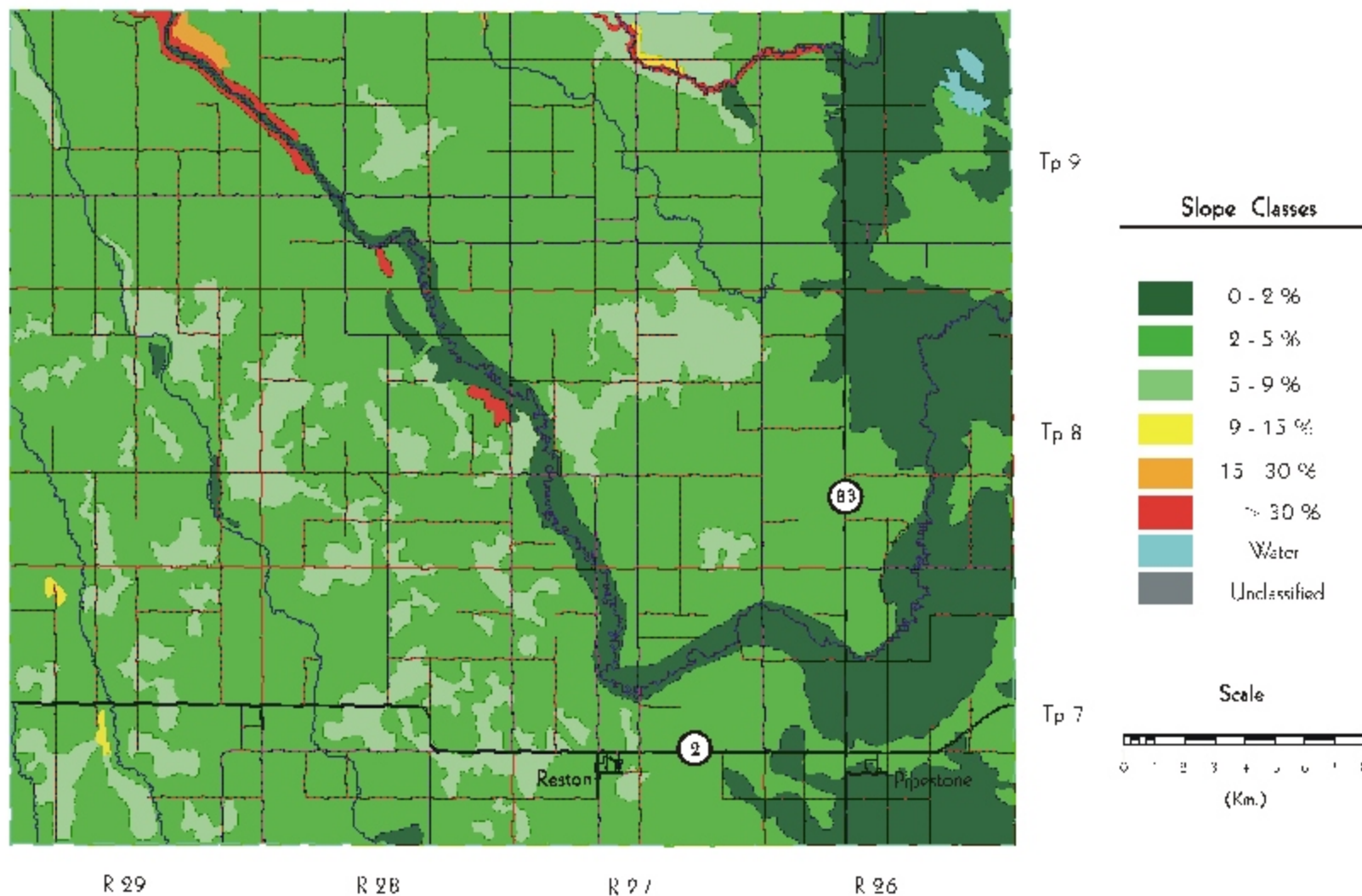
Table 1. Slope Classes¹

Slope Class	Area (ha)	Percent of RM
Water	218	0.2
0 - 2 %	18991	16.4
2 - 5 %	81621	70.3
5 - 9 %	14120	12.2
9 - 15 %	190	0.2
15 - 30 %	192	0.2
> 30 %	803	0.7
Total	116135	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 Pipestone

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 landforms 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.

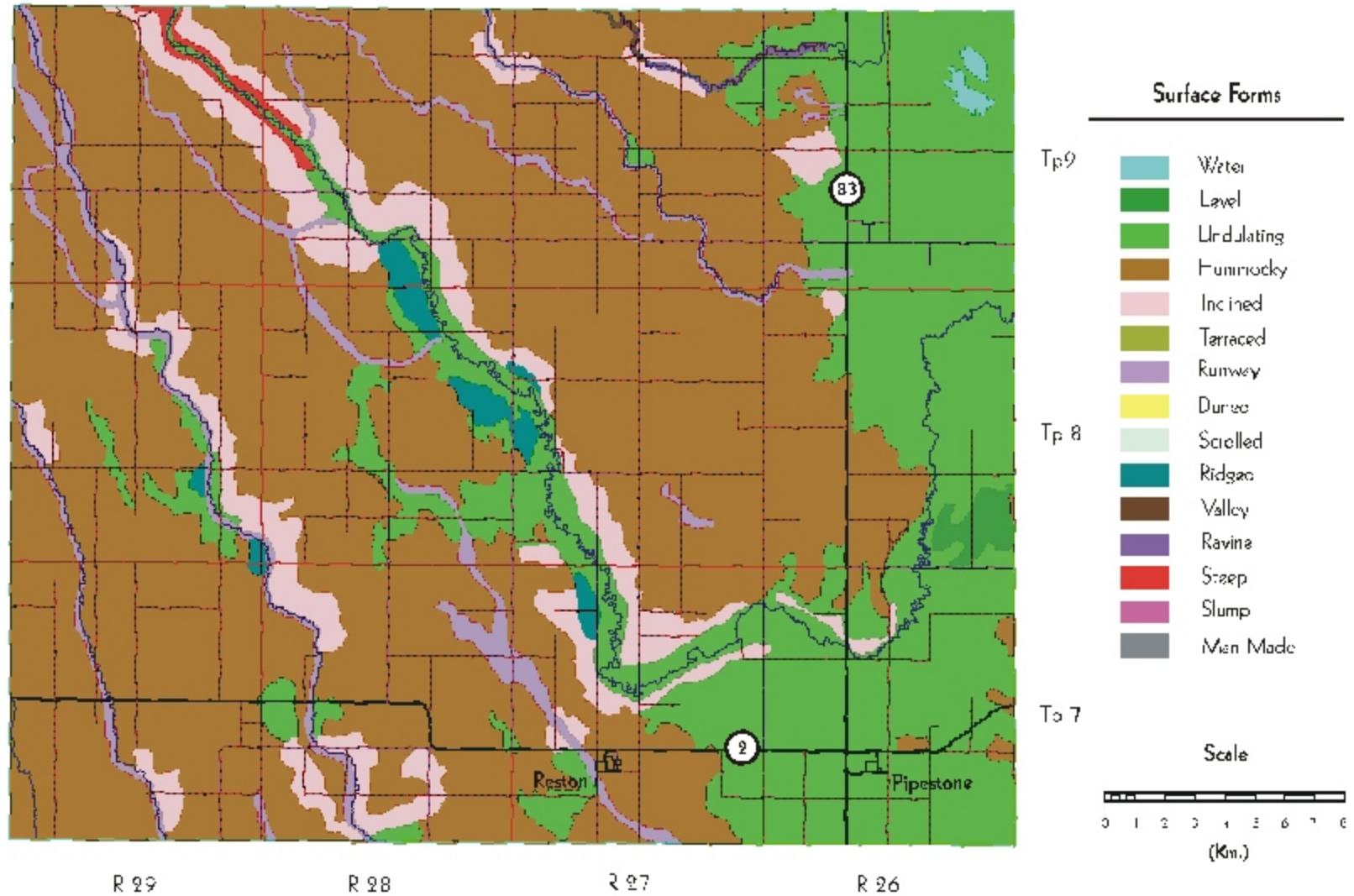
Table 2. Surface Form and Slope Classes¹

Surface Form Slope Class	Area (ha)	Percent of RM
Hummocky	69306	59.7
C (2.0 to 5.0%)	55882	48.1
D (6.0 to 9.0%)	13318	11.5
E (10.0 to 15.0%)	107	0.1
Inclined	9586	8.3
C (2.0 to 5.0%)	8663	7.5
D (6.0 to 9.0%)	664	0.6
E (10.0 to 15.0%)	84	0.1
F (16.0 to 30.0%)	176	0.2
Level	548	0.5
B (0.5 to 2.0%)	548	0.5
Ravine	190	0.2
J (> 70.0%)	190	0.2
Ridged	1095	0.9
C (2.0 to 5.0%)	14	0.7
D (6.0 to 9.0%)	138	0.1
H (31.0 to 70.0%)	102	0.1
J (> 70.0%)	42	< 0.1
Steep	398	0.3
J (> 70.0%)	398	0.3
Undulating	30255	26.1
B (0.5 to 2.0%)	18444	15.9
C (2.0 to 5.0%)	11812	10.2
Runway	4467	3.8
C (2.0 to 5.0%)	4450	3.8
F (16.0 to 30.0%)	17	< 0.1
Valley	71	0.1
H (31.0 to 70.0%)	20	< 0.1
J (> 70.0%)	51	< 0.1
Water	218	0.2
Total	116135	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 Pipestone

Surface Form Map



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December 1994

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.

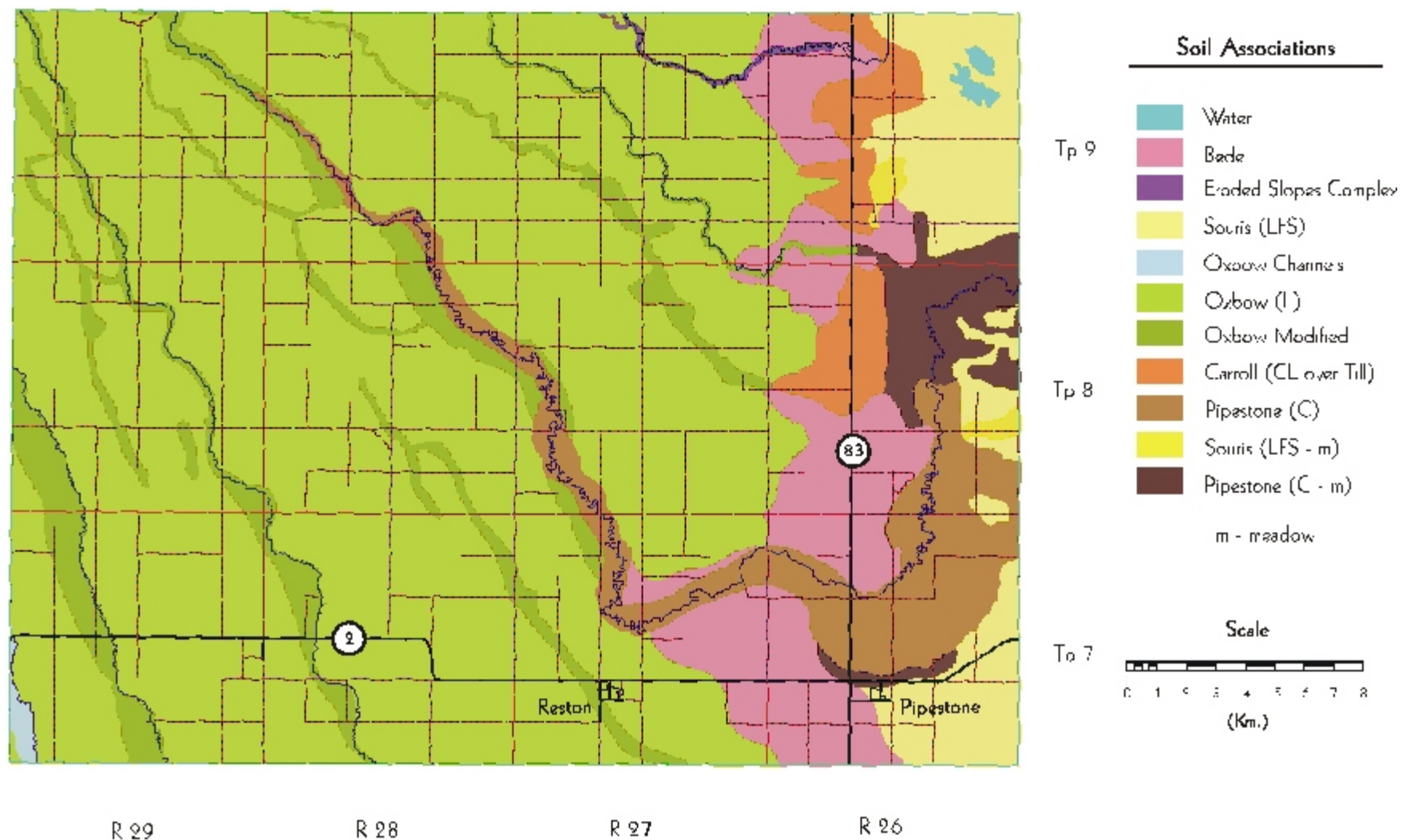
The groups have been named after the dominant soil association, and the statistics for each of the groups have been summarized (in bold). The original reconnaissance map symbol types and their areal extent in the municipality are shown within each group.

Table 3. Generalized Soil Association Groups

Association Group Associate	Area (ha)	Percent of RM
Water	218	0.2
Bede	10514	9.1
Bs	3960	3.4
M	6554	5.6
Eroded Slopes Complex	261	0.2
Er	261	0.2
Souris (LFS)	7490	6.4
Slfs	7490	6.4
Oxbow (L)	73620	63.4
Ol	73447	63.2
Osp	174	0.1
Oxbow Modified	9695	8.3
Om	9453	8.1
Oe	242	0.2
Carroll (CL over Till)	3175	2.7
Ccl/T	3175	2.7
Pipestone (C)	7765	6.7
Pc	7765	6.7
Souris (LFS-m)	406	0.3
Slfs (meadow)	406	0.3
Pipestone (C-m)	2992	2.6
Pc (meadow)	2992	2.6
Total	116135	100.0

Rural Municipality of Pipestone

Generalized Soil Map



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 Centre for Land and Biological Resources Research
 December 1994

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.

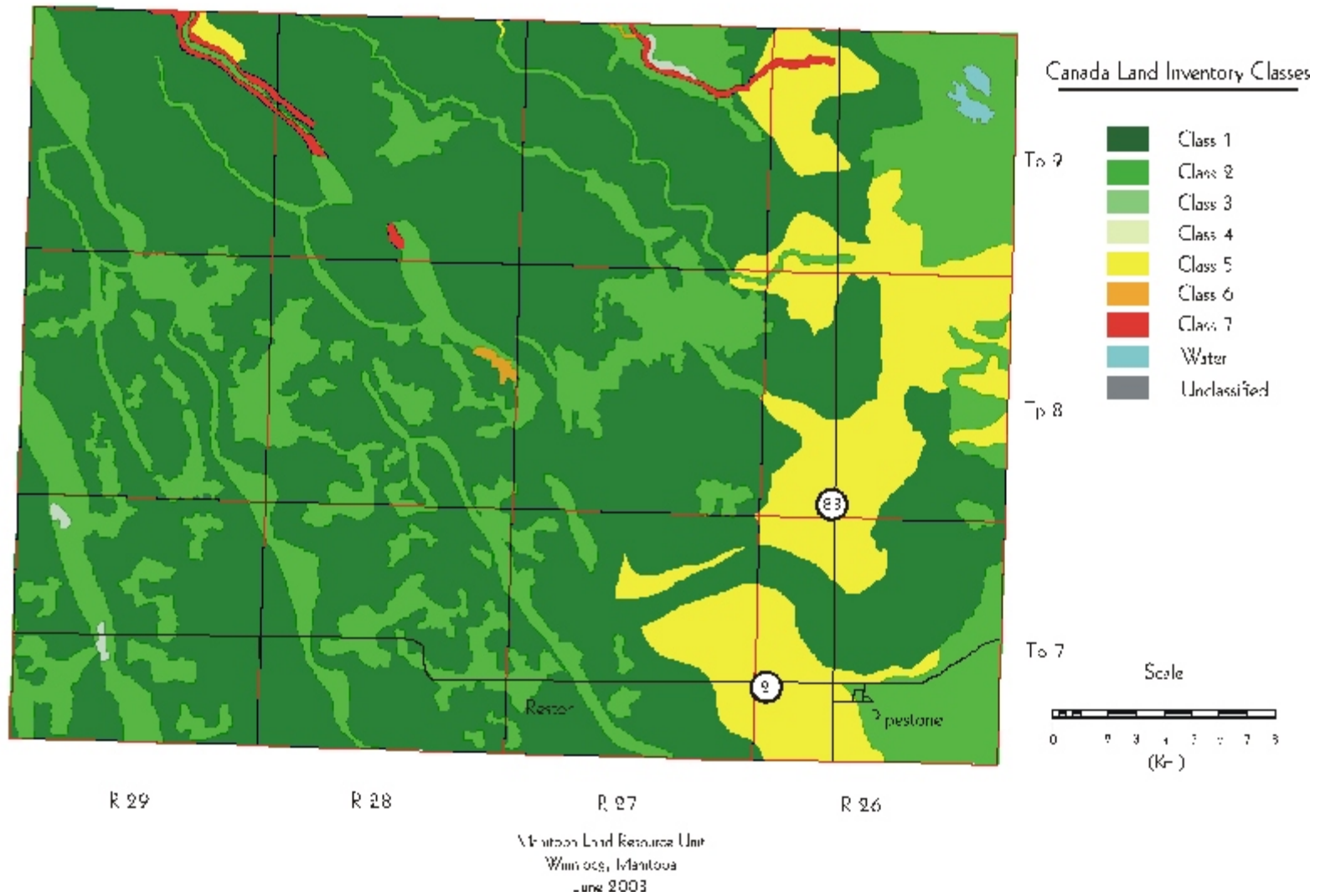
Table 4. Agricultural Capability¹

Class Subclass	Area (ha)	Percent of RM
2	71083	61.1
2T	60987	52.4
2TW	114	0.1
2W	7631	6.6
2X	2352	2.0
3	30032	25.8
3M	15846	13.6
3MT	734	0.6
3T	13452	11.6
4	188	0.2
4T	188	0.2
5	14035	12.1
5M	10473	9.0
5T	192	0.2
5W	3371	2.9
6	121	0.1
6	40	0.0
6T	81	0.1
7	680	0.6
7	437	0.4
7T	243	0.2
Water	216	0.2
Total	116355	100.0

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

Rural Municipality of Pipestone

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.

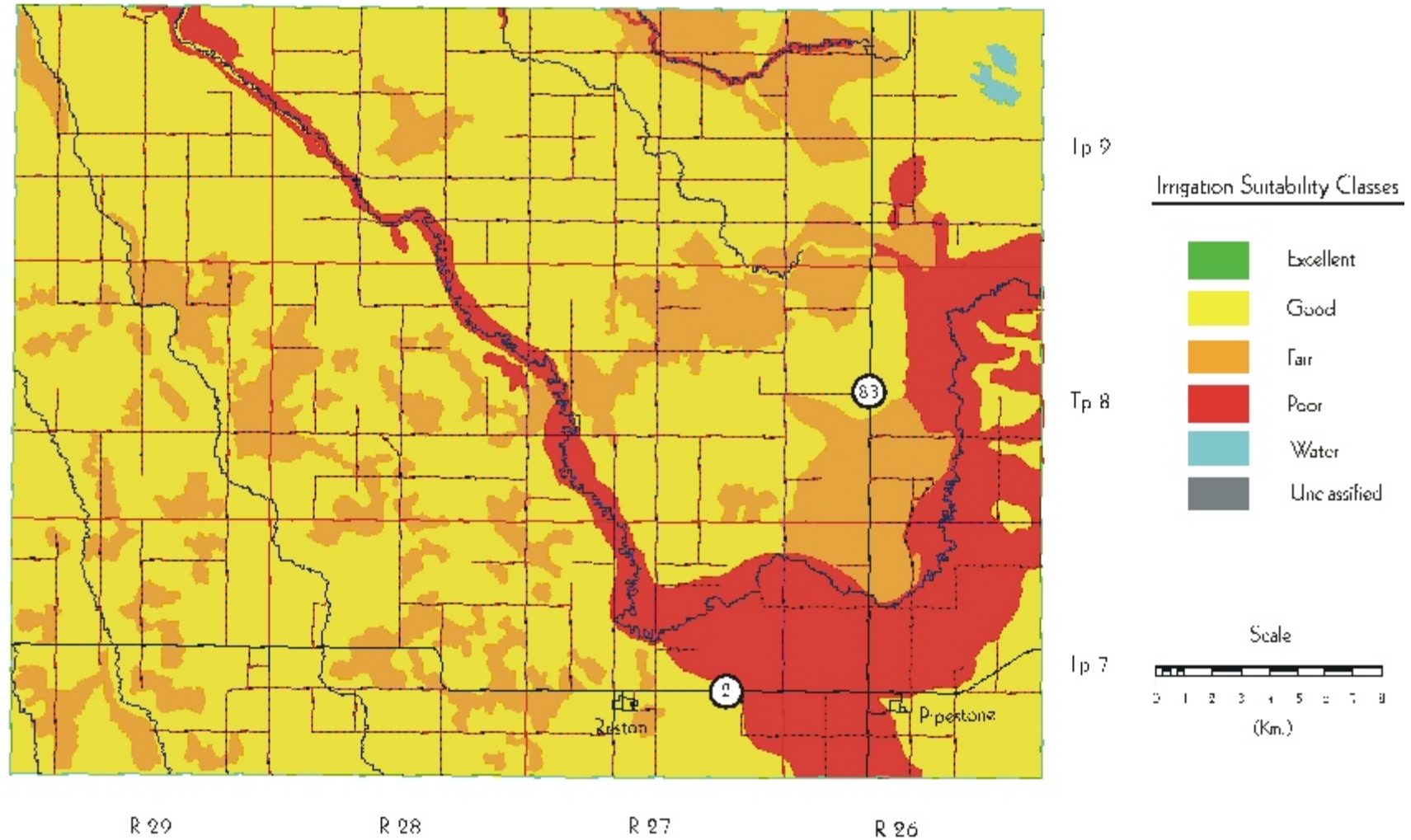
Table 5. Irrigation Suitability¹

Class	Area (ha)	Percent of RM
Excellent	0	0.0
Good	78963	68.0
Fair	20860	18.0
Poor	16094	13.9
Organic	0	0.0
Water	218	0.2
Unclassified	0	0.0
Total	116135	100.0

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

Rural Municipality of Pipestone

Irrigation Suitability Map



Manitoba Land Resource Unit
Centre for Land and Biological Resources Research
March 1996

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.

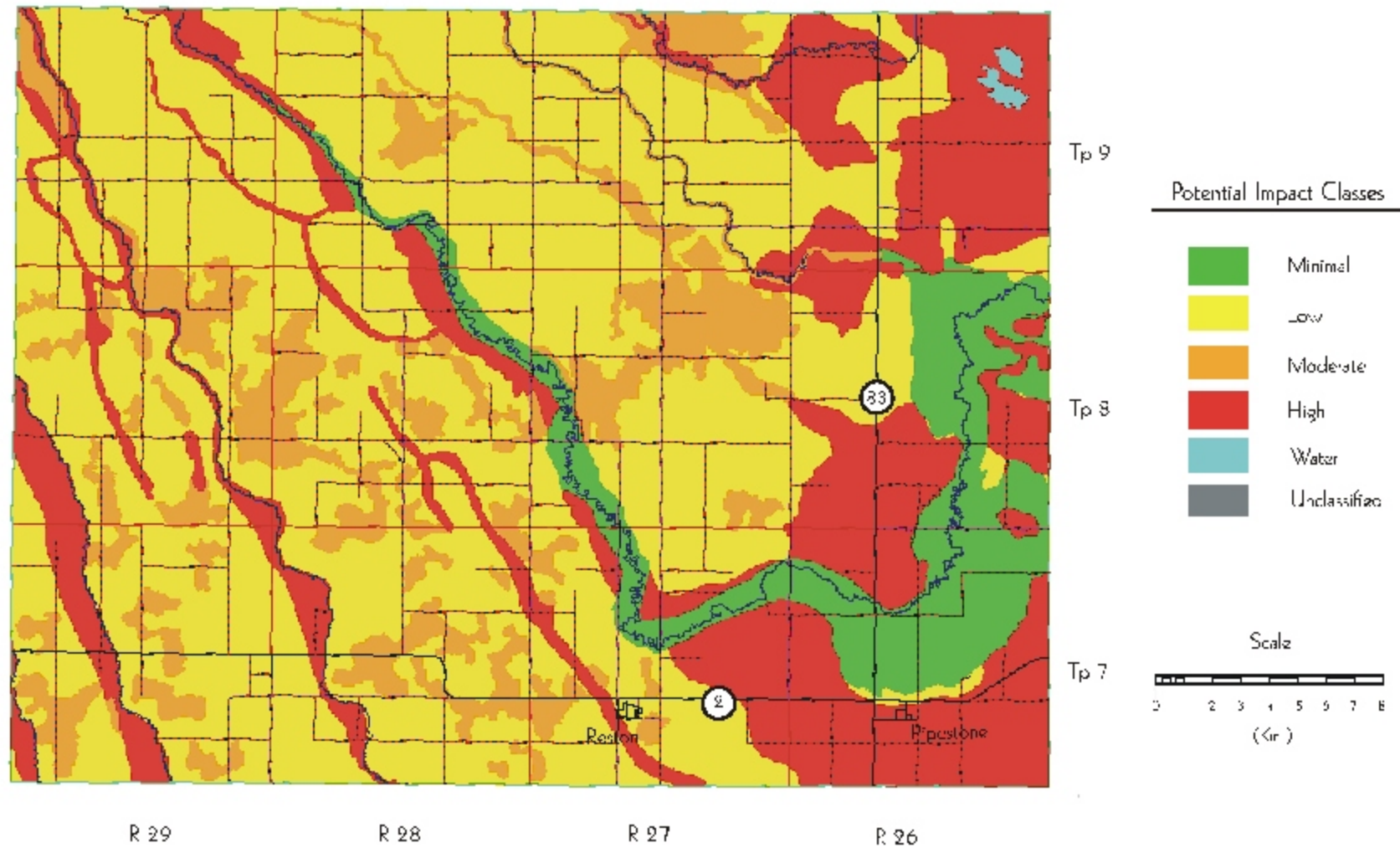
Use of this rating is intended to serve as a warning of potential environmental concern. It may be possible to design and/or give special consideration to soil-water-crop management practices that will mitigate any adverse impact.

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 Irrigation¹

Class	Area (ha)	Percent of RM
Minimal	10002	8.6
Low	63820	55.0
Moderate	15170	13.1
High	26925	23.1
Organic	0	0.0
Water	218	0.2
Unclassified	0	0.0
Total	116135	100.0

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

Rural Municipality of Pipestone**Potential Environmental Impact Under Irrigation**

Manitoba Land Resource Unit
Centre for Land and Biological Resources Research
March 1995

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.

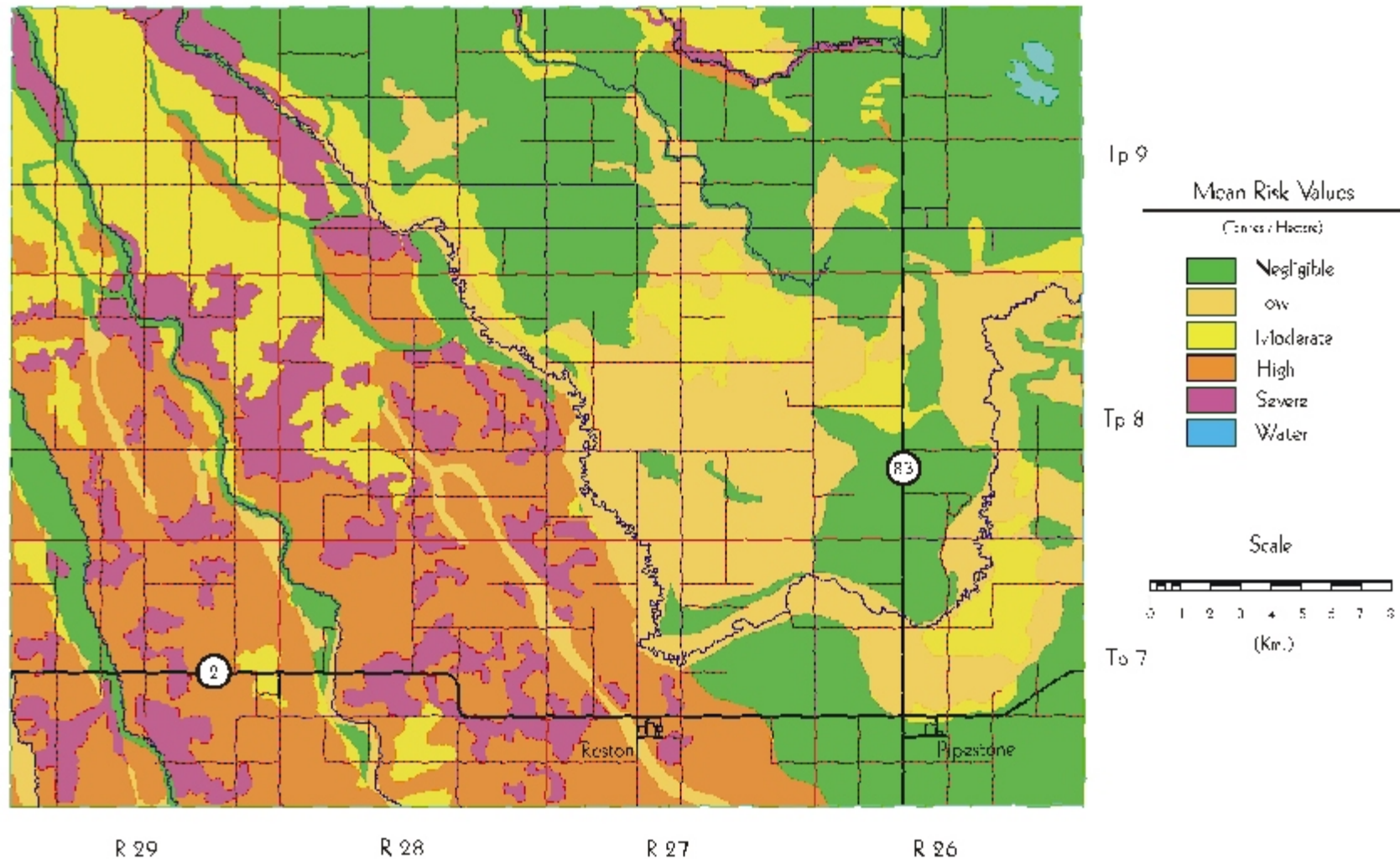
Table 7. Water Erosion Risk¹

Class	Area (ha)	Percent of RM
Negligible	37997	32.7
Low	21461	18.5
Moderate	18644	16.1
High	25267	21.8
Severe	12549	10.8
Water	218	0.2
Unclassified	0	0.0
Total	116135	100.0

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

Rural Municipality of Pipestone

Water Erosion Risk Map



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December 1994

REFERENCES

Agronomic Interpretations Working Group. 1992. Land Suitability Rating System for Spring-seeded Small Grains. 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.

Ellis, J.H., and Schafer, W.H. 1940. Reconnaissance Soil Survey of South-Western Manitoba. Soils Report No. 3. Manitoba Soil Survey. Published by Manitoba Dept. of Agriculture. 104pp and map.

Ehrlich, W.A., Pratt, L.E. and Poyser, E.A. 1956 Report of Reconnaissance Soil Survey of Rossburn and Virden Map Sheet Areas. Soils Report No. 6. Manitoba Soil Survey. Published by Manitoba Dept. of Agriculture. 121pp and 2 maps.

Environment Canada. 1982. Canadian Climatic Normals 1951-1980. 1- Temperatures, Vol. 2; 2- Precipitation, Vol. 3; 3- Frost, Vol. 6; 4- Degree Days, Vol. 4. 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.

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.

PFRA. 1964. Handbook for the Classification of Irrigated Land on the Prairie Provinces. PFRA, Regina, Saskatchewan.

Podolsky, G. 1985. Soils of the Souris, Virden and Wawanesa Townsites. Report No. D-56. Canada-Manitoba Soil Survey. Winnipeg.

Wishmeier, 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.

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 Use¹

Class	Area (ha)	Percent of RM
Annual Crop Land	77676	66.4
Forage	4242	3.6
Grasslands	24630	21.1
Trees	2036	1.7
Wetlands	4396	3.8
Water	317	0.3
Urban and Transportation	3680	3.1
Total	116977	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.

