
APPENDIX A

BIPOLE III

500 kV TRANSMISSION LINE PROJECT:

**A DESCRIPTION OF SOILS AND MAJOR AGRICULTURAL ACTIVITIES IN
THE STUDY AREA**

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Manitoba Hydro

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A DESCRIPTION OF SOILS AND MAJOR AGRICULTURAL ACTIVITIES IN THE STUDY AREA

This description of the soils and major agricultural activity in study area is based on information provided in the Ecological Stratification of Manitoba's Natural Landscapes, described by Smith et al, 1998¹. This document and map describes in more detail, the Manitoba portion of the National Ecological Framework of Canada, which has been used extensively for national state-of-environment reporting in Canada.

The boundary delineations of the study area (Figure 1) encompass a small portion on the eastern edge of the Prairie Ecozone - (Ecoregion 162 Lake Manitoba Plain and Ecoregion 156 Aspen Parkland) - extending from Reil to the Saskatchewan border and north to Ethylbert and Roblin including the Westlake region. The study also includes a small portion of Ecoregion 155 the Interlake Plain and Ecoregion 148 the mid-Boreal Lowland. These ecological map delineations (Figure1) reflect important ecological and physical characteristics of the land, bedrock, surface deposits, soils, drainage, relief, and vegetation. The sources of information are referenced in detail by Smith et al. 1998.

The study area has been delineated into 29 distinct soil and agriculture units as outlined in Figure 2, to facilitate the description of the soils and agricultural activities. For the most part, the boundary delineations follow the Ecodistrict polygons of the Ecostrat map (Smith et al. 1998). In some areas however, these Ecodistricts have been subdivided using the SLC (Soil Landscape of Canada²) boundaries to reflect important differences in soil and related agriculture conditions. Table 1 shows the relationship between the soil and agriculture units of this study and the nested ecological and SLC map polygons (Figure 2). This relationship facilitated access to more detailed soil information in the SLC database. An edited excerpt from each of the Ecodistricts as described by Smith et al. (1998) is summarized in Table 2. The following is an overview

1 Smith, R.E., H. Veldhuis, G.F. Mills, R.G. Eilers, W.R. Fraser, and G.W. Lelyk 1998. Terrestrial Ecozones, Ecoregions, and Ecodistricts, An Ecological Stratification of Manitoba's Natural Landscapes. Technical Bulletin 98-9E. Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada. Winnipeg, Manitoba. Report and map at 1:1 500 000 scale.

2 Canada Soil Inventory. 1989. Soil Landscapes of Canada – Manitoba. Land Resource Research Centre, Research Branch, Agriculture Canada, Ottawa, Ont. Agric. Can. Publ. 5242/B. 22pp. 1:1 million scale map compiled by Canada-Manitoba Soil Survey.

description of the soils, agricultural and land use conditions in each of the 29 delineations in this study.

The SSEA process began by characterizing the study area. Agricultural use was examined through the use of:

- Ecological Stratification of Manitoba's Natural Landscapes, described by Smith et al, 1998³;
- Soil Landscape of Canada⁴;
- Ecodistrict polygons of the Ecostrat map (*Smith et al. 1998*);

Map unit number as shown in Table 1 and Figure 2. - Summary of soils and agricultural activities. The study area was divided into seven agricultural categories:

1. Limited Agricultural Use Areas;
2. Mixed Farming Areas;
3. Intensively Cropped Area –Cereal and Special Crop and Mixed Farming;
4. Intensively Cropped Area – Cereal and Special Crops;
5. Intensively Cropped Area - Cereal, Special and Row Crops;
6. Intensively Cropped Area - Existing and Potential Irrigation ; and
7. Intensive Livestock Production Area.

3 Smith. R.E., H. Veldhuis, G.F. Mills, R.G. Eilers, W.R. Fraser, and G.W. Lelyk 1998. Terrestrial Ecozones, Ecoregions, and Ecodistricts, An Ecological Stratification of Manitoba's Natural Landscapes. Technical Bulletin 98-9E. Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada. Winnipeg, Manitoba. Report and map at 1:1 500 000 scale.

4 Canada Soil Inventory. 1989. Soil Landscapes of Canada – Manitoba. Land Resource Research Centre, Research Branch, Agriculture Canada, Ottawa, Ont. Agric. Can. Publ. 5242/B. 22pp. 1:1 million scale map compiled by Canada-Manitoba Soil Survey.

Table 1. Delineation of Soil and Agricultural Units In the Hydro-Transmission Corridor				
Ecoregion Number and Name	Soil and Agriculture Unit	Ecodistrict Number and Name	Soil Landscapes of Canada (SLC) Numbers	
162 Lake Manitoba Plain	1	849 Winnipeg	89,98,97	
	2		90	
	3		69	
		4	852 Winkler	73,74
		5	850 MacGregor	100,101,103,104
		6	851 Portage	99
		7	848 Langruth	92
		8	847 Gladstone	105,325
		9	841 Alonsa	138
		10	843 Ste. Rose	54,136,137,123
		11	844 McCreary	121,122,124
		12	840 Dauphin	125,135,442
		13	840 Dauphin	133
149 Boreal Transition	14	709 Swan River	186,12	
155 Interlake Plain	15	717 Swan Lake	131,130	
	16	717 Swan Lake	15,175,132,173,172,118, 178,23,119,134,	
148 Mid Boreal Lowlands	17	674 Pelican Lake	410,434,435,436,437,177,174	
	18	672 Overflowing River	182, 176	
	19	669 Saskatchewan Delta	204,408,166	
	20	664 Namew Lake	205,328, 329	
	21	672 Overflowing River	183	
	22	668 The Pas Moraine	185,409	
	23	667 Summerberry	207, 203,330	
156 Aspen Parkland	24	751 St. Lazare	6,7,8,114,113,333	
	25	753 Hamiota	111,324,110, 53, 109, 27,29, 108, 107, 60	
	26	759 Carberry	59	
	27	757 Shilo	31,58,56,61	
161 Aspen Parkland	28	839. Grandview	44,126,127,128	
149 Boreal Transition	29	709 Swan River	9, 116,435,438	

FIGURE 1. BOUNDARY OF STUDY AREA

Ecological Stratification of Manitoba's Natural Landscapes

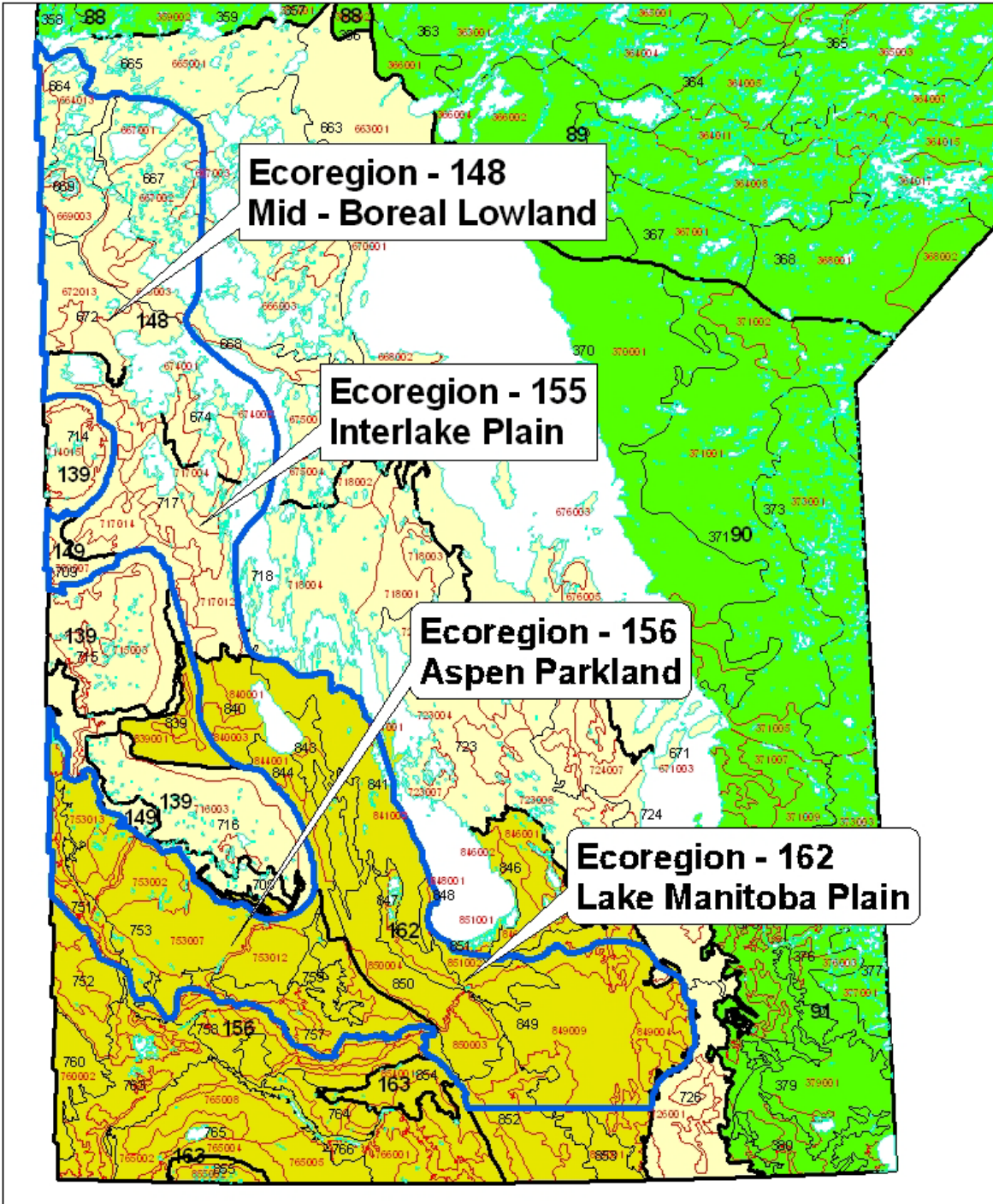
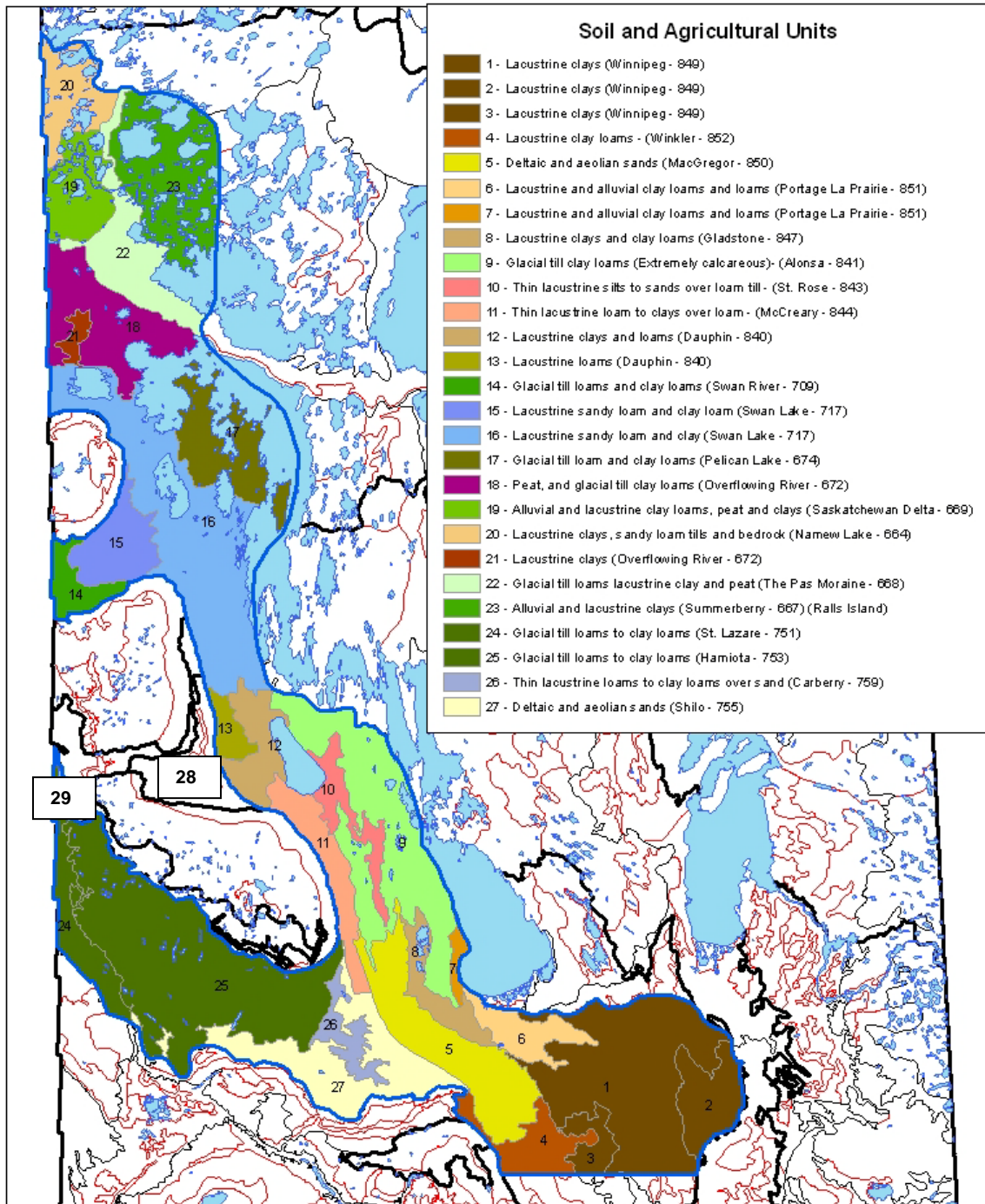


FIGURE 2. SOIL AND AGRICULTURAL UNITS

Ecological Stratification of Manitoba's Natural Landscapes



SOIL AND AGRICULTURE UNIT 1

CATEGORY 4 - INTENSIVELY CROPPED AREA -CEREAL AND SPECIAL CROP AREAS (LACUSTRINE CLAY SOILS)

WINNIPEG SOUTH, ECODISTRICT 849

Unit 1, Category 4 Winnipeg South - Lacustrine clay soils – (primarily Winnipeg Ecodistrict 849) – The unit is located south of Winnipeg and mostly west of the Red River. Cereals, oil seeds, some corn, sunflowers, and specialty crops are common. Intensive crop production is common throughout the whole area. There is little mixed farming unless it is associated with intensive livestock production in large scale barns. Rural and farm residences commonly occur on the better drained, minor elevations in the landscape. There are fewer livestock facilities and residences west of the Red River compared to east of the Red River. This area consists primarily of imperfectly drained, level, deep clayey lacustrine soils. Surface drainage has been enhanced through a network of semi-controlled drains. These clayey soils are renowned for their seasonally active shrink-swell behavior for both construction and crop production. Salinity is common in the northern part of the unit.

SOIL AND AGRICULTURE UNIT 2

CATEGORIES 4 AND 7 - INTENSIVELY CROPPED AREA -CEREAL AND SPECIAL CROP AREAS (LACUSTRINE CLAY SOILS) AND AN INTENSIVE LIVESTOCK PRODUCTION AREA

WINNIPEG, ECODISTRICT 849

Unit 2, Categories 4 and 7 – Winnipeg Southeast-Steinbach-St Adolph - Lacustrine clays - (portions of Winnipeg Ecodistrict 849) – Agriculture use consists of intensive livestock and crop production. Cereals, oil seeds, some corn, sunflowers, and specialty crops are common. Many towns, villages, rural residential and farm residences commonly occur on the better drained, minor elevations in each of the landscape units. The unit is located east of the Red River between Riel Station, Lorette, Steinbach west and to the Red River at St Agathe. These soils consists primarily of poorly drained, level, deep, clayey sediments that are frequently susceptible to surface ponding and flooding, particularly after spring snowmelt and occasionally after heavy spring and summer rains. For the most part each of these areas has been improved for agriculture by an integrated

network of surface drains. These clayey soils are also renowned for their seasonally active shrink-swell behavior for both construction and crop production.

SOIL AND AGRICULTURE UNIT 3

CATEGORY 4 - INTENSIVELY CROPPED AREA -CEREAL AND SPECIAL CROP AREAS (LACUSTRINE CLAY SOILS)

WINNIPEG, ECODISTRICT 849

Unit 3, Category 4 – Lacustrine clays - (portions of Winnipeg Ecodistrict 849) – Agriculture use consists of intensive crop production. Cereals, oil seeds, some corn, sunflowers, and specialty crops are common. Rural and farm residences commonly occur on the better drained, minor elevations in each of the landscape units. The unit is located north of Sperling and west of the Red River. There is little mixed farming unless it is associated with intensive livestock production in large scale barns. These soils consists primarily of poorly drained, level, deep, clayey sediments that are frequent susceptible to surface ponding and flooding, particularly after spring snowmelt and occasionally after heavy spring and summer rains. For the most part each of these areas has been improved for agriculture by an integrated network of surface drains. These clayey soils are also renowned for their seasonally active shrink-swell behavior for both construction and crop production. .

SOIL AND AGRICULTURE UNIT 4

CATEGORY 5 - INTENSIVELY CROPPED AREA - CEREAL, SPECIAL AND ROW CROPS (LACUSTRINE CLAY LOAM SOILS)

WINKLER, ECODISTRICT 852

Unit 4, Category 5 – Lacustrine clay loams - (Winkler Ecodistrict 852) – This is an intensively cropped area. Cereals, oilseeds and vegetable crops are grown mainly under dry land conditions. There is little mixed farming unless it is associated with intensive livestock production in large scale barns. This area contains farm yards, rural residences, and small communities. These soils are typically imperfectly drained and developed in thick lacustrine sediments. Occurrences of soil salinity are common.

SOIL AND AGRICULTURE UNIT 5

CATEGORY 5 - INTENSIVELY CROPPED AREA - EXISTING AND POTENTIAL IRRIGATION AREAS (DELTAIC AND AOELIAN SANDY SOILS)

MACGREGOR, ECODISTRICT 850

Unit 5, Category 5 – Deltaic and aeolian sands (MacGregor Ecodistrict 850) – Existing and potential irrigation agriculture are the major characteristic of land use in this unit. The unit is located north of Carman to Elm Creek, past St Claude to Rathwell, over the Assiniboine River past Austin, MacGregor and Bagot to Beaver and Arden to Gladstone north of Highway 1. Many rural and farm residences commonly occur in the treed areas. The area is characterized by intensive irrigation (1/4 section center pivot) systems. These are used primarily for potato production. Irrigation activities are increasing. Other crops produced in the area include cereals, corn, oil seeds (canola and sunflower). Livestock production is common on non irrigated dunned sands where extensive grazing takes place and numerous treed areas are utilized as natural habitat. The majority of this unit is characterized by wet (high water table), shallow (< 5 m), and sandy deltaic deposits. Some portions are strongly influenced by steep, sandy, dunned topography.

SOIL AND AGRICULTURE UNIT 6

CATEGORY 5 AND 6 - INTENSIVELY CROPPED AREA - EXISTING AND POTENTIAL IRRIGATION AREAS (LACUSTRINE AND ALLUVIAL CLAY LOAMS AND LOAMS SOILS)

PORTAGE, ECODISTRICT 851

Unit 6, Categories 5 and 6 – Lacustrine and alluvial clay loams and loams (Portage La Prairie Ecodistrict 851) – Most of these soils are highly productive. Vegetable crops grown under irrigation are common in the Portage La Prairie area. Other crops include spring wheat, cereal grains, oil seeds and hay crops. These soils are found east of Highway 16. The dominant soils are developed on imperfectly drained sediments in the Portage la Prairie area south of Lake Manitoba.

SOIL AND AGRICULTURE UNIT 7

CATEGORY 2 - MIXED FARMING AREAS (LACUSTRINE LOAMS AND SANDY LOAM SOILS) LANGRUTH, ECODISTRICT 848

Unit 7, Categories 2 - Lacustrine loams and sandy loams (Langruth Ecodistrict 848) - Agriculture consists of cereal crops with some mixed farming including pasture and hayland. Most of these soils are found east of Highway 50. Soils are imperfectly drained shallow, extremely to strongly calcareous sediments. Internal drainage is impeded by a clay substrate resulting in high water tables. There are significant local areas of poorly drained soils nearer the lake shore.

SOIL AND AGRICULTURE UNIT 8

CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL AND SPECIAL CROP AND MIXED FARMING (LACUSTRINE LOAMS AND CLAY SOILS) GLADSTONE, ECODISTRICT 847

Unit 8, Categories 3 - Lacustrine loams and clays (Gladstone Ecodistrict 847) - The sandy soils with active and potential for irrigation give way to these soils north of Beaver and south of Highway 16. The soils proceed north of Highway 16 on the west side of the Big Grass Marsh. Most of the soils are cultivated for spring wheat, other cereal grains, oil seeds and hay crops. Tame and native hay production as well as pasture occurs on saline and Solonetzic soils. Grazing occurs near the Big Grass Marsh. Here soils are imperfectly drained, shallow and strongly calcareous sediments. Internal drainage is impeded by clay surface textures in the south and a clay substrate in the north, causing high water tables. Local areas of poorly drained soils, saline soils and poorly structured Solonetzic soils also occur.

SOIL AND AGRICULTURE UNIT 9

CATEGORY 1 - LIMITED AGRICULTURAL USE AREAS (GLACIAL TILL CLAY LOAMS)

ALONSA, ECODISTRICT 841

Unit 9, Category 1 – Glacial till clay loams - (Alonsa Ecodistrict 841) - There is limited agricultural crop production in this area although spring wheat, other cereal grains, oilseeds and hay crops are produced on some lands. These lands begin at Highway 16 and proceed north on the west side of Highway 50 and on the east side of the Big Grass Marsh. North of the Marsh these soils form a large part of the central and east side of the Westlake and west to Ste Anelie. Excessive stones and cobbles, an irregular topographic pattern and the lack of natural drainage are major limitations for soil management. Much of the area remains as public lands, some of which are leased for native pasture and hay. Most of this unit remains in trees and marsh with minor areas of commercial agriculture. The local ridges consist of strongly calcareous, very cobbly to gravelly glacial till. Significant areas of permanently wet (Gleysols) soils occur in the swales with most having thin peaty surface layers. Glacial deposits vary in thickness to more than 30 m.

SOIL AND AGRICULTURE UNIT 10

CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL, SPECIAL CROP AND MIXED FARMING AREAS (THIN LACUSTRINE SILTS TO SANDS OVERLYING LOAMY GLACIAL TILL SOILS)

STE ROSE, ECODISTRICT 843

Unit 10, Category 3 – Thin lacustrine silts to sands overlying loamy glacial till - (St. Rose Ecodistrict 843) Intensive agriculture includes grain and oilseeds production and some mixed farming. These soils are found south and north of Ste Rose There are minor areas of well drained soils on till ridges and some well drained sandy soils. An area of shallow organic soils occurs south of Dauphin Lake. Soils this area are characterized by imperfectly and poorly drained, shallow, very strongly calcareous sediments, overlying to extremely calcareous loamy till. Bare soil conditions make the soils susceptible to wind erosion.

SOIL AND AGRICULTURE UNIT 11

CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL, SPECIAL CROP AND MIXED FARMING AREAS (THIN LACUSTRINE LOAM TO CLAYS OVERLYING LOAMY GLACIAL TILL SOILS)

MCCREARY, ECODISTRICT 844

Unit 11, Category 3 – Thin lacustrine loam to clays overlying loamy glacial till - (McCreary Ecodistrict 844) - Spring wheat, other cereal grains, oil seeds and hay crops are produced intensively in the area from McCreary to Laurier and north. Saline affected areas mostly remain in native pasture and hay land. Some light agricultural and processing industries occur in the vicinity of Dauphin. Soils are imperfectly and poorly drained shallow sediments overlying very strongly calcareous glacial till. Small areas of soil salinity are also present. Flooding in spring and after summer storms is common and significant amounts of shaly sediment are often washed out and deposited in the bottom of streams and ditches below the escarpment.

SOIL AND AGRICULTURE UNIT 12

CATEGORY 4 - INTENSIVELY CROPPED AREA -CEREAL AND SPECIAL CROP AREAS (LACUSTRINE LOAMS AND CLAYS SOILS)

DAUPHIN, ECODISTRICT 840

Unit 12, Category 4 – Lacustrine loams and clays (Dauphin Ecodistrict 840)
Agricultural use is characterized by intensive commercial grain and oilseed production with some livestock and pasture to the south, east, west and northwest of Dauphin. This Ecodistrict has been subdivided to reflect important soil and agricultural differences. One area is typically loam textured while the other has more clay. Most soils are imperfectly drained, shallow, and very strongly calcareous. Minor local areas of imperfectly drained, poorly structured salt affected (Solonetzic) soils occur in the vicinity of Dauphin. Poorly drained Gleysols are common.

SOIL AND AGRICULTURE UNIT 13

**CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL, SPECIAL CROP AND MIXED FARMING AREAS (LACUSTRINE LOAM SOILS)
DAUPHIN, ECODISTRICT 840**

Unit 13, Category 3 - Lacustrine loams (Dauphin Ecodistrict 840) - Agricultural land use includes mostly cereal and oilseed crop production with some hay and pasture. Soils are more sandy and silty, shallow and susceptible to wind erosion.

SOIL AND AGRICULTURE UNIT 14

**CATEGORY 3 - INTENSIVELY CROPPED AREA – CEREAL, SPECIAL CROP AND MIXED FARMING AREAS (GLACIAL TILL LOAMS AND CLAY LOAM SOILS)
SWAN RIVER, ECODISTRICT 709**

Unit 14, Category 3 – Glacial till loams and clay loams (Swan River Ecodistrict 709) - This is an area of significant agricultural activity including cereal crop production, grazing and mixed farming in the southwest portion of the Swan River Valley. Only a small portion of this Ecodistrict in the vicinity of Swan River, occurs in the study area. Many of the soils are developed on well drained glacial till with some fluvio glacial deposits and sandy relic beach deposits. Local areas of well drained clayey till and pockets of lacustrine sediments, occur at higher elevations.

SOIL AND AGRICULTURE UNIT 15

**CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL, SPECIAL CROP AND MIXED FARMING AREAS (LACUSTRINE SANDY LOAM AND CLAY LOAM SOILS)
SWAN LAKE, ECODISTRICT 717**

Unit 15, Category 3 - Lacustrine sandy loam and clay loam (Swan Lake Ecodistrict 717) - This is an area of intensive agricultural activity including cereals, oilseeds and pulse grain production. There is some grazing and mixed farming in the heart of the Swan River Valley. The Ecodistrict has been subdivided to reflect important soil and agricultural differences. This agricultural unit contains two major soil textures, i.e., sands and clay loams. Soils in this agricultural unit are dominantly imperfectly drained.

SOIL AND AGRICULTURE UNIT 16

CATEGORY 1 - LIMITED AGRICULTURAL USE AREAS - (LACUSTRINE SANDY LOAM AND CLAY SOILS)

SWAN LAKE, ECODISTRICT 717

Unit 16, Category 1 – Lacustrine sandy loam and clay (Swan Lake Ecodistrict 717) – Where drainage has not been improved there is little or no agricultural use and where it is used, land use is native pasture and hay. Small local areas of better drained mineral soils are cropped to spring wheat, other cereal grains, oil seeds and hay crops on the east side of the Swan River Valley. This unit contains primarily imperfectly drained, shallow, very strongly calcareous, sediments and glacial till. Local areas of poorly drained peaty soils and shallow organic soils are found in depression areas. .

SOIL AND AGRICULTURE UNIT 17

CATEGORY 1 - LIMITED AGRICULTURAL USE AREAS - (GLACIAL TILL LOAM AND CLAY LOAMS SOILS)

PELICAN LAKE, ECODISTRICT 674

Unit 17, Category 1 - Glacial till loam and clay loams (Pelican Lake Ecodistrict 674) - Land use remains primarily natural habitat. This is an area of very limited agricultural use. A small amount of public lands are commonly leased out for native pasture and hay. Excessive amounts of stones and cobbles, an irregular topographic pattern and lack of natural drainage are the main problems for soil management. Ridges are dominantly well to imperfectly drained extremely calcareous, and very cobbly to gravelly. Significant areas of poorly drained peaty soils and slightly to moderately decomposed organic soils are significant inclusions.

SOIL AND AGRICULTURE UNIT 18

CATEGORY 1 - LIMITED AGRICULTURAL USE AREAS - (GLACIAL CLAY LOAM TILLS AND LACUSTRINE CLAY SOILS)

OVERFLOWING RIVER ECODISTRICT 672

Unit 18, Category 1 - Peat (weakly decomposed organic) soils are dominant (Overflowing River Ecodistrict 672) with significant areas of lacustrine clay and clay loam tills on ridges. There is no agricultural use in the unit. Lack of natural drainage and poor thermal conductance properties limit the usefulness of organic soils. Excessive stones and cobbles limit the usefulness of the tills; however, the clayey soils have some limited agricultural potential. Land use remains primarily natural habitat.

SOIL AND AGRICULTURE UNIT 19

CATEGORY 2 - MIXED FARMING AREAS (ALLUVIAL TO CLAYEY LACUSTRINE SOILS) SASKATCHEWAN DELTA ECODISTRICT 6

Unit 19, Category 2 - Alluvial and lacustrine loams to clayey sediments (Saskatchewan Delta Ecodistrict 669) - A limited portion of the alluvial soils are cultivated for cereal grains, oilseeds and hay crops in the agricultural area at The Pas. Lack of natural drainage and sporadic occurrence of soil salinity are the major limitations for agriculture on the alluvial and lacustrine soils, while excessive stones and cobbles limit agriculture on the till soils. The construction of ditches has improved drainage for agricultural purposes in some areas of the Manitoba portion of the Ecodistrict. Soils are poorly drained and generally deep, with occasional areas having a shallow depth to underlying glacial tills. Peat soils are common along the Saskatchewan border to the west and till soils more prevalent to the east.

SOIL AND AGRICULTURE UNIT 20

CATEGORY 2 - MIXED FARMING AREAS (LACUSTRINE CLAYS AND GLACIAL TILL LOAM SOILS)

NAMEW LAKE ECODISTRICT 664

Unit 20, Category 2 - Lacustrine clays and glacial till loams to clay loams (Namew Lake Ecodistrict 664) - A limited portion of the clayey soils are cultivated for cereal grains, alfalfa seed and hay crops west of The Pas. Most of the land is public land and some of it is leased as native pasture and hay. Soil drainage is mostly imperfect, and the till soils are stoney and cobbly. Extensive areas of weakly decomposed organic soils are common throughout this unit, with minor occurrences of permafrost. Poor soil structure, lack of

natural drainage, excess stoniness and high lime content associated with the till soils are the major limitations to agricultural use of the soils.

SOIL AND AGRICULTURE UNIT 21

CATEGORY 1 - LIMITED AGRICULTURAL USE AREAS

OVERFLOWING RIVER ECODISTRICT 672

Unit 21, Category 1 - Lacustrine clays with significant moderately decomposed peats. (Overflowing River Ecodistrict 672) The area provides natural habitat. There are no agricultural activities in this area, although there is some limited potential for agriculture on the clay soils. This area is located to the west and north of Red Deer Lake. It was subdivided on the basis of the SLC unit 183, which is dominantly clay textured.

SOIL AND AGRICULTURE UNIT 22

CATEGORY 1 - LIMITED AGRICULTURAL USE AREAS

THE PAS MORAINÉ ECODISTRICT 668

Unit 22, Category 1 - There is no agricultural use and essentially no potential for agriculture in this unit due to poor drainage, stoniness, topography and cold thermal regimes. Soils are mixed glacial deposits of cobbly gravel, loamy tills and weakly to moderately decomposed peat lands (The Pas Moraine Ecodistrict 668). This unit has a range of slopes from steep on ridges to level in depressions.

SOIL AND AGRICULTURE UNIT 23

CATEGORY 2 - MIXED FARMING AREAS (ALLUVIAL TO LACUSTRINE LOAMS TO CLAYS WITH SIGNIFICANT AREA OF PEAT)

SUMMERBERRY ECODISTRICT 667

Unit 23, Category 2 - Alluvial and lacustrine loams to clays with significant areas of peat. (Summerberry Ecodistrict 667). A limited extent of the soils in the Rahls Island area is cultivated for the production of cereal grains, oil seeds and hay crops. Most of the land is public and/or leased for native pasture and hay. Lack of natural drainage is the major soil problem. The excessive amounts of stones and cobbles associated with the till soils is an additional problem.

SOIL AND AGRICULTURE UNIT 24

CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL, SPECIAL CROP AND MIXED FARMING AREAS (GLACIAL TILL LOAMS AND CLAY LOAM SOILS) ST. LAZARE ECODISTRICT 751

Unit 24, Category 3 - Glacial till loams and clay loams (St. Lazare Ecodistrict 751) – . Agriculture is a dominant land use, but steep slopes, risk of erosion and some localized areas of salinity pose some restrictions on the types of crops and yield potentials. Cultivated soils produce spring wheat, other cereal grains, oil seeds and hay crops. The steeper valley slopes and drier outwash soils are used for pasture and hay crops. The Shellmouth Dam is a major flood control structure on the Assiniboine River and the associated Lake of the Prairies is the focus for water-oriented recreation. Because of the broad river valleys containing the Assiniboine and Qu'Appelle rivers the soils have a large range of slopes and topography.

SOIL AND AGRICULTURE UNIT 25

CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL, SPECIAL CROP AND MIXED FARMING AREAS (GLACIAL TILL LOAMS AND CLAY LOAM SOILS) HAMIOTA ECODISTRICT 753

Unit 25, Category 3 - Glacial till, loams to clay loams (Hamiota Ecodistrict 753) - Agriculture is a dominant land use. Current continuous cropping practices, reduced summer fallow and retention of crop residues as surface cover has greatly reduced the risk of erosion damage. Most of the land is cultivated for wheat, other cereal grains, oil seeds and hay crops. The more saline soil areas are used for pasture and hay production. Most of the soils are well drained, some of the knolls have been slightly to moderately affected by tillage erosion as well as wind and water erosion. There are many undrained potholes that provide natural habitat.

SOIL AND AGRICULTURE UNIT 26

CATEGORY 5 - INTENSIVELY CROPPED AREA - EXISTING AND POTENTIAL IRRIGATION AREAS (LACUSTRINE LOAMS TO CLAY LOAMS OVERLYING SANDY DELTAIC SOILS) CARBERRY ECODISTRICT 759

Unit 26, Category 5 - Lacustrine loams to clay loams overlying stratified sandy deltaic deposits (Carberry Ecodistrict 759) – Agriculture is a dominant land use. Nearly all of these uniformly excellent agricultural soils are cultivated for dryland production of spring

wheat, other cereal grains, oil seeds, hay, and limited production of alfalfa. Irrigated production of potatoes has expanded rapidly in the last decade in this unit; corn production under irrigation is also common.

SOIL AND AGRICULTURE UNIT 27

CATEGORY 5 - INTENSIVELY CROPPED AREA - EXISTING AND POTENTIAL IRRIGATION AREAS (DELTAIC AND AOELIAN SANDY SOILS)

SHILO ECODISTRICT 755

Unit 27, Category 5 - Wind modified deltaic sands (Shilo Ecodistrict 755) – Soil materials are well to rapidly drained and profile development is weak. In the non-cultivated portions, sand dunes are one of the most diagnostic features of this landscape. In recent times, the more level to gently undulating portions have been developed for irrigated production of potatoes using centre pivots. The production of spring wheat, other cereal grains, flax, hay and limited production of alfalfa, and corn are also common, much of it under dry land conditions. Some of these crops are also irrigated as they form part of the rotation for irrigated potatoes. The more steeply sloping, erosive silty soils in the eastern section grow a similar range of crops using mostly dryland management practices. These latter soils exhibit moderate to severe tillage, water and wind erosion. Current continuous cropping practices, reduced summerfallow, cover crops and retention of crop residues on the surface have greatly reduced the erosion risk.

SOIL AND AGRICULTURE UNIT 28

CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL, SPECIAL CROP AND MIXED FARMING AREAS (GLACIAL TILL LOAMS AND CLAY LOAM SOILS)

GRANDVIEW ECODISTRICT 839

Unit 28, Category 3 - Lacustrine loamy sands and clays (Grandview Ecodistrict 839) – Agriculture is the dominant land user. Most soils are cultivated for the production of spring wheat, other cereal grains, oil seeds and hay crops. Areas with unimproved drainage are in native pasture and hay. Wet and wooded areas provide natural habitat. There is some risk of erosion on lighter textured soils with steeper slopes; otherwise the soils are generally good for agricultural production. Soils are well to imperfectly drained shallow, strongly calcareous sediments overlying extremely calcareous glacial till. Tills are dominant at higher elevations.

SOIL AND AGRICULTURE UNIT 29


























**CATEGORY 3 - INTENSIVELY CROPPED AREA –CEREAL, SPECIAL CROP AND MIXED
FARMING AREAS (GLACIAL TILL LOAMS AND CLAY LOAM SOILS)**






SWAN RIVER ECODISTRICT 709

Unit 29, Category 3 - Glacial till loams and clay loams (Swan River Ecodistrict 709) – Land use in this area includes mixed farming activities including cereals and grazing. There are numerous permanent water bodies and small lakes south and west of Duck Mountain. This unit identifies the southern arm (See unit 14 for description of northern section) of this Ecodistrict in Manitoba.. Many of the soils are developed on well drained glacial till with some fluvioglacial deposits and sandy relic beach deposits. Local areas of well drained clayey till and pockets of lacustrine sediments, occur at higher elevations.

APPENDIX B. Memory Map Symbol Key

34 Categories of Activities

	Occupied Livestock
	Occupied Grain
	Occupied Dairy
	Occupied Mixed
	Residential Buildings
	Livestock Buildings
	Grain Buildings
	Dairy Buildings
	Mixed Buildings
	Abandoned Residential
	Abandoned Livestock
	Abandoned Grain
	Abandoned Dairy
	Abandoned Mixed
	Rural Residential – Unknown if Occupied
	Livestock – Unknown if Occupied
	Grain – Unknown if Occupied
	Dairy – Unknown if Occupied
	Mixed – Unknown if Occupied
	Livestock Buildings – Unknown if Operational
	Grain Buildings – Unknown if Operational
	Dairy Buildings – Unknown if Operational
	Mixed Buildings- Unknown if Operational
	Colony
	Colony

	Colony
	Irrigation Pivot
	Irrigation Well Head
	Bins
	Bins
x	No Building
?	Unknown

APPENDIX C. BIPOLE III ROUTING OPPORTUNITIES THROUGH
AGRICULTURAL MANITOBA, JULY, 2009

**Bipole III
Routing Opportunities
through Agricultural Manitoba**

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1.0 Introduction

J&V Nielsen and Associates Ltd. were contracted by Manitoba Hydro to develop possible routing lines for Bipole III. The preliminary investigation identified numerous corridors from the Riel Station, south and west across the Seine, Red and Assiniboine Rivers past Highway 1 and 16 and north to Bellsite (East of the Porcupine Hills) via Rorketon and Winnipegosis, Dauphin or west of the Duck Mountain Provincial Park (Duck Mountain) and the Riding Mountain National Park (Riding Mountain). After an initial meeting with MMM Group and Manitoba Hydro various corridors options were removed, such as the routes south and north of Spruce Woods Park, just west of the Duck and Riding Mountain Parks and through the bogs west of the Swan River Valley. Priority was given to placing lines on the road allowance and drainage ditches to decrease the cost of construction. This meant most routes were developed in areas utilized by agriculture as these are where rural infrastructure has been developed.

Detail agricultural routing criteria and analysis methodology was developed so alternate line placement could be evaluated. This process was conducted on all routes developed. Four potential routes were established from Riel Station across the Seine, Red and Assiniboine Rivers, north through Westlake, Winnipegosis, Cowan, and ending at Bellsite (on the east side of the Porcupine Hills). A fifth potential route was developed from Riel Station across the Seine, Red and Assiniboine Rivers, north past the east side of Riding Mountain, south and west of Dauphin, east of Highway 10, east of the Duck Mountain, through Cowan and north ending at Bellsite (on the east side of the Porcupine Hills). A sixth potential route was developed from Riel Station across the Seine, Red and Assiniboine Rivers, north past the south and west side of Riding Mountain, then west of the Duck Mountain, through the Swan River Valley and northeast ending at Bellsite (on the east side of the Porcupine Hills). This analysis covered much of the agricultural area of Manitoba.

2.0 Determining Routing Criteria (Excerpt from Silver Transmission Line Study)

The following section from the Silver 230 kV Transmission Line study outlines how the transmission line will affect agricultural productivity. It describes the transmission line impacts in a descending order of importance. These criteria were used to create the scoring system (see Section 3.0) used to compare various line choices.

Excerpt from the Silver 230kV Transmission Line Study

Beginning with the highest priority, agricultural activities to avoid with large scale transmission lines are as follows:

- *Dwellings and farm yards;*
- *Intensive livestock operations;*
- *Lands under irrigation;*
- *Lands with irrigation potential;*

- *Row crop areas;*
- *Intensive annually cropped areas;*
- *Tame forage areas;*
- *Mixed farming areas with some cultivated land;*
- *Native pasture and hay lands; and*
- *Lands with limited/no agricultural use.*

The following general guidelines have been adopted for routing transmission lines through agricultural lands:

- *Route on or adjacent to the road allowance, if possible;*
- *Route along the half mile to avoid farm yards, livestock barns and other higher priority obstacles;*
- *Avoid in-field placement in cultivated lands under annual crop production; placement parallel to the road allowance is preferred to diagonal placement.*

3.0 Agricultural Routing Criteria for the Bipole III Study

The following preliminary criteria have been established and will be used to select routes with agricultural priority 1, 2, 3, 4 and 5. The criteria may change as the study evolves particularly with the development of the Study Area Characterization. Each past transmission line study has produced a different set of criteria depending on the agricultural areas the line crosses. The rating system has been developed in an ascending order where the lower numbers reflect the least impact on agriculture and therefore will receive the highest agricultural priority. For example, the shortest line combined with the poorest agricultural land crossed will provide the the lowest number and therefore will be given the highest priority from an agricultural transmission line routing perspective.

3.1 Agricultural Impact Rating

Agricultural soils were divided into eight categories based on productivity, present use and potential impacts. These ratings are presented in Table 1.

Table 1: Agricultural Impact Rating

Rating	Rating Description
1	Limited to no agricultural use including wetlands.
2	Shallow glacial till soils producing mainly native hay and grazing; however some tame hay and annual crops are produced.
3	Higher quality glacial till soils with numerous larger potholes used for cereal, special, pulse and tame forage production.
4	Soils used for cereal, special, pulse and tame forage production, however the soils have production limitations such as topography, light soil texture, potholes, and others.
5	Intensively cropped soils used for cereal, special, pulse and tame forage production.

6	Intensively cropped soils used for row cropping and cereal, special, pulse and tame forage production.
7	Soils with irrigation potential.
8	Areas with active irrigation systems.

3.2 Tower Placement

The agricultural impact of the tower placement is dependent on the land use of the area as well as the location of the tower on the field. In areas of intensive cropping the impact of the tower is greater and therefore the rating of tower placement through areas with lands in categories 3-8 is higher (see Section 3.1). Where lines are placed through lower category land (categories 1-2) the impact of the tower is minimal.

3.2.1 Tower Placement (Categories 1 and 2)

Soils in categories 1 and 2 are not used for cropping therefore the impact on the land use of towers placed in the field is minimal. The rating for tower placement is the same for all placement categories (Table 2).

Table 2: Agricultural Impact of Categories 1 and 2 Tower Placement

Rating	Rating Description
1	Tower placement on or on the edge of the road allowance.
1	Tower placement on the edge of a drainage ditch.
1	Tower placement on the half mile line (some management unit splits).
1	Tower placement on the quarter mile line or 50 m into the field (each field will have a management unit split).
1	Tower placement on the diagonal (each field will have a management unit split).

3.2.2 Tower Placement (Category 3)

Lands in category 3 may be used for cropping or forage. Forage crops are not as affected by tower placement therefore the rating for this category is lower than for soils in categories 4-7. Table 3 outlines the ratings given to the various tower placements.

Table 3: Agricultural Impact of Category 3 Tower Placement

Rating	Rating Description
1	Tower placement on or on the edge of the road allowance.
1	Tower placement on the edge of a drainage ditch.
3	Tower placement on the half mile line (some management unit splits).
3	Tower placement on the quarter mile line or 50 m into the field (each field will have a management unit split).
3	Tower placement on the diagonal (each field will have a management unit split).

3.2.3 Tower Placement (Categories 4-7)

Soils in categories 4-7 are used for growing crops. Intensive cropping requires the use of large implements. A tower placed in the middle of the field impedes the farmer's ability to move equipment through the field and as a result the farmer must divide the field into smaller management units. Towers placed on the road allowance or on the edge of a drainage ditch have only minimal impact on the land use. Most agricultural land is divided in half sections and therefore towers placed on the half section interfere less with cropping. Towers placed on the quarter mile have more impact as well as towers placed on a diagonal line. Table 4 outlines the ratings given to the various tower placements.

Table 4: Agricultural Impact of Categories 4-7 Tower Placement

Rating	Rating Description
1	Tower placement on or on the edge of the road allowance.
1	Tower placement on the edge of a drainage ditch.
3	Tower placement on the half mile line (some management unit splits).
4	Tower placement on the quarter mile line or 50 m into the field (each field will have a management unit split).
5	Tower placement on the diagonal (each field will have a management unit split).

3.2.4 Tower Placement (Category 8)

Tower placement in soils with active irrigation, category 8, should be avoided. If the line must pass through an area with active pivot irrigation the towers will need to be strategically placed and the line should be on the road allowance, drainage ditch, or half mile lines. The ratings in table 5 reflect the importance of minimizing towers placed in these areas.

Table 5: Agricultural Impact of Category 8 Tower Placement*

Rating	Rating Description
10	Tower placement on or on the edge of the road allowance.
10	Tower placement on the edge of a drainage ditch.
10	Tower placement on the half mile line.

* In field and diagonal placement are not compatible with pivot irrigation.

3.3 Line Length

The line length is determined for each line segment as well as the agricultural and tower placement rating. The total route length and rating is determined by the sum of the segments chosen for that route.

3.4 Facilities

Where data is available facilities within a quarter mile of the line are counted.

3.5 Final Scoring of the Agricultural and Tower Placement Impact

In this system each segment of line is assessed. This allows comparisons of various combinations of segments. In the future more data may be utilized in the comparison process. As an example, lines will cross the Red River Valley where all clays fall into soil category 5. At the tree line at Elm Creek lighter textured soils have an irrigation potential and therefore fall into category 7. All lines will have to pass through these areas. If the line follows Highway 50 north a significant portion of the line will fall into soil categories 1 and 2 compared to other Westlake routes and those north, south and west of the Riding and Duck Mountains where more of the farm land will fall into soil categories 3, 4, and 5 and the route will be longer. Agricultural impact from transmission line placement will have lower scores in soil categories 1 and 2.

4.0 Discussion of Various Sections of the Routes

The area studied between Riel Station and Bellsite (east of the Porcupine Hills) can be divided into three sections. There is an initial section between Riel Station and just east of the Red River, then a section between the Red River and Highway 16. North of Highway 16, the route can take one of three options:

- through Westlake and Winnipegosis,
- through Westlake and Dauphin, or
- around the west side of the Riding and Duck Mountains.

4.1 Riel Station to Segments 11-14 (East of the Red River)

There are four line choices coming from Riel Station. On the maps they are coloured orange, blue, yellow and pink. Each line is further east and south of the south loop 500 kV line and that results in a longer Bipole III route. Separation distance from the south loop and Bipoles I and II has never been clarified. Initially it was 40 km; however, recently the discussion has centered around 100 km. The question of separation was asked at the Transmission line 101 seminar but no clear cut answer was provided.

Routes one and four provide the easiest passage through the heavily populated area east of Winnipeg along the Seine River and the settlement at Lorette. Lines two and three pass through the densely populated areas along the Seine River both east and west of Lorette. The soils in this area are Red River-Osborne clays (rating 5) and therefore none of the four line choices has an advantage in terms of agricultural production. The impact the lines have in this area will be due to the placement of the line. Lines placed in drainage ditches or road allowances have the least impact. Lines on the half mile have more impact and the greatest

impact on cropping will be lines on the quarter mile or on a diagonal. South of Lorette and west of Steinbach the emphasis on tower placement was based on avoiding farms and rural residences. The area from Highway 1 east to Sanford needs to be flown to obtain new aerial photography as construction continues at a rapid pace in these areas.

When selecting lines in this area the lowest agricultural impact was not necessarily utilized as providing various options was a priority. Any one segment can be connected to the next segment. Routing choice in this area may depend on the distance required from the south loop. Line one which is the shortest distance and has less agricultural impact is also the closest to the south loop. Line four which also has a lower impact since it avoids the heavily populated area east of Winnipeg is the furthest from the south loop. Therefore this line has the most separation; however, it is the longest line.

4.2 The Red River to Highway 16

Various routes were chosen with an attempt to stay on road allowances and drainage ditches and to avoid diagonal and in-field line placement. The east half of this area are Red River Osborne clays and the west half are generally sandier soils with active irrigation or irrigation potential. Routes were chosen to avoid active irrigation areas. These areas include the irrigated areas between Elm Creek and Highway 16.

The lines were selected for this area to provide separation from one another and access to the various corridors to Bellsite that begin from Highway 16. Diagonal line placement along the Arden Ridge from Carman to Bernie was considered to be a routing opportunity.

4.3 Highway 16 to Bellsite (east of the Porcupine Hills)

4.3.1 Westlake

The Westlake area between Lake Manitoba and Riding Mountain provides excellent routing opportunities from an agricultural perspective. Most of the land is in native hay and pasture with some cultivated fields and therefore lines placed in this area do not have a large impact on agriculture. The Westlake area also has many lakes and bogs. An effort was made to avoid these areas.

The eastern Westlake area lines rated the lowest of all the routes with scores between 1,800 and 1,950 (323-344 miles). The Central and Central West routes rated approximately 2,200 mostly due to a larger proportion of route passing through more productive agricultural areas (313-353 miles). The Westlake West route rated in the 2,300 range (336-348 miles). In reality, the impact is not very different between any of these routes. All routes converge on the narrow crossing between Winnipegosis and Dauphin Lake. The routes then continue on to Cowan through the bog or on dryer land to the northeast. From Cowan to Bellsite, one line from skirts the agricultural area while the other was placed to the west through the cropped lands.

4.3.2 *Westlake (Dauphin)*

The Westlake Dauphin route follows the Westlake west route until the crossing south of Dauphin Lake where it skirts the north side of the Riding Mountain. Then it continues north on the east side of Highway 10, on the east side of the Duck Mountain, through Cowan and on to Bellsite. This route is longer and rates higher than the Westlake routes (2,500 and 355-372 miles).

4.3.3 *Riding Mountain*

The route on the west side of the Riding and Duck Mountains has the highest score (3,200) for two reasons. Firstly it is the farthest route to Bellsite and therefore the longest (399 miles). This provides the greatest separation from Biopoles I and II. Secondly, it goes through many areas of good cropland. Compared to the Westlake area which has very little cropped land, a line west of the Riding Mountain will have more agricultural impact since it travels through more high quality agricultural land.

5.0 Fourteen Possible Routing Choices

Fourteen possible routes were chosen to highlight the whole study area. A variety of line combinations were chosen including some of the lowest scoring routes. The various routes show the options available between Riel Station and Bellsite. The shortest route has a low score and does not have a large agricultural impact but is the closest to the south loop and Biopoles I and II. The separation needed between Biopole III and Biopoles I and II may determine which corridors are best.

On the maps, routes leaving Riel Station via line 1 were highlighted in orange, routes leaving via line 2 were highlighted in blue, routes leaving via line 3 were highlighted in yellow, and routes leaving via line 4 were highlighted in pink. These routes are only fourteen of an infinite number of combination of routes available.

Route 1 – Line 1 to 69 to Westlake East (orange) (324 miles-rating 1,691)

This route is the shortest route to Bellsite. It crosses less productive agricultural land and therefore it has less impact on agriculture. From Riel Station to the Red River it follows the south loop and does not pass through the heaviest populated areas east of Winnipeg. From the Red River to Highway 16 it continues on a diagonal in places, passes north of the Long Plains Indian Reserve, crosses Highway 16 at the most easterly crossing. From Highway 16 to Winnipegosis it follows the route closest to Lake Manitoba and does not cross as much productive agricultural land as it progresses past Eddystone, north of Rorketon, on to Winnipegosis and Cowan through the bog. It has a low score since it uses the shortest route to Bellsite; however, it does not provide as much separation from Biopoles I and II.

Route 2 – Line 1 to 72 to Westlake East (orange) (331 miles-rating 1,888)

This route, like route 1, leaves Riel Station using line 1, follows the south loop to the Red River and does not pass through the heaviest populated areas east of Winnipeg. From the Red River to Highway 16 it continues west through the intensively cropped land in the Red River Valley. It then travels north to Highway 16 on the west side of the Long Plains Indian Reserve and uses the Westlake East route to Bellsite. From Highway 16 to Winnipegosis this route uses the southwesterly line south of Rorketon which crosses more productive agricultural land than the northeasterly line. From Winnipegosis to Cowan this route travels through the bog. Compared to route 1 this route is only slightly longer but since it crosses more productive agricultural land in the Red River Valley and through Westlake East its rating is higher for agriculture and tower placement.

Route 3 – Line 3 to 72 to Westlake East (yellow) (344 miles-rating 1,870)

Route 3 takes line 3 from Riel Station to the Red River. This line is longer than line 1 and crosses through the heavily populated area at Lorette. Through the Red River Valley it travels west like route 2 but on a more southern line. It then travels north on a diagonal and then straight north on the west side of the Long Plains Indian Reserve to Highway 16 and uses the Westlake East route to Bellsite. From Highway 16 to Winnipegosis it follows the route closest to Lake Manitoba and does not cross as much productive agricultural land as it progresses past Eddystone, north of Rorketon, on to Winnipegosis and Cowan through the bog. Although this route is longer than route 2, they have a similar agriculture and tower placement ratings.

Route 4 – Line 3 to 69 to Westlake East (yellow) (344 miles-rating 1,890)

This route takes line 3 from Riel Station to the Red River and is longer than line 1 and crosses through the heavily populated area at Lorette. Through the Red River Valley it travels north on a diagonal and then north of the Long Plains Indian Reserve and joins route 1 when crossing Highway 16 into the Westlake East area. From Highway 16 to Winnipegosis this route uses the southwesterly line south of Rorketon which crosses more productive agricultural land than the northeasterly line. From Winnipegosis to Cowan this route goes through the drier land northeast of the bog. The distance travelled is similar to route 3 but the tower placement rating is higher. This is due to the diagonal line placement through the intensively cropped Red River Valley and the line through the agricultural Westlake East area.

Route 5 – Line 4 to 72 to Westlake East (pink) (329 miles-rating 1,877)

This route using line 4 provides the most separation from the south loop. It also avoids the heavily populated area at Lorette. Through the Red River Valley it takes the most southerly route. It then take a ninety degree turn and travels north past the west side of the Long Plains Indian Reserve and crosses Highway 16 on an easterly crossing to Westlake East.

From Highway 16 to Winnipegosis this route uses the southwesterly line south of Rorketon which crosses more productive agricultural land than the northeasterly line. From Winnipegosis to Cowan this route travels through the bog. Although this route takes the crossing the furthest from Winnipeg, the distance it travels is not different than routes 1-4. Through the Red River Valley it avoids diagonals and consequently its final rating, although not as low as routes 1 and 3 is lower than routes 2 and 4.

Route 6 – Line 1 to 74 to Westlake Central (orange) (337 miles-rating 2,132)

This route leaves Riel Station using line 1, follows the south loop to the Red River and does not pass through the heaviest populated areas east of Winnipeg. It travels west through the east half of the Red River Valley and then on a diagonal through the west half of the Red River Valley following the Arden Ridge to just east of Austin. Just south of Highway 1 the line heads straight north past the east side of Gladstone and the Big Grass Marsh through Westlake Central. This Westlake Central route travels through the centre of the area between Lake Manitoba and the Riding Mountain and then joins the Westlake East routes by Alonsa. From Alonsa to Winnipegosis this route uses the southwesterly line south of Rorketon which crosses more productive agricultural land than the northeasterly line. From Winnipegosis to Cowan it travels through the bog. It crosses more productive agricultural land and therefore the Westlake Central routes rate higher than the Westlake East routes.

Route 7 – Line 2 to 74 to Westlake Central (blue) (352 miles-rating 2,120)

Route 7 is the same as route 6 through the Red River Valley but uses line 2 from Riel Station. Line 2 crosses through the heavily populated area at Lorette. Through the east half of the Red River Valley it travels west and then on a diagonal through the west half following the Arden Ridge to just east of Austin. Just south of Highway 1 it heads straight north past the east side of Gladstone and the Big Grass Marsh through Westlake Central. It uses a slightly different Westlake Central route compared to route 6. Route 7 uses the Westlake East line closest to Lake Manitoba and therefore crosses less productive agricultural land north of Rorketon and therefore its rating is slightly lower than route 6 but higher than the Westlake East routes.

Route 8 – Line 2 to 75 to Westlake West Central (option 1) (blue) (353 miles-rating 2,213)

This route takes line 2 through the heavily populated area at Lorette. Through the east half of the Red River Valley it travels west on a southerly route and then on a diagonal through the west half of the Red River Valley and continues diagonally into the Westlake West Central route. The Westlake West Central route travels through the centre of the Westlake area from Edrans past Plumas and Glenella and then joins the Westlake East route south of and at Eddystone and heads to Winnipegosis north of Rorketon. From Winnipegosis to Cowan it goes through the bog. The Westlake West Central routes rate similar to the Westlake Central routes.

Route 9 – Line 2 to 75 to Westlake West Central (option 2) (blue) (349 miles- rating 2,293)

This route is the same as route 8 from Riel Station, past Highway 16, Rorketon north to Cowan. From Cowan to Bellsite this route uses the central Swan River route. The Westlake West Central routes rate similar to the Westlake Central routes.

Route 10 – Line 2 to 76 to Westlake West (blue) (348 miles-rating 2,256)

This route takes line 2 through the heavily populated area at Lorette. Through the east half of the Red River Valley it travels west on a southerly route west of Steinbach and just north of Carman. From Carman it follows the diagonal Arden Ridge over Highway 1 to Edrans where it heads north to Ste Amelie, past south Rorketon and on to Winnipegosis. The Westlake West route crosses productive land through the Westlake area to Winnipegosis. From Winnipegosis to Cowan it uses the line through the bog. The Westlake West route rates higher than the Westlake East and Central routes.

Route 11 – Line 1 to 76 to Westlake West (orange) (336 miles-rating 2,182)

Route 11 leaves Riel Station using line 1, follows the south loop to the Red River and does not pass through the heaviest populated area east of Winnipeg. Through the Red River Valley to Westlake West and on to Bellsite it is the same as route 10. The final rating of this line is lower than route 10 due to the initial routing using line 1.

Route 12 – Line 2 to 76 to Westlake West (Dauphin) (blue) (356 miles-rating 2,427)

Route 12 uses line 2 through the heavily populated area at Lorette. Through the east half of the Red River Valley it travels west on a southerly route west of Steinbach and just north of Carman. From Carman it follows the diagonal Arden Ridge over Highway 1 to Edrans where it heads to south of Ste Amelie and then turns west. The route passes between Highway 5 and Riding Mountain crossing Highway 10 and turning north on the east side of Highway 10 to Swan River. It joins the other routes at Cowan and takes the easterly route to Bellsite. The Westlake West (Dauphin) route rates higher than the other Westlake routes due to longer line length and it crosses more productive soils.

Route 13 – Line 4 to 76 to Westlake West (Dauphin) (pink) (372 miles-rating 2,516)

This route uses line 4 from Riel Station to the Red River. Line 4 provides the most separation from the south loop and avoids the heavily populated area at Lorette. Through the Red River Valley it takes the most southerly route west to Highway 16. From Highway 16 to Bellsite it is the same route as route 12. It is a longer route through the Red River Valley and consequently has a higher rating than route 12.

Route 14 – Line 2 to 77 to Riding Mountain (blue) (399 miles-rating 3,220)

This route takes line 2 through the heavily populated area at Lorette. Through the east half of the Red River Valley it travels west on a southerly route west of Steinbach and just north of Carman. From Carman it follows the diagonal Arden Ridge over Highway 1 to Highway 16. It turns west south of Birnie and travels west past Polonia, Clanwilliam, Newdale, Shoal Lake to join the southern route north of Solsgirth. From there it passes Angusville, Ingles, and Boggy Creek west of the Riding and Duck Mountains. It then passes through the forested area west of the Duck Mountain, proceeds straight north to the Porcupine Hills west of Swan River and then goes northeast along the agricultural edge of the Porcupine Hills to Bellsite. This route has a high score because it is the longest and it crosses through quality agricultural land.

6.0 Summary

The main conclusions are:

- The area from the Seine River to Sanford and south past a line from Steinbach to Carman needs new aerial photography.
- Routes 1 and 4 offer Seine River crossings that affect the least people.
- Route 1 is the shortest but closest to the south loop and Bipoles I and II.
- Routes 2, 3 and 4 offer more road allowance and drainage ditch routing and are progressively further from the south loop and Bipoles I and II.
- The agricultural side (northeast) of the Arden Ridge offers a routing opportunity.
- Large irrigation areas need to be bypassed.
- The Highway 50 route next to Lake Manitoba passes through the least amount of higher quality agricultural land.
- The central Westlake routes are quite comparable in scores and not too much higher than the Highway 50 routes.
- The Westlake West routes score slightly higher than the other Westlake routes.
- The Westlake - Dauphin – Cowan route scores higher and therefore is less desirable from an agricultural standpoint compared to the Westlake – Winnipegosis – Cowan routes.
- The least desirable route is the one on the west side of the Duck and Riding Mountains as the route impacts the largest area of productive farmland and is also the longest route.



Photograph House at NE21-10-5E1 – R2



Photograph House at 17-10-6E1 – Rr1



Photograph House at 17-10-6E1 – Rr1 – Second House south of House 1



Photograph House at SW24-8-5E1 – R5



Photograph House at SW24-8-5E1 – R5 on the right



Photograph Yard at SW12-8-5E1 – R6, Bb3, Bb4, Bb6



Photograph Yard at SW1-8-5E1 – R7, Bb7, Bb8, Bb9, Bb10



Photograph Yard at SW25-7-5E1 – R8 and Bb13



Photograph Barns with lagoons and very wet fields in the Red River Valley SW14-7-5E1 – B1



Photograph House at NE12-7-4E1 – R9



Photograph Barn at NE10-7-4E1 – Six Barns and Sheds



Photograph House and Shed at NE10-7-4E1



Photograph House and Shed at NW9-7-4E1 – R10



Photograph House at NE8-7-4E1 – R11



Photograph House at NE7-7-4E1 – R12



Photograph House and Barns at NE11-7-3E1 – Rr2, B7, B7



Photograph House at east Red River Crossing – R13



Photograph Aerial View at east Red River Crossing – R13, R14, 5 Large Sheds and 2 Barns



Photograph Aerial View at east Red River Crossing



Photograph 2 Sheds at east Red River Crossing East



Photograph of Farm with House to the south at west Red River Crossing at HWG 75



Photograph of House-Yard to the north at west Red River Crossing at HWG 75



Photograph of House and Yard at SW10-7-1W1 – R16



Photograph at 1-8-8W1 – field where line passes – with large manure tank



Photograph at 1-8-8W1 – field where line passes – with large manure tank



Photograph of House at Swan River, SW16-39-24W1 – R20



Photograph of House at Swan River, SW16-39-24W1 – R20



Photograph of Yard and House at Swan River, SW16-39-24W1 – R20



Photograph of Yard and House at Swan River, SW16-39-24W1 – R20



Photograph of the Field across from Houses Rr8 and Rr9



Photograph of The Pas House - Rr8



Photograph of The Pas House - Rr9

Errata in Electromagnetic Fields (EMF) Technical Report Appended to Bipole III Environmental Impact Statement

(http://www.hydro.mb.ca/projects/bipoleIII/eis_technical_download.shtml)

Errata in Main Section “Environmental and Health Assessment of the Electrical Environment: Direct Current Electric and Magnetic Fields and Corona Phenomena.”

1. “Figure 6” in text on page 44 (pdf page 60), line 4, should read “Figure 7.”
2. “Figure 7” in text on page 45 (pdf page 61), line 19, should read “Figure 8.”
3. “Figure 7” in text on page 45 (pdf page 61), line 21, should read “Figure 8.”
4. “Figure 7” in text on page 46 (pdf page 62), line 4, should read “Figure 8.”

Errata in Appendix 1 - “Modeling of the Electrical Environment for Proposed DC Components of the Bipole III Project”

1. Figure 33 on Appendix 1 page 45 (pdf page 132) is missing. The figure that should have appeared is reprinted below.

