


# Manitoba Environment Act Proposal RM of Swan River

June 2013



# Environment Act Proposal Form

Name of the development: RM of Swan River Rural Water Supply System Expansion	
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): Transportation and Transmission	
Legal name of the proponent of the development: RM of Swan River	Mailing address: 216 Main Street West Box 610, Swan River MB R0L1Z0
Location (street address, city, town, municipality, legal description) of the development: RM of Swan River Pipelines-Variou Sections in Townships 32 to 38, Ranges 28W and 29W	
Name of proponent contact person for purposes of the environmental assessment: Nathan Wittmeier	
Phone: (204)726-6081 Fax: (204)726-7196	Mailing address: The Manitoba Water Services Board P.O.BOX 22080 Brandon , MB R7A 6Y9
Email address: nathan.wittmeier@gov.mb.ca	
Webpage address:	
Date:  July 02,2013	Signature of proponent, or corporate principal of corporate proponent:  Printed name: Nathan Wittmeier

A complete Environment Act Proposal (EAP) consists of the following components:

- Cover letter
- Environment Act Proposal Form
- Reports/plans supporting the EAP (see "Information Bulletin - Environment Act Proposal Report Guidelines" for required information and number of copies)
- Application fee (Cheque, payable to Minister of Finance, for the appropriate fee)

Submit the complete EAP to:

Director  
Environmental Assessment and Licensing Branch  
Manitoba Conservation  
Suite 160, 123 Main Street  
Winnipeg, Manitoba R3C 1A5

For more information:

Phone: (204) 945-7100  
Fax: (204) 945-5229  
Toll Free: 1-800-282-8069, ext. 7100  
<http://www.gov.mb.ca/conservation/eal>

Per Environment Act Fees Regulation (Manitoba Regulation 168/96):

Class 1 Developments .....	\$500
Class 2 Developments .....	\$5,000
Class 3 Developments:	
Transportation and Transmission Lines.....	\$5,000
Water Developments .....	\$50,000
Energy and Mining.....	\$100,000

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## Executive Summary

The Rural Municipality of Swan River requested The Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal for a Class 2 Development License under the Manitoba Environment Act for an expansion of the rural water supply.

The RM of Swan River is located in the Parkland Region of Manitoba surrounding the Town of Swan River. The RM has a population of approximately 2546 people. Water for the system is to be supplied by the Town of Swan River Water Treatment Plant (WTP). The WTP receives raw water from three groundwater wells. Pipeline extensions to the RM of Swan River would service approximately 383 households in the RM. The current peak day treated water demand for the Town of Swan River is 26.5 L/s, and sufficient capacity for the proposed expansion is available from the WTP.

The proposed development includes the construction of approximately 353,100 metres of pipeline, 383 service connections in the RM, and booster pumping stations. A preliminary pipeline route is included in Appendix A.

The Town of Swan River will be responsible for operation and maintenance of the WTP and the RM of Swan River will be responsible for maintaining the rural water pipelines. An operator is required to periodically inspect flushouts, air releases, water meters, pressure reducing stations, etc. to ensure system performance is maintained. In addition, the operator will be required to submit bi-weekly water samples for bacteriological testing in accordance with the Manitoba *Drinking Water Quality Standards Regulation*. The operator will be responsible to read water meters on a quarterly basis and respond to maintenance issues related to the system.

The Woody River and the Swan River are the major rivers that run through the RM. The waterways within the proposed pipeline system are the creeks and rivers flowing off the Swan River including the Keillor Creek, Ruby Creek, Tamarack Creek and Roaring River. There are 3 river crossings and 14 creek crossings involved with the proposed pipeline.

## List of Acronyms

AO	Aesthetic Objective
DBP	Disinfection By-Product
DWSA	Drinking Water Safety Act
EAP	Environment Act Proposal
GCDWQ	Guidelines for Canadian Drinking Water Quality
GUDI	Groundwater Under Direct Influence of Surface Water
MWSB	Manitoba Water Services Board
ODW	Office of Drinking Water
RM	Rural Municipality
TDS	Total Dissolved Solids
THM	Trihalomethane
TOC	Total Organic Carbon
UV	Ultraviolet
WTP	Water Treatment Plant

## **1.0 Introduction**

The RM of Swan River requested The Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal for a Class 2 Development License under the Manitoba Environment Act for the construction of a rural water supply system in the RM of Swan River. This document provides the compiled information required on Manitoba Conservation's Environment Act Proposal Report Guidelines and Supplementary Guidelines for Municipal Water Supply Systems. This Environment Act proposal includes components for rural distribution pipelines.

### **1.1 Background Information**

The RM of Swan River is located in the Parkland region of Manitoba surrounding the Town of Swan River. The RM currently has a population of approximately 2,546 people. Water for the system will be supplied by the Town of Swan River Water Treatment Plant (WTP) which was originally constructed in 1976 and upgraded in 2003 and has a treatment capacity of 4535 m<sup>3</sup>/day. The highest maximum day demand from the Town was 2288 m<sup>3</sup>/day in 2005. The Town of Swan River WTP receives raw water from three groundwater wells whose capacities are 40L/s, 25L/s and 65L/s. The Variable Frequency Drive well pumps control the rate at which water is supplied from the three groundwater wells. The water is pumped a distance of approximately 850 metres to the WTP. The WTP supplies the Town of Swan River and approximately two residences in the RM of Swan River. Pipeline extensions to the RM of Swan River would service approximately 383 households in the RM.

#### **1.1.1 Previous Studies**

A pipeline feasibility study was completed for the RM of Swan River in May 2013. The report reviews existing infrastructure, design criteria, the proposed pipeline network and presents a cost estimate.

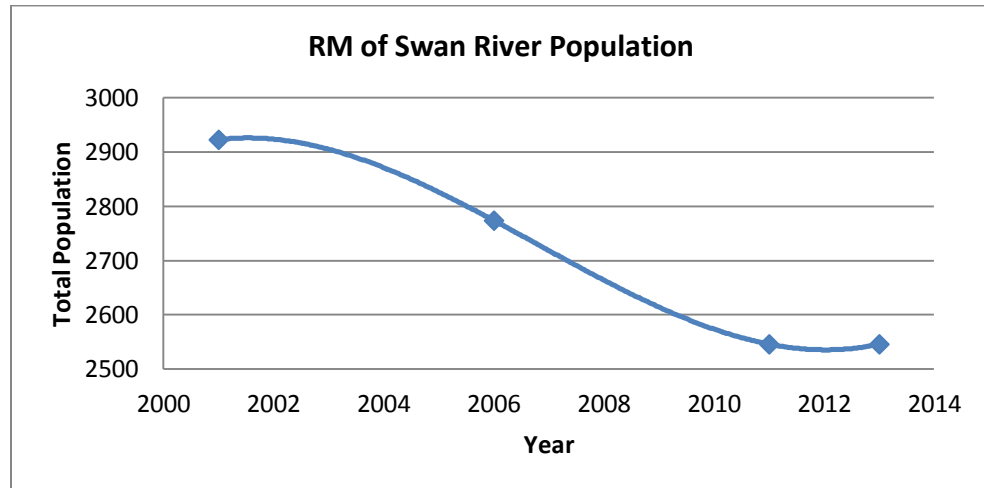
An engineering assessment for the Town of Swan River PWS was conducted in February 2009 to assess and review the existing infrastructure and water supply system in the Town of Swan River. The assessment was reviewed in writing of this report. The engineering assessment recommended minor upgrades to the WTP.

No WTP upgrading has been completed since the 2003 upgrade.

#### **1.1.2 Population**

Based on 2013 Municipal Officials Directory, the RM of Swan River has an estimated population of 2546, a decrease from 2923 in 2001. The population of the RM of Swan River declined from 2001 to 2011, but appears to be steady from 2011 to 2013. Although the population has been shown to be fairly steady over the past 3 years, some allowance for a future population should be designed in the system. The RM has estimated there will initially be approximately 383 service connections to the water

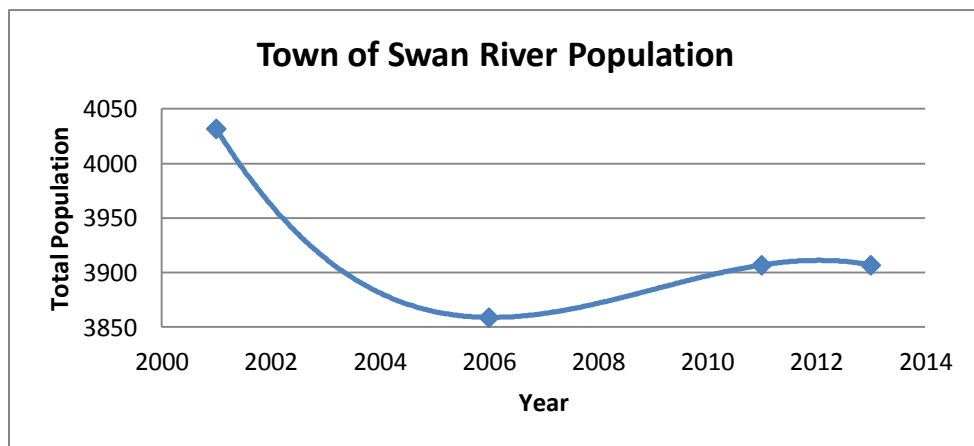
system. Assuming 3.5 people per household, this equates to approximately 1341 people. Based on the assumption that the population in the RM will increase over the next few years at an annual population growth rate factor of 0.5% per year, a 20-year population of approximately 1481 for the rural system may be assumed.



**FIGURE 1.1 –RM OF SWAN RIVER POPULATION TRENDS**

Based on the 2013 Municipal Officials Directory, the Town of Swan River has an estimated population of 3907, a decreased from 4032 in 2001. The population of the RM of Swan River declined from 2001 to 2006, however, the population appears to be steady from 2011 to 2013. Although the population has been shown to be fairly steady over the past 3 years, some allowance for a future population should be designed in the system. The Town has approximately 1117 service connections on the water system assuming 3.5 people per household. Based on the assumption that the population in the Town will increase over the next few years at an annual population growth rate factor of 0.5% per year, a 20-year population of approximately 4320 for the Town's may be assumed.





**FIGURE 2.2 –RM OF SWAN RIVER POPULATION TRENDS**

**1.1.3 Current and Projected Water Use of the RM of Swan River**

A WTP is designed based on peak day demand. When calculating water consumption, typical average daily water usage ranges from 250 L/person/day to 300 L/person/day and peak day usage (peak day factor) is typically 1.5 to 2.0 times greater. Consumptions of 300 L/person/day and a peak day factor of 1.8 were used for this study. The projected treated water demands are summarized in Table 1.1.

**TABLE 1.1 – FUTURE 20 YEAR POPULATION WATER DEMANDS**

	Units	
RM of Swan River Expected Connections		383
Equivalent Population (x3.5)		1341
20 Year Future Population (@0.5%/yr)		1481
Consumption/capita/day	L/c/day	300
Average Day Consumption	L/day	444 300
Peak Day Factor		x 1.8
Peak Day Consumption	L/day	799 740
Peak Day (20 hour operating day)	L/s	11.1

When designing a WTP the peak day demand of livestock must also be taken into consideration. When calculating water consumption, typical average daily water usage for cattle ranges from 70 L/head/day to 150 L/head/day, that of pigs ranges from 10 L/head/day to 20 L/head/day and for horses it is approximately 60L/head/day. The peak day usage (peak day factor) is typically 1.5 to 2.0 times greater. Consumptions of 70 L/head/day for cattle, 60 L/head/day for horses, 20

L/head/day for pigs and a peak day factor of 1.5 were used for this study. The projected treated water demands for livestock are summarized in Table 1.2.

**TABLE 1.2 – LIVESTOCK WATER DEMANDS**

	Units		Cattle	Horses	Pigs	Total
Head count			1 030	60	1 700	
Consumption/head/day	L/head/Day		70	60	20	
Average Day Consumption	L/day		72 100	3 600	34 000	109 700
Peak Day Factor		X1.5				
Peak Day Consumption	L/day		108 150	5 400	51 000	164 550
Peak Day (20 hour operating day)	L/s		1.5	0.1	0.7	2.3

According to table 1.1 and table 1.2, the projected total peak day consumption of the RM including both livestock and the population is calculated to be 964 290L/day and the peak day (20 hour operating day) is calculated to be 13.4L/s.

#### **1.1.4 Current and Projected Water Use of the Town of Swan River**

A WTP is designed based on peak day demand. When calculating water consumption, typical average daily water usage ranges from 250 L/person/day to 300 L/person/day and peak day usage (peak day factor) is typically 1.5 to 2.0 times greater. Consumptions of 300 L/person/day and a peak day factor of 1.8 were used for this study. The projected treated water demands are summarized in Table 1.3.

**TABLE 1.3 – PROJECTED TREATED WATER DEMAND FOR THE TOWN OF SWAN RIVER**

<b>Projected Treated water demand for the Town population</b>		
	Units	Quantity
Town of Swan River Expected Connections:	1117	
Equivalent Human Population(x3.5)		3910
20 year future population(@0.5% /yr)		4320.0
Consumption/capita/day	L/c/day	300.0
Average Day Consumption	L/day	1 296 000.0
Average Day Demand	L/s	18.0
Peak Day factor		x1.8
Peak Day Consumption	L/day	2 332 800.0
Peak Day Demand (20 hr operating day)	L/s	32.4

The peak treated water demand for the Town of Swan River is 26.5 L/s as listed in the Waterworks System Assessment by the KGS group and confirmed with the WTP. The projected 20 Year demand for the Town of Swan River is 32.4 L/s, and from Section 1.1.3, the projected peak day demand for the RM is 13.4 L/s. The total projected water demand of the Town and the RM of Swan River is 45.8 L/s.

The Town of Swan River WTP is therefore capable of meeting the peak day demands from a rural water system in the RM of Swan River as well as the projected 20 Year peak day demands for the Town of Swan River.

Raw water for the town is stored in two underground treated water storage reservoirs. These underground storage reservoirs are connected by underground concrete structures. The treated water storage has a capacity of 2900m<sup>3</sup>. This is approximately three times the current peak day requirement of the Town of Swan River. The flow of raw water from the ground water wells is controlled by VFD well pumps which are in turn controlled by a Programmable Logic Controller (PLC).

**TABLE 1.4 –PROJECTED TOTAL WATER DEMAND FOR THE TOWN OF SWAN RIVER WTP**

Demand	Units
25.7	L/s
810,475,200	L/yr
810,475.2	m <sup>3</sup> /yr
810.5	Dm <sup>3</sup> /yr

**1.1.5 Raw Water Source**

The Town of Swan River has a Water Rights Act Licence to divert water from the three groundwater wells for its municipal distribution system. The license allows the RM to draw no more than 559.50 acre-feet of water annually. Under this Act no water will be diverted when the aquifer in the wells is measured at: more than 22.46 m beneath the ground surface for Well No. 1, more than 21.34 m beneath the ground surface for Well No. 2, or more than 20.57 m beneath the ground surface for Well No. 3. Raw water is pumped from three groundwater wells to the WTP.

**1.1.6 Water Rights Act**

The Town of Swan River *Water Rights Act* Licence No. 2002-053 indicates the maximum rate at which water may be diverted shall not exceed 63 L/s and the total quantity of water diverted in any one year shall not exceed 690.13 cubic decametres.

It is estimated that the Town of Swan River’s 20 year demand will be 32.4 L/s on a peak day and thus with the proposed rural system will require an additional 13.4 L/s during a peak day.

The Town of Swan River WTP is therefore capable of meeting the peak day demands from a rural water system in the RM of Swan River as well as the peak day demands for the Town of Swan River. However, the projected annual demand on the RM water supply system expansion will be approximately 811 cubic decametres a year, which exceeds the total allowable quantity of 690.13 cubic decametres of water diverted a year by the Water Rights Act Licence, therefore, an amendment to the Water Rights Licence will be required prior to construction.

An amendment is required to the Water Rights Act Licence to accommodate the projected increased demand.

**1.1.7 Water Quality**

The Office of Drinking Water (ODW) currently conducts annual audits of all public water systems which includes sampling and chemistry analysis every three years for secure groundwater sources and once per year for surface water and GUDI supply systems. The following table outlines water quality parameters of concern which include iron,

manganese, hardness, total dissolved solids (TDS), and uranium. In addition the operator tests chlorine residuals daily on the treated water.

Raw water quality parameters exceeding the GCDWQ include iron, manganese and total dissolved solids. Treated water quality parameters exceeding the GCDWQ include uranium and total dissolved solids. The existing treatment system does not reduce all parameters below the maximum acceptable concentration or the aesthetic objective including hardness. A treatment system upgrade may be necessary to address all the parameters that exceed the GCDWQ and the high hardness in the treated water.

**Table 1.5 Water Quality Results (2011 Certificate of Analysis and 2012 Audit Report)**

Parameter	Unit	GCDWQ	Raw Water	Treated water
Arsenic	mg/L	≤ 0.01	0.00097	0.00038
Benzene	mg/L	≤ 0.005	<0.50	<0.0005
Fluoride	mg/L	≤ 1.5	0.181	0.653
<b>Hardness(Total) CaCO<sub>3</sub></b>	mg/L	200/500a	<b>467</b>	<b>493</b>
<b>Iron</b>	mg/L	≤ 0.3	<b>0.62</b>	<0.10
<b>Manganese</b>	mg/L	≤ 0.05	<b>0.273</b>	0.0161
Nitrate	mg/L	≤ 10	<0.050	0.052
pH	pH units	6.5-8.5	8.12	8.19
Tetrachloroethylene	mg/L	≤ 0.03	<0.5	<0.0005
<b>Total Dissolved Solids</b>	<b>mg/L</b>	<b>500</b>	<b>576</b>	<b>568</b>
Total Organic Carbon	mg/L	-	3.5	2.5
Trichloroethylene	mg/L	≤ 0.005	<0.5	<0.0005
True Color	CU	15	<5.0	<5.0
Turbidity	NTU	≤ 0.3 / 0.1c	5.63	0.35
<b>Uranium</b>	mg/L	≤ 0.02	0.00705	<b>0.0670</b>

<sup>a</sup> Hardness levels greater than 200 are considered poor but tolerable. Hardness levels greater than 500 are generally considered unacceptable

<sup>b</sup> THM based on average of quarterly samples

<sup>c</sup> Turbidity limits as follows: 1.0 NTU for slow sand or diatomaceous earth filtration, 0.3 NTU for chemically assisted filtration, and 0.1 NTU for membrane filtration

### 1.1.8 Compliance Plan

According to the 2012 ODW Audit, no corrective action reports or emergency reporting is required.

## 2.0 Description of proposed Development

### 2.1 Project Description

The proposed development includes the construction of approximately 353,100 meters of pipeline and 383 connections in the RM.

The rural water pipeline will be constructed on provincial and municipal road right of ways as well as private easements if required. A preliminary pipeline route is included in Appendix A.

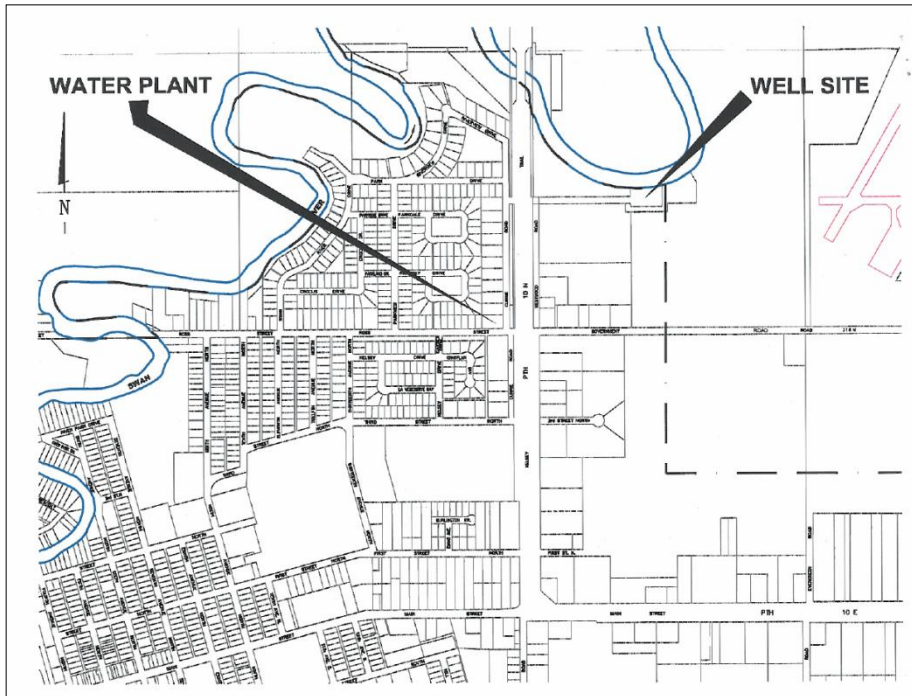


Figure 2.1- Location of WTP

#### 2.1.1 Operation and Maintenance

The Town of Swan River will be responsible for operation and maintenance of the WTP. The RM of Swan River will be responsible for maintaining the rural water pipelines. An operator is required to periodically inspect flushouts, air releases, water meters, pressure reducing stations, booster pumping stations etc. to ensure system performance is maintained. In addition, the operator will be required to submit bi-weekly water samples for bacteriological testing in accordance with the Manitoba *Drinking Water Quality Standards Regulation*. An operator will also be required to read water meters on a quarterly basis and respond to maintenance issues related to the system.

## **2.2 Certificate of Title**

It is proposed to locate the rural water pipeline partially within municipal and provincial road right of ways which are owned by the Crown. If necessary, private easements will be obtained to accommodate the pipeline.

## **2.3 Existing and Adjacent Land Use**

The proposed land for the development will be on municipal and provincially owned land in road right of ways. Adjacent land is used for agriculture. Existing and adjacent land use will not change as a result of this development.

## **2.4 Land Use Designation and Zoning**

Zoning designation for the pipelines on municipal owned land is not applicable.

## **2.5 Project Schedule**

The project is scheduled to commence and be completed in the 2014/2015 construction year depending on funding and the receipt of all approvals.

## **2.6 Project Funding**

This project is eligible for cost sharing between the MWSB and the RM of Swan River subject to all approvals and the availability of funding.

## **2.7 Regulatory Approvals**

The following branches/departments will be provided with copies of plans and specifications for information purposes and for the purposes of approvals and agreements:

Manitoba Conservation and Water Stewardship  
Office of Drinking Water

The contractor will be required to contact MTS, Hydro, and gas utilities for utility locations and approvals.

## **2.8 Public Consultation**

A public consultation will be held in the near future to discuss the proposed rural water distribution system to the citizens of the RM of Swan River. It is not expected that there will be major concerns forwarded to the municipality regarding the upgrades.

## **2.9 Storage of Petroleum Products and Other Chemicals**

Fuel will not be stored on-site at any time or location along the proposed construction route or near any well. Fuel will be supplied by fuelling trucks which are regulated under The Storage and Handling of Petroleum Products and Allied Products Regulation. Records of fuel volumes and an emergency response plan which includes spill prevention, notification and response will be implemented. No fuelling activities will be permitted within 100 m of watercourses during construction. During construction, the contractors will be required to ensure that all equipment is properly maintained to prevent leaks of fuel and motor fluids.

There will be no storage of petroleum products or other chemicals at any of the well sites during operation of the proposed development. Maintenance activities for the wells do not require refuelling on-site. Chemicals associated with the operation of the plant (hydrofluosilicic acid, calgon C5 and potassium permanganate) will be stored in designated areas within the plant complete with spill containment. General household cleaning products will also be stored at this site.



### **3.0 Physical Environment**

#### **3.1 Physiographic Setting and Climate**

The RM of Swan River is located in the Parkland region of Manitoba surrounding the Town of Swan River. The RM will be serviced by the rural water pipeline. Due to elevation changes as well as to account for head losses, six booster pumping stations will be installed.

Based on Environment Canada climatic data, the mean annual temperature in the area is 1.6 degrees Celsius with below zero average daily temperatures from November through March. Mean annual precipitation is approximately 530.3 mm.

#### **3.2 Hydrogeology**

Early investigations of the hydrogeology of the area have identified the main aquifers to be confined aquifers. The bedrock beneath the Town of Swan River consists of sandstone, lignites, and shale. The three aquifer types in this area include bedrock, sand and gravel. The whole area of the Swan Lake Basin is underlain by a bedrock aquifer.

#### **3.3 Hydrology**

The Woody River and the Swan River are the major rivers that run through the RM. The waterways involved with the proposed pipeline system are the creeks, rivers and tributaries that flow off the Swan River which include the Keillor Creek, Ruby Creek, Tamarack Creek and Roaring River.

#### **3.4 Fish and Fish Habitat**

Potential fish habitat in the project area includes the Swan River, Woody River, Roaring River, Keillor Creek and associated tributaries. A list of fish species found in the Swan River, Woody River, Roaring River, and Keillor Creek has been included in Appendix B.

#### **3.5 Wildlife Habitat and Vegetation**

The project area is located within the Prairie Eco-region of the Boreal Plains eco-zone (Agriculture and Agri-Food Canada). The climate is strongly influenced by continental climatic conditions and typically has cold winters coupled with moderately warm summers. The Boreal Plains eco-zone is mainly associated with coniferous species such as; white and black spruce, jack pine, tamarack, and broad leaf trees such as; white birch, trembling aspen and balsam poplar. The soils in the zone are mainly Luvisols but grade northward and southward into Brunisols, and organics and Black Chernozems respectively. There is considerable agricultural development in the zone. However the main activities on the Luvisolic soils include forestry, mining, and oil and gas exploration among others. Characteristic mammals include woodland caribou, mule deer, white-tailed deer, moose, wapiti (elk), coyote, black bear, marten, fisher,

lynx and chipmunk. Bird species include boreal and great horned owl, blue jay, rose-breasted and evening grosbeak, Franklin's gull, red-tailed hawk and northern harrier. Other prominent birds include great pelican, cormorant, gull, heron and tern (National Ecological Framework Report).

### **3.6 Socioeconomic**

The project area is located within the RM of Swan River. The RM has an area of approximately 1,719.47 km<sup>2</sup> and a population of approximately 2,546 (2011 Census). Urban centres include the Town of Swan River. The main economic base is agriculture and forestry.

### **3.7 Heritage Resources**

Most project activities will occur in previously disturbed municipal and provincial right of ways. The proponent will work with Heritage Resources Branch to mitigate any concerns as required.

## **4.0 Potential Environmental Effects**

An environmental effect includes any change that the project may cause to the environment. Environmental effects were identified from interactions between proposed project activities and environmental components. Mitigation measures and follow-up activities were identified for environmental effects determined to be adverse.

### **4.1 Air Quality**

During construction, dust will be raised by construction equipment and there will be gaseous and particulate emissions from the construction equipment. Water spraying is an important, common and practical procedure that would be applied as required to alleviate potential dust problems. Emissions of gases and particulates would be minimized by keeping machinery in good working order. Any effects would be localized, temporary and insignificant. During operation of the development there will be no releases of pollutants to the air.

### **4.2 Soils**

During construction, there is a risk of fuel or lubricant spills from heavy equipment and vehicle operation. The storage of fuel or lubricants within the area of the well construction site will not be allowed. Therefore, the potential spills will be very small in size and standard construction spill clean-up procedures, including the removal of any impacted soil, will be used to prevent impact.

During operation, project activities are limited to regular monitoring and maintenance activities that have a negligible effect on soil disturbance and compaction because of low vehicle traffic and the use of established routes to access the wells and water treatment plant. Regular

monitoring and maintenance activities will have a negligible effect on soil contamination since fuel trucks and other hazardous substances will not be brought on-site on a regular basis. The potential adverse effect on soil quality is assessed to be minor.

#### **4.3 Surface Water, Fish and Fish Habitat**

Minor and short term impacts on surface water may occur as a result of construction activity in road allowance ditches during runoff events. The impact on surface water would include sediment that may be eroded from excavation activities, minor engine leaks and potential fuel spills should runoff events occur during construction. Horizontal directional drilling will be conducted to install the pipeline at the drain and river outlets. This will eliminate excavation within the riparian zone and minimize impacts. There is potential for some loss of drilling mud to surface water. Impacts to fisheries and fish habitat are considered minor.

#### **4.4 Groundwater Quality**

Groundwater quality can be impacted by surface activities and surface water quality. Mitigation measures are necessary to protect groundwater quality during construction activities. The proposed activities are unlikely to result in adverse changes to water quality.

#### **4.5 Groundwater Levels**

If required an amendment to the Water Rights Act Licence will be applied for prior to construction. Groundwater monitoring will be performed by the Town of Swan River as required.

#### **4.6 Vegetation**

Construction will occur primarily within municipal right of ways or easements that are previously disturbed, regularly managed and comprised primarily of grasses. As the areas are already disturbed, they are unlikely to contain rare plant species. The amount of vegetation disturbance is expected to be minimal.

During operation, monitoring and maintenance activities including access to the well sites will be restricted to designated and previously disturbed areas. Potential effects to vegetation are considered to be negligible.

#### **4.7 Wildlife Habitat and Vegetation**

The construction and operation activities associated with this project will be limited to areas already developed for hydro lines or urban or agricultural uses. The potential adverse effects of wildlife habitat loss were assessed to be negligible to minor.

#### **4.8 Noise and Vibration**

During the construction phase of the project, there will be several sources of sound emissions including equipment used for construction. The types of noises heard due to construction are dominated by equipment engines. However, miscellaneous short term impact noises (ie: dump truck gates, back hoe buckets) are often heard. The noise will be in addition to regular community and highway activities, and the effects are considered minor.

Scheduling of various site activities can minimize the impact of noise. This would include scheduling construction for day-time hours to avoid sleep disturbance and the disruption of evening domestic activities. All equipment used on site will be fitted with appropriate mufflers and will be maintained in good working order to minimize noise levels.

#### **4.9 Employment/Economy**

Socio-economic implications are not expected as a result of environmental impacts as impacts are considered minor and short-term. Some economic implications may exist for the Municipality due to the costs of developing the water system, however, the Municipality will have a sustainable potable water supply to meet future demands. There may be some local economic benefit during construction. The potential effects of the project on employment and the economy were assessed to be positive.

#### **4.10 Human Health and Well Being**

The potential adverse effects of the project on human health are assessed to be negligible to minor. Short term temporary increases in noise and dust emissions will occur during construction that is considered to be minor effects. During operation, there will be a minor increase in vehicular traffic associated with monitoring and maintenance activities. The potential effects are considered minor.

The project will result in the construction of the pipeline designed and operated to produce a treated water supply to meet current water quality standards. The effects of this on human health and well being are considered positive.

#### **4.11 Climate Change**

There are no predicted impacts to climate as a result of the project activities.

## **5.0 Environmental Management Measures**

Environmental management practices proposed to prevent or mitigate environmental effects that were determined to be adverse are identified and described below.

### **5.1 Air Quality**

Emissions resulting from construction and transportation equipment may be mitigated by the utilization of well maintained and operating vehicles while reducing unnecessary vehicle idling.

The impact of dust may be mitigated by the use of an approved dust suppressant, limiting construction during high wind periods, and re-establishment of vegetation as soon as possible.

### **5.2 Soils**

Mitigation to potential impacts to soil by contamination from petroleum products include preparation of an emergency response plan for potential spills, use of spill clean-up equipment and materials, using properly maintained equipment, and using appropriate fuelling equipment.

Re-establishment of vegetation as soon as possible after disturbance will limit loss of soil due to wind or water erosion. Backfilling with soil stockpiles as soon as possible and minimizing the amount of soil disturbance can be implemented.

### **5.3 Surface Water**

Mitigation of surface water issues may be achieved by limiting open cut trenching to within 30 m ahead or behind the pipe laying, redirecting surface water runoff, pumping accumulated water to adjacent ditches and providing erosion control practices as required.

Petroleum leaks or spills will be mitigated by use of properly maintained equipment, use of spill clean-up equipment and materials, and use of appropriate fuelling equipment. A prepared emergency response plan can be implemented in the event of a significant spill. In the event of a reportable spill, Manitoba Conservation and Water Stewardship will be notified through the emergency response line and appropriate measures will be taken according to Manitoba Conservation and Water Stewardship requirements.

A 100 m setback to watercourses will be maintained for fuelling activities. Horizontal directional drilling will be implemented at watercourse crossings. Vehicles will avoid entering the riparian zones. Re-establishment of vegetation will occur as soon as possible on areas of disturbed soil.

Chlorinated water used to disinfect pipelines will be de-chlorinated and not released to surface waters.

#### **5.4 Groundwater**

Mitigation of potential groundwater impacts from petroleum products can be mitigated as described in Section 5.3. Any long term changes in groundwater quality will be observed from periodic WTP raw water samples taken by the Town of Swan River.

The availability of groundwater usage for this proposal and potential future users will be assessed through the Water Rights Act Licensing process. Groundwater monitoring will be performed as required.

#### **5.5 Vegetation and Wildlife**

Re-establishment of vegetation will occur as soon as possible on disturbed areas. Impacts to wildlife habitat can be limited by minimizing the area of construction, soil disturbance and vegetation disturbance. Other impacts resulting from dust or smoke will be minimized as previously indicated. Noise disturbance will be limited by use of muffling vehicles and equipment, limiting idling and limiting the construction area.

#### **5.6 Fisheries**

Fisheries impacts will be minimized by implementing practices to reduce soil and contaminate runoff as previously mentioned in Sections 5.3 and 5.5. In addition, horizontal directional drilling will occur under all watercourses containing water. The required excavation needed to introduce the drilling equipment will be maintained outside watercourse riparian zones.

#### **5.7 Noise and Vibration**

Limiting any noise-creating activities, including regular maintenance and monitoring activities to normal working hours, and limiting unnecessary long-term idling can mitigate any potential increased noise and vibration effects.

#### **5.8 Water Conservation**

Water conservation measures include metering and pricing of water. Water conservation information in water bill mailings can be implemented. Leak detection will consist of reconciling on a quarterly basis the volume of water pumped and charged to ratepayers. Since these services are metered, abnormalities can be identified and rectified.

#### **5.9 Socio-Economic Implications**

There are no known negative environmental socio-economic impacts that need mitigation. Since the proposed development would provide a reliable healthy drinking water supply, it would be expected to enhance quality of life and economic viability for the Municipality. The proposed project may provide some economic benefits to the area for local businesses and employment opportunities during construction phase.

## 6.0 References

Agriculture and Agri-Food Canada. A National Ecological Framework for Canada 06 May 2013  
<<http://sis.agr.gc.ca/cansis/nsdb/ecostrat/index.html>>

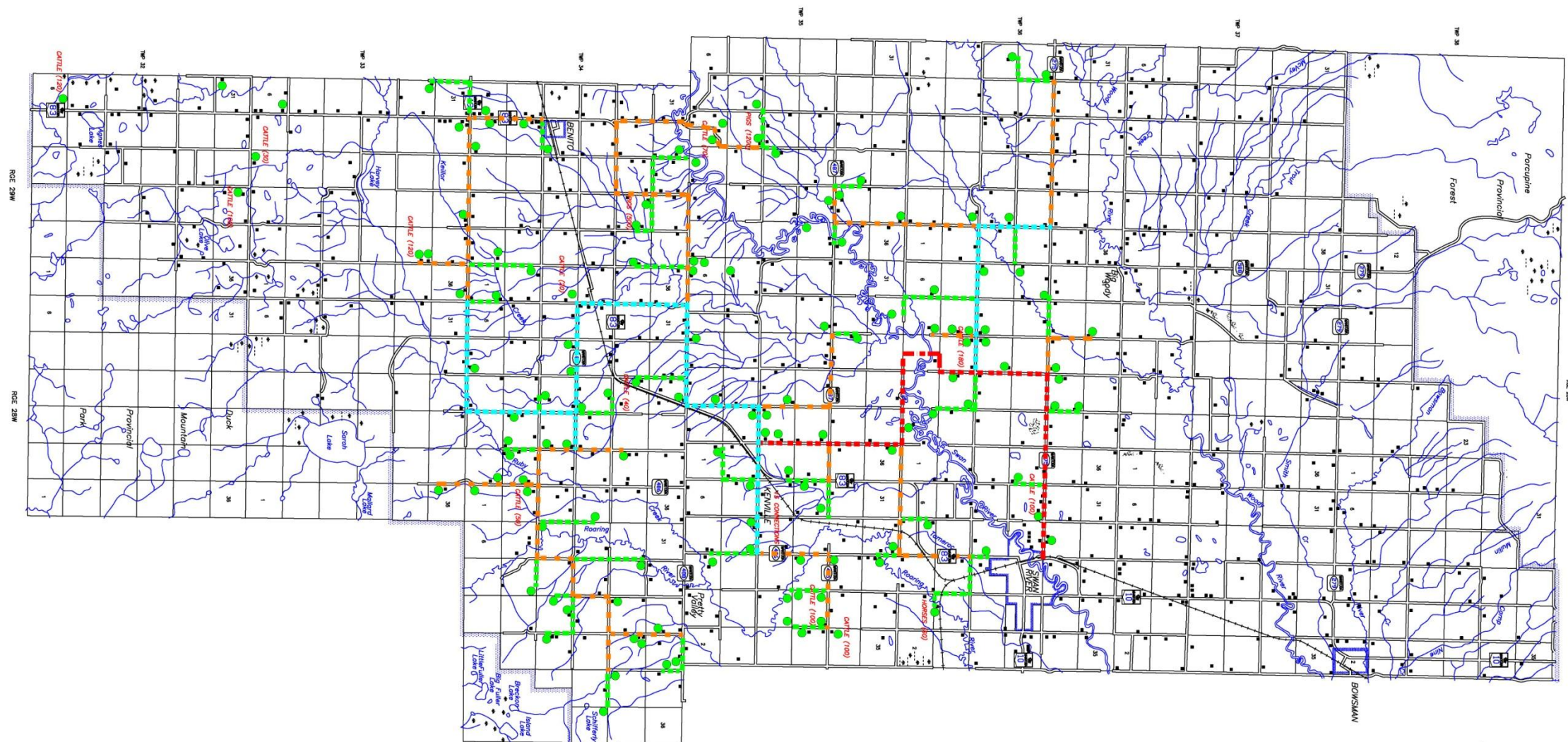
Ecological Framework For Canada. National Ecological Framework Report. 1995.  
<http://sis.agr.gc.ca/cansis/publications/ecostrat/intro.html>

Statistics Canada. 2012. Swan River, Manitoba (Code 4620041) and Manitoba (Code 46) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012. <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E> (accessed May 21, 2013).

## **Appendix A**

### Preliminary Pipeline Route





LEGEND

- CATTLE (60)
- 150 mm WATER PIPELINE
- 100 mm WATER PIPELINE
- 75 mm WATER PIPELINE
- 50 mm WATER PIPELINE

NO.	DESCRIPTION	BY	DATE

SURVEYED		BOOK NUMBER	
DRAWN R. NASON		DESIGNED L. CIAPALA	
CHECKED L. CIAPALA		REVIEWED	
SUBMITTED		APPROVED	
CHIEF ENGINEER	DATE	GENERAL MANAGER	DATE

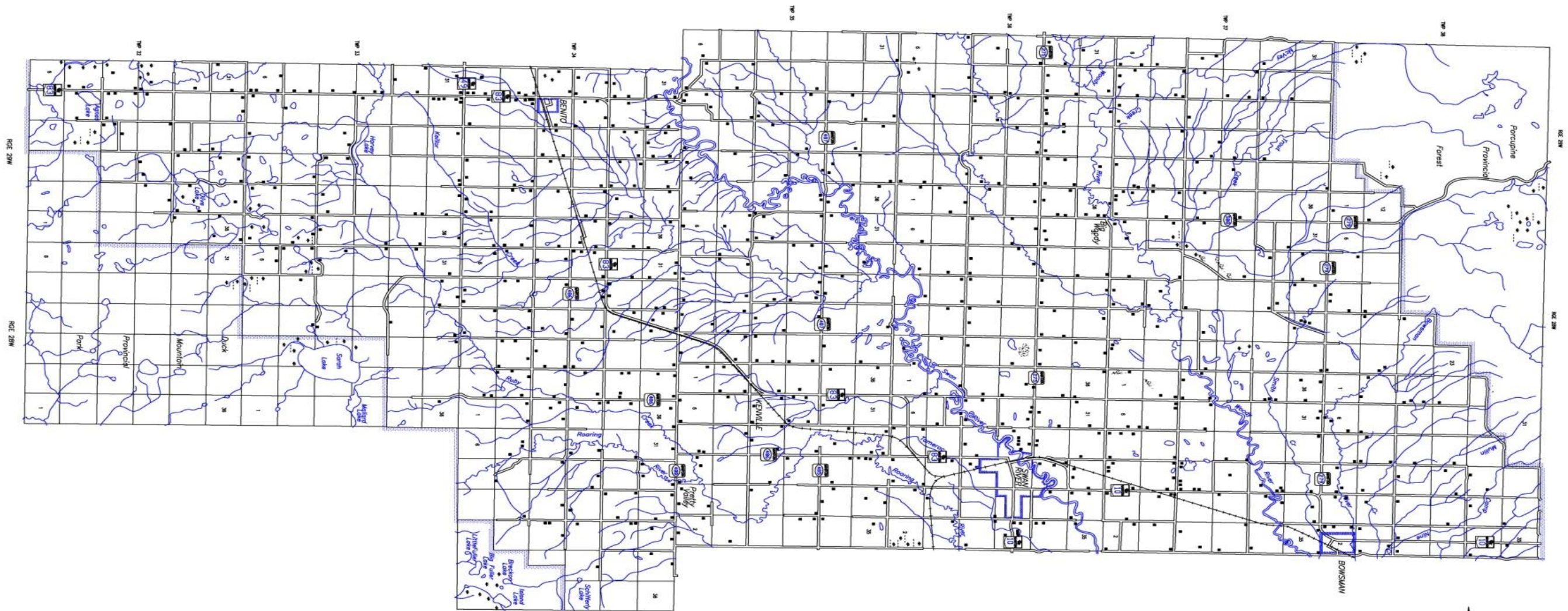
PROVINCE OF MANITOBA  
**THE MANITOBA WATER SERVICES BOARD**  
 DEPARTMENT OF INTERGOVERNMENTAL AFFAIRS

R.M. OF SWAN RIVER RURAL WATER PIPELINES			
<b>PROPOSED WATER PIPELINES</b>			
SCALE	DATE	PROJECT NUMBER	REVISION
	03-02-14		
SHEET			1 of 1

## **Appendix B**

### Hydrology of the RM of Swan River





LEGEND

150 mm WATER PIPELINE  
 100 mm WATER PIPELINE  
 75 mm WATER PIPELINE  
 50 mm WATER PIPELINE



NO.	DESCRIPTION	BY	DATE

SURVEYED	BOOK NUMBER
DRAWN	R. NASON
DESIGNED	L. CIAPALA
CHECKED	L. CIAPALA
REVIEWED	R. FOREMAN

PROVINCE OF MANITOBA  
**THE MANITOBA WATER SERVICES BOARD**  
 DEPARTMENT OF INTERGOVERNMENTAL AFFAIRS

SUBMITTED	APPROVED
_____ <small>CHIEF ENGINEER</small>	_____ <small>GENERAL MANAGER</small>
DATE	DATE

R.M. OF SWAN RIVER RURAL WATER PIPELINES				
<b>BASE MAP</b>				
SCALE	DATE	PROJECT NUMBER	REVISION	SHEET
	02-12-12			1 of 1

## **Appendix C**

Fish Species in the Swan River, Woody River, Roaring River, and Keillor Creek

<b>Waterbody: Keillor Creek</b>		<b>Provincial Waterbody Id #</b> 4045.00	<b>Watershed</b> 5LED	<b>Region</b> Western	<b>District</b> Swan	<b>Map Sheet</b> 62N14	<b>Latitude:</b> 51 57 24	<b>Longitude:</b> 101 27 15
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### Habitat Suitability

Seasonal Habitat Suitability\*

All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	None
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

\*The month(s) the waterbody is useable for fish Habitat (without human intervention)

### Resource Access

Resource	Distance (km)

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### Habitat Classifications

Habitat Class	Class

### General Uses

General Use	Harvest Weight

---

### Needed Improvements

Year	Improvements	Comments

---

### BIOLOGY

BROOK STICKLEBACK <i>Culaea inconstans</i>	Unknown
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### Creel

Year	Species	Catch/Unit Effort*

\*Catch/Unit Effort = Catch/Hour

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### Water Chemistry

Code	Samples	Low	High	Average	MSWQO LO	MSWQO HI	CWQG LO	CWQG HI
<b>Sample Dates:</b> 2005-05-31								
<b>Inorganic</b>								
Ph (Ph Units)	1			7.0000	6.500 unit	9.000 unit	6.500 unit	9.000 unit
<b>Physical</b>								
Conductivity (mho/cm)	1			1099.0000				
Oxygen (BOD)	1			9.1200				
Temperature (C)	1			18.8000				
Turbidity (NTU Or JTU)	1			11.8700				
<small>MSWQO = Manitoba Surface Water Quality Objectives CWQG = Canadian Water Quality Guidelines</small>								

Waterbody: Roaring River		
Provincial Waterbody Id # 4948.00	Watershed 5LEF	Region Western
	District Swan	Map Sheet 63C03
	Latitude: 52 12 33	Longitude: 101 1 44

BIOLOGY	
BIGMOUTH SHINER <i>Notropis dorsalis</i>	Unknown
BLACKNOSE DACE <i>Rhinichthys atratulus</i>	Common
BROOK TROUT <i>Salvelinus fontinalis</i>	Unknown
BURBOT <i>Lota lota</i>	Common
COMMON SHINER <i>Notropis cornutus</i>	Common
CREEK CHUB <i>Semotilus atromaculatus</i>	Common
JOHNNY DARTER <i>Etheostoma nigrum</i>	Common
NORTHERN PIKE <i>Esox lucius</i>	Common
NORTHERN REDBELLY DACE <i>Chrosomus eos</i>	Unknown
RAINBOW TROUT <i>Salmo gairneri</i>	Unknown
SHORTHEAD REDHORSE <i>Moxostoma</i>	Common
WHITE SUCKER <i>Catostomus commersoni</i>	Common
YELLOW PERCH <i>Perca flavescens</i>	Common

Creel		
Year	Species	Catch/Unit Effort*
*Catch/Unit Effort = Catch/Hour		



<b>Waterbody: Ruby Creek</b>		<b>Provincial Waterbody Id #</b> 4048.00	<b>Watershed</b> 5LEF	<b>Region</b> Western	<b>District</b> Swan	<b>Map Sheet</b> 62N14	<b>Latitude:</b> 51 58 40 <b>Longitude:</b> 101 15 24
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### Habitat Suitability

Seasonal Habitat Suitability\*

All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	None
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

\*The month(s) the waterbody is useable for fish Habitat (without human intervention)

### Resource Access

Resource	Distance (km)
Aircraft on Floats	5
Aircraft on Wheels	14
All Season Road	0
Boat	0
Electrical Power	7
Seasonal Road	0
Walking	0

---

### Habitat Classifications

Habitat Class	Class

### General Uses

General Use	Harvest Weight

---

### Needed Improvements

Year	Improvements	Comments
2004	Note: There has been a name change; blacknose dace ( <i>Rhinichthys atratulus</i> ) is now known as western blacknose dace ( <i>Rhinichthys obtusus</i> ) according to Stewart and Watkinson.	
2005	Beaver activity is present in the creek - poplar trees as far as 20m from the bank have been removed by the beavers. Areas of the creek have standing pools with very little flow.	
1999	Milani's "2002-2004 Agricultural Drain Inventory" in addition to Barbour et al. which may also be found online at <a href="http://www.epa.gov/OWOW/monitoring/techmon.html">http://www.epa.gov/OWOW/monitoring/techmon.html</a> .	
	Note: Milani conducted a visual-based habitat assessment on this waterbody. The parameters of this assessment are outlined in (continued)	"Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition" by Barbour, Gerritsen, Snyder and Stribling. For the condition category of each habitat parameter consult (continued)

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### BIOLOGY

BLACKNOSE DACE <i>Rhinichthys atratulus</i>	Unknown
BROOK STICKLEBACK <i>Culaea inconstans</i>	Common
FATHEAD MINNOW <i>Pimephales promelas</i>	Common
NORTHERN PIKE <i>Esox lucius</i>	Unknown
WHITE SUCKER <i>Catostomus commersoni</i>	Unknown

### Creel

Year	Species	Catch/Unit Effort*

\*Catch/Unit Effort = Catch/Hour

Waterbody: Swan River		
Provincial Waterbody Id # 5081.00	Watershed 5LED	Region Western
District Swan	Map Sheet 63C07	Latitude: 52 29 40 Longitude: 100 45 15
<b>BIOLOGY</b>		
BIGMOUTH SHINER <i>Notropis dorsalis</i>	Common	
BLACKNOSE DACE <i>Rhinichthys atratulus</i>	Unknown	
BLACKSIDED DARTER <i>Percina maculata</i>	Common	
BURBOT <i>Lota lota</i>	Unknown	
CARP <i>Cyprinus carpio</i>	Unknown	
COMMON SHINER <i>Notropis cornutus</i>	Common	
CREEK CHUB <i>Semotilus atromaculatus</i>	Common	
FATHEAD MINNOW <i>Pimephales promelas</i>	Unknown	
JOHNNY DARTER <i>Etheostoma nigrum</i>	Unknown	
LONGNOSE DACE <i>Rhinichthys cataractae</i>	Common	
NORTHERN PIKE <i>Esox lucius</i>	Unknown	
RIVER DARTER <i>Percina shumardi</i>	Common	
SAND SHINER <i>Notropis stramineus</i>	Common	
SHORthead REDHORSE <i>Moxostoma</i>	Unknown	
TROUT PERCH <i>Percopsis omiscomaycus</i>	Unknown	
WALLEYE <i>Stizostedion vitreum</i>	Unknown	
WHITE SUCKER <i>Catostomus commersoni</i>	Unknown	
YELLOW PERCH <i>Perca flavescens</i>	Unknown	
<b>Creel</b>		
<u>Year</u>	<u>Species</u>	<u>Catch/Unit Effort*</u>
*Catch/Unit Effort = Catch/Hour		



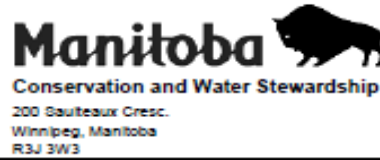
Waterbody: <b>Woody River</b>		Provincial Waterbody Id #	Watershed	Region	District	Map Sheet	Latitude: 52 30 37
		5164.00	5LEC	Western	Swan	63C10	Longitude: 100 50 47
<b>BIOLOGY</b>							
BIGMOUTH BUFFALO <i>Ictiobus cyprinellus</i>	Unknown						
BLACKNOSE DACE <i>Rhinichthys atratulus</i>	Unknown						
BLACKSIDED DARTER <i>Percina maculata</i>	Common						
BROOK STICKLEBACK <i>Culaea inconstans</i>	Unknown						
BROOK TROUT <i>Salvelinus fontinalis</i>	Unknown						
BROWN TROUT <i>Salmo trutta</i>	Unknown						
BURBOT <i>Lota lota</i>	Unknown						
COMMON SHINER <i>Notropis cornutus</i>	Common						
CREEK CHUB <i>Semotilus atromaculatus</i>	Common						
GOLDEYE <i>Hiodon alosoides</i>	Unknown						
JOHNNY DARTER <i>Etheostoma nigrum</i>	Unknown						
LONGNOSE DACE <i>Rhinichthys cataractae</i>	Unknown						
RAINBOW TROUT <i>Salmo gairdneri</i>	Unknown						
SAND SHINER <i>Notropis stramineus</i>	Unknown						
SHORTHEAD REDHORSE <i>Moxostoma</i>	Unknown						
SLIMY SCULPIN <i>Cottus cognatus</i>	Unknown						
WALLEYE <i>Stizostedion vitreum</i>	Unknown						
WHITE SUCKER <i>Catostomus commersoni</i>	Unknown						
YELLOW PERCH <i>Perca flavescens</i>	Unknown						
<b>Creel</b>							
<u>Year</u>	<u>Species</u>	<u>Catch/Unit Effort*</u>					
*Catch/Unit Effort = Catch/Hour							

## **Appendix D**

### Water Rights Licence

MG-14854 (English)

**Licence to Use Water for  
Municipal-Distribution System  
Purposes**



Project: G319

Issued in accordance with the provisions of  
**The Water Rights Act** and regulations made thereunder.

Licence No.: **2002-053**

U.T.M.: Zone 14 346201 E  
5776571 N

Know all men by these presents that in consideration of and subject to the provisions, conditions and restrictions hereinafter contained, the Minister of Conservation for the Province of Manitoba does by these presents give full right and liberty, leave and licence to **The Town of Swan River** of the **Postal District of Swan River** in the Province of Manitoba (hereinafter called "the LICENSEE") to divert water for **municipal-distribution system** purposes from a **sand and gravel** aquifer by means of three (3) water wells and pumps (hereinafter called "the WORKS"), located on the following described lands:

**the Southwest Quarter of Section 27, in Township 36 and Range 27, West of the Principal Meridian in Manitoba.**

and more particularly shown on a plan filed in the office of the Director, Water Branch, a copy of which plan is hereto attached and marked Exhibit "A" for **municipal-distribution system** purposes in:

**the Town of Swan River.**

This licence is issued upon the express condition that it shall be subject to the provisions of the Water Rights Act and Regulations and all amendments thereto and, without limiting the generality of the aforesaid, to the following terms and conditions, namely:

1. The water shall be used solely for **municipal-distribution system** purposes.
2. The WORKS shall be operated in accordance with the terms herein contained.
3. The rate at which water shall be diverted pursuant hereto shall not exceed **0.063 cubic metres per second (2.2 cubic feet per second)** and the total quantity diverted in any one year shall not exceed **690.13 cubic decametres (559.50 acre feet)**.
4. No water shall be diverted during any period when the water level in the said aquifer as measured at:
  - (a) Well No. 1 is more than 22.46 metres (73.7 feet) beneath the surface of the ground,
  - (b) Well No. 2 is more than 21.34 metres (70 feet) beneath the surface of the ground,
  - (c) Well No. 3 is more than 20.57 metres (67.5 feet) beneath the surface of the ground.
5. The LICENSEE does hereby remise, release and forever discharge Her Majesty the Queen in Right of the Province of Manitoba, of and from all manner of action, causes of action, claims and demands whatsoever which against Her Majesty the LICENSEE ever had, now has or may hereafter have, resulting from the use of water for **municipal-distribution system** purposes.
6. In the event that the rights of others are infringed upon and/or damage to the property of others is sustained as a result of the operation or maintenance of the WORKS and the rights herein granted, the LICENSEE shall be solely responsible and shall save harmless and fully indemnify Her Majesty the Queen in Right of the Province of Manitoba, from and against any liability to which Her Majesty may become liable by virtue of the issue of this Licence and anything done pursuant hereto.
7. This Licence is not assignable or transferable by the LICENSEE and when no longer required by the LICENSEE this Licence shall be returned to the said Minister for cancellation.
8. Upon the execution of this Licence the LICENSEE hereby grants the said Minister and/or his Agents the right of ingress and egress to and from the said lands for the purpose of inspection of the WORKS and the LICENSEE shall at all times comply with such directions and/or orders that may be given by the Minister or his Agents in writing from time to time with regard to the operation and maintenance of the WORKS and appurtenances.
9. If for any reason whatsoever the Minister deems it advisable to cancel this Licence, he may do so by letter addressed to the LICENSEE at **Box 879, Swan River, MB, R0L 1Z0, Canada** and thereafter this Licence shall be determined and at an end.
10. The term of this Licence shall be **twenty (20) years** and this Licence shall become effective only on the date of execution hereof by a person so authorized in the Department of Conservation. The LICENSEE may apply for renewal of this Licence not more than 365 days and not less than 90 days prior to the expiry date.
11. The LICENSEE does hereby agree to correct, to the satisfaction of the said Minister, any water supply problems to other currently existing wells, dugouts, or other forms of supply, which are partly or wholly attributable, in the opinion of the Minister, to the diversion of water as authorized by this Licence.
12. A flow meter must be installed, positioned to accurately measure instantaneous pumping rate and accumulative withdrawals from the water source.

13. Records of monthly and annual water use must be kept by the LICENSEE for each calendar year, and a copy of such records shall be furnished to the Director, Water Branch, and/or his agents not later than February 1st of the following year.
14. The LICENSEE shall hold and maintain all other regulatory approvals that may be required and shall comply with all other regulatory requirements for the construction, operation, or maintenance of the WORKS or to divert or use water as provided by this Licence.

In witness whereof I the undersigned hereby agree to accept the aforesaid Licence on the terms and conditions set forth therein and hereby set my hand and seal this \_\_\_\_\_ day of \_\_\_\_\_ A.D. 20 \_\_\_\_\_ .

SIGNED, SEALED AND DELIVERED  
In the presence of

\_\_\_\_\_ } \_\_\_\_\_ (Seal)  
Witness Licensee

Canada, PROVINCE OF MANITOBA To Wit:

I, \_\_\_\_\_ of the \_\_\_\_\_  
of \_\_\_\_\_ in the Province of Manitoba, MAKE OATH AND SAY:

1. That I was personally present and did see \_\_\_\_\_  
the within named party, execute the within Instrument.
2. That I know the said \_\_\_\_\_  
and am satisfied that he/she is of the full age of eighteen years.
3. That the said Instrument was executed at \_\_\_\_\_  
aforesaid and that I am subscribing witness thereto.

SWORN BEFORE me at the \_\_\_\_\_  
In the Province of Manitoba this \_\_\_\_\_ day of \_\_\_\_\_ A.D. 20 \_\_\_\_\_ .

\_\_\_\_\_ } \_\_\_\_\_  
A COMMISSIONER FOR OATHS Witness  
In and for the Province of Manitoba

My Commission expires \_\_\_\_\_

Issued at the City of Winnipeg, in the Province of Manitoba, this \_\_\_\_\_ day of \_\_\_\_\_ A.D. 20 \_\_\_\_\_ .

\_\_\_\_\_  
The Honourable the Minister of Conservation and Water Stewardship

## **Appendix E**

### MWSB Guidelines for Watercourse Crossings

# WATERCOURSE CROSSINGS

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## *Mitigation Measure*

1. All watercourse crossings will be directionally drilled.
2. A minimum undisturbed buffer zone of 15 metre will be maintained between directional drill entry/exit areas and banks of watercourse.
3. Heavy equipment (caterpillars, tractors) shall not be allowed within the buffer zone.
4. Enforce measures regarding fuelling or servicing equipment within 100 metre of watercourse.
5. Waste drill mud and cuttings will be prevented from entering surface water.
6. Should erosion control measures be implemented, post construction monitoring shall be conducted to ensure effectiveness.
7. Further erosion control measures will be implemented as necessary.

## **Reclamation**

1. Restore all disturbed areas to original contours.
2. Install erosion control measures, if warranted, and maintain until vegetation becomes established.

## **Pressure Loss/Fluid Loss Response**

To avoid or minimize the potential for drilling fluids and drill cuttings from entering watercourses because of a frac-out, the following monitoring and response plan will be followed:

1. A record of drilling progress will be maintained to always know the location of the drill head relative to the point of entry.
2. A record of drilling component usage (type and quantity) will be maintained throughout each drilling operation.
3. A record of drilling fluid volume used and returned will be maintained to detect any significant fluid losses. Drilling fluid pump pressure will be continuously monitored. Abnormal loss of returned fluids or loss of fluid pressure that may be indicative of a frac-out will be reported immediately to MWSB/PFRA construction field supervisor.
4. At watercourse crossings where water clarity permits, a view of the stream bottom, an observer will continuously check for signs of mud escapement to the watercourse.

## **Loss of Fluid and Frac-out Response Plan**

1. If an abnormal loss of fluid, drop in pressure or visible plume is observed indicating a frac-out or possible frac-out, drilling is to stop immediately.
2. The contractor will notify the MWSB/PFRA construction field supervisor of the frac-out condition or potential condition and decide on the appropriate action as follows:
  - a) Assign a person to visually monitor for the presence of muddy plume.

- b) Make adjustments to the mud mixture; add lost circulation material (LCM) to the drilling fluid in an attempt to prevent further loss of fluid to the ground formation and/or watercourse.
- c) Where conditions warrant and permit (i.e., shallow depth, clear water, low water velocity, potentially sensitive habitat) and where a frac-out has been visually detected, attempt to isolate the fluid release using a large diameter short piece of culvert.
- d) Under circumstances where a frac-out has occurred, and where conditions do not permit containment and the prevention of drilling fluids release to the watercourse, attempts to plug the fracture by pumping LCM are not to continue for more than 10 minutes of pumping time.
- e) If the frac-out is not contained within this time, MWSB/PFRA construction supervisor will halt any further attempts until a course of action (either abandon directional drilling or further consultation with MWSB engineers) is decided upon.