

Manitoba Environment Act Proposal RM of Woodlands Water Distribution System


February 2015



The Manitoba Water Services Board

Environment Act Proposal Form



Name of the development: RM of Woodlands Water Distribution System	
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): Transportation and Transmission - Class 2	
Legal name of the applicant: RM of Woodlands	
Mailing address of the applicant: Box 10	
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Location of the development: <small>Pipeline - RM of Woodlands municipal and provincial right-of-ways, Pumphouse and Reservoirs - Communities of Warren and Woodlands</small>	
Contact Person: Lynn Kauppila - CAO	
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Legal Description:	
City/Town: Woodlands	Province: MB Postal Code: R0C 3H0
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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)

Per Environment Act Fees Regulation (Manitoba Regulation 168/96):	
Class 1 Developments	\$1,000
Class 2 Developments	\$7,500
Class 3 Developments:	
Transportation and Transmission Lines ..	\$10,000
Water Developments	\$60,000
Energy and Mining.....	\$120,000

Submit the complete EAP to:

Director
Environmental Approvals Branch
Manitoba Conservation and Water Stewardship
Suite 160, 123 Main Street
Winnipeg, Manitoba R3C 1A5

For more information:

Phone: (204) 945-8321

Fax: (204) 945-5229

<http://www.gov.mb.ca/conservation/eal>

Executive Summary

The RM of Woodlands requested the Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal for a Class 2 Development Licence under the Manitoba Environment Act to develop a water distribution system to service the communities of Woodlands and Warren from the Cartier Regional Water Cooperative (CRWC). This EAP is submitted for the installation of 23 km of distribution pipeline extending from the reservoir in the community of Grosse Isle, which as part of the CRWC receives water from the St. Eustache water treatment plant (WTP), to the communities of Woodlands and Warren along provincial trunk highway (PTH) 6. The construction of a pumphouse and reservoir at Woodlands and the construction of an additional reservoir in Warren are included in the proposed project.

The RM of Woodlands is located northwest of Winnipeg at the southeast corner of Lake Manitoba. Both the communities of Woodlands and Warren are in the RM along PTH 6 as is the community of Grosse Isle which is in the RM of Rosser. Currently the community of Woodlands does not have a public water system even though water distribution piping was installed in 1997. The community of Warren has a public water system that was constructed in the late 1980s. It consists of a WTP that chlorinates a groundwater supply, a 125 m³ storage reservoir and distribution pipelines that service the community. Warren experiences aesthetic water quality issues due to high hardness and total dissolved solids in the treated water.

A feasibility study conducted by the MWSB in 2013 identified the option to pipe water from the Grosse Isle reservoir north along PTH 6 to service both Woodlands and Warren as an economical and feasible solution to supply water to these communities. The proposed installation of 23 km of 150 mm pipeline will deliver treated water to 106 connections in Woodlands and 205 connections in Warren. Future expansion of the distribution pipeline will be available for rural connections.

By using treated water from the CRWC the RM of Woodlands proposed water system will require rechlorination prior to community distribution. A reservoir and pumphouse will be constructed in the community of Woodlands to provide chlorination and 315 m³ storage. An 800 m³ reservoir expansion will be required at Warren to ensure sufficient storage and fire protection as the existing WTP is capable of satisfying rechlorination requirements.

The RM of Woodlands will be responsible for operating and maintaining the water distribution system. A Class I Water Treatment and Class I Water Distribution certified operator will be required to ensure system operation and monitoring is maintained.

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List of Acronyms

AO	Aesthetic Objective
CRWC	Cartier Regional Water Cooperative
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
HDPE	High Density Polyethylene
MWSB	Manitoba Water Services Board
ODW	Office of Drinking Water
RM	Rural Municipality
TDS	Total Dissolved Solids
THM	Trihalomethanes
TOC	Total Organic Carbon
UV	Ultraviolet
WTP	Water Treatment Plant

1.0 Introduction

The RM of Woodlands 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 water distribution system to supply treated water to the communities of Woodlands and Warren located in the RM of Woodlands. This document provides the compiled information required by Manitoba Conservation's Environment Act Proposal Report Guidelines and Supplementary Guidelines for Municipal Water Supply Systems.

1.1 Background Information

The RM of Woodlands is located northwest of Winnipeg at the southeast corner of Lake Manitoba. The Municipality is seeking to construct a water distribution system to service Warren and Woodlands with treated water from the CRWC satellite reservoir located at Grosse Isle. All three communities are located along PTH 6 though Grosse Isle is situated in the RM of Rosser. The proposed water system would service a combined population of approximately 1500 people.

1.1.1 Previous Studies

A pipeline feasibility study was completed by the MWSB for the RM of Woodlands in October 2013. The study reviews existing infrastructure, design criteria, options for treated water sources, the proposed pipeline network and probable costs. The study was used in preparation of this EAP.

An EAP was completed for the expansion of the CRWC in 2013. The expansion included the construction of a WTP in the RM of Headingly, the installation of distribution pipeline and the construction of pumphouses and reservoirs in the RMs of Rosser, Rockwood and West St. Paul. The CRWC EAP was referenced in preparation of this EAP.

1.1.2 Population

Historical data from Statistics Canada shows that the RM of Woodlands has maintained a constant population from 1996 to 2011 as shown in Figure 1. The current population of Warren is 900 people while Woodlands has a population 465 people (L. Kauppila, personal communication, August 21, 2013). Due to the proximity of Warren and Woodlands to Winnipeg and compared to communities located a similar distance north of Winnipeg, a 1.0 % annual growth-rate has been assumed for population growth over the next 20 years. Based on these rates the projected population for Warren is 1098 and 567 people in Woodlands.

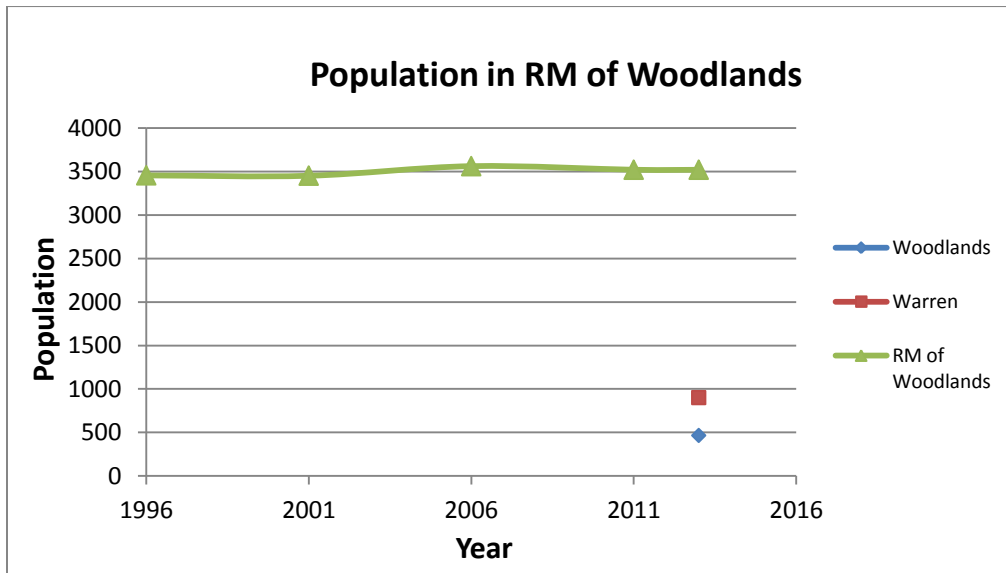


FIGURE 1.1 – RM OF WOODLANDS POPULATIONS

1.1.3 Water Consumption

In 2013 the community of Warren consumed an average of 174 m³ of water per day. The average consumption for Woodlands is unknown as each residence uses individual wells. The average water use can be estimated by assuming 3 people per household, and an average per capita consumption of 300 L/capita/day. Utilizing the 106 connections only results in a total population of 309, therefore the population of 465 will be utilized to estimate consumption, resulting in an average day consumption of 139.5 m³.

The quarterly consumption from April to June in 2013 for Grosse Isle was 2,395 m³ which amounts to 26 m³/day. Table 1.1 below shows a summary of the current treated water consumption.

TABLE 1.1 – TREATED WATER CONSUMPTION FOR THE RM OF WOODLANDS AND COMMUNITY OF GROSSE ISLE

	Units	Warren	Woodlands	Total RM of Woodlands	Grosse Isle	TOTAL
Connections:		205	106	311	74	385
2013 Population		900	465	1365	222	1,587
Consumption/capita/day	L/c/day	193.4	300		118	
Average Day Consumption	L/day	174,026	139,500	313,526	26,328	339,854
	L/s	2.4	1.94	4.34	0.4	4.74
Peak Day factor		2.0	2.0		2.0	
Peak Day Consumption	L/day	348,052	279,000	627,052	52,656	679,708
	L/s	4.83	3.88	8.71	0.73	9.44

Based on a 20-year projection the population of Warren and Woodlands would be 1120 people and 580 people respectively. Typical water use rates of 250 L/person/day to 300 L/person/day and peak day factors of 1.5 to 2.0 are used to calculate water consumption. A rate of 300 L/person/day and a peak day factor of 2.0 were assumed resulting in a 20-year projected average day consumption of 610.500 m³/day (8.5 L/s) and a maximum peak day use of 1,221 m³/day (17.0 L/s) for Warren, Woodlands, and Groose Isle combined.

TABLE 1.2 – 20 YEAR PROJECTED TREATED WATER CONSUMPTION

	Units	Warren	Woodlands	Total RM of Woodlands	Grosse Isle	TOTAL
Expected Connections:		366	189	555	109	664
2013 Population		900	465	1365	268	1633
2015 Population		918	475	1393	274	1667
2035 Population		1120	580	1700	335	2035
Consumption/capita/day	L/c/day	300	300		300	
Average Day Consumption	m ³ /day	336	174	510	100.5	610.5
	L/s	4.67	2.42	7.1	1.40	8.5
Peak Day factor		2.0	2.0		2.0	
Peak Day Consumption	m ³ /day	672	348	1020	201	1221
	L/s	9.33	4.83	14.17	2.80	16.96

The Community of Grosse Isle has a current population of 268 people which results in a projected 20-year population of 335 people based on a 1.0 % growth rate. Assuming a

water consumption of 300 L/person/day and a peak day factor of 2.0 the average day demand is 100,500 L/day (1.4 L/s) with a peak day use of 201,000 L/day (2.8 L/s). Table 1.2 shows the combined 20-year projected consumption for Woodlands, Warren and Grosse Isle.

The CRWC services existing water systems which include; Elie, Oakville, St. Eustache, St. Francois Xavier, Fannystelle, Grosse Isle, Headingley, Headingley Correctional Centre and rural residents throughout the seven municipalities of Cartier, Portage la Prairie, St. Francois Xavier, Headingley, Grey, Rockwood and Rosser. The total estimated service population is approximately 10,000 people with 2995 connections.

The average annual treated water consumption for the CRWC is 1,052,584 m³ (1,053 ML) which gives a daily demand of 2884 m³/day (40.0 L/s). The peak day treated water demand was 6,466 m³/day (89.8 L/s), which amounted to a peak factor of 2.2. Table 1.3 below shows the average monthly water consumption.

TABLE 1.3 – CARTIER REGIONAL WATER CO-OP WATER CONSUMPTION

Month	RAW (m ³)			TREATED (m ³)		
	2013	2012	Average	2013	2012	Average
January	96,660	89,273	92,966	76,616	67,705	72,161
February	89,349	80,108	84,729	70,352	62,879	66,615
March	99,580	98,227	98,904	78,225	76,567	77,396
April	105,388	103,354	104,371	80,379	77,663	79,021
May	126,688	115,794	121,241	91,914	87,905	89,910
June	139,708	122,427	131,067	107,041	95,377	101,209
July	139,047	144,532	141,789	109,291	113,420	111,355
August	133,979	127,873	130,926	106,125	95,579	100,852
September	126,915	120,198	123,556	98,795	89,664	94,230
October	121,690	106,164	113,927	96,118	81,325	88,721
November	114,649	92,594	103,621	96,942	73,558	85,250
December	121,009	93,351	107,180	93,978	77,739	85,858
Total	1,414,663	1,293,902	1,354,282	1,105,781	999,386	1,052,584

The projected 20-year treated water demands for the CRWC are shown in Table 1-4 assuming a 1.5% annual growth rate.

TABLE 1-4 SUMMARY OF CRWC TREATED WATER DEMANDS

	Units	2015	2035
Connections:		2,995	4,034
Population		10,000	13,470
Consumption/capita/day	L/c/day	288	288
Average Day Consumption	L/day	2,884,000	3,879,360
	L/s	40	53.9
Peak Day factor		2.2	2.2
Peak Day Consumption	L/day	6,466,000	8,534,592
	L/s	89.8	118.5

The peak day of the CRWC in 2033 would be 8,535 m³/day (118.5 L/s) based on a 1.5 % population increase. For the combined system of CRWC and RM of Woodlands:

$$\begin{aligned} \text{Peak day demand (L/s)} &= 17 \text{ L/s} + 118 \text{ L/s} \\ &= 135 \text{ L/s} > 60 \text{ L/s CRWC treatment capacity} \end{aligned}$$

The Cartier Regional WTP currently does not have sufficient treatment capacity to meet the 20-year peak day demands for the RM of Woodlands and the CRWC combined. However, the CRWC WTP at St. Eustache has the ability to expand its treatment capacity by approximately 30 L/s increasing production to 90 L/s. Construction of a new 150 L/s WTP in Headingley is underway to further increase the capacity of the CRWC to a combined total capacity of 210 L/s, thereby relieving much of the pressure on the St. Eustache plant by the end of 2015. Therefore the CRWC will have sufficient treatment capacity to provide treated water for the proposed RM of Woodlands current and future demands by the end of 2015.

1.1.4 Storage Reservoir

The Grosse Isle reservoir is a 400 m³ in-ground concrete structure located beneath the pumphouse. The reservoir is sized for fire protection and will need no modifications to supply water to the RM of Woodlands.

The reservoir in the Community of Warren is a 125 m³ underground concrete chamber that does not have the capacity to provide fire protection. Using the MWSB minimum fire flow of 60 L/s for two hours (Class 3, population 800-1200) and the Ontario Ministry of Environment (MOE), the recommended reservoir capacity for Warren is 750 m³. Combined with the current reservoir, an additional 625 m³ reservoir is required.

$$\text{Total Storage Requirement} = A + B + C$$

Where $A = \text{Fire Storage}$
 $B = \text{Equalization Storage (25 \% of Max Day Demand)}$
 $C = \text{Emergency Storage (25 \% of "A" + "B")}$

$$A = 60 \text{ L/s} \times 60 \text{ s/min} \times 60 \text{ min/hr} \times 2 \text{ hr} = 432 \text{ m}^3$$

$$B = 25\% \times 672 \text{ m}^3/\text{day} = 168 \text{ m}^3$$

$$C = 25\% \times (432 + 168) = 150 \text{ m}^3$$

$$\text{Total Storage} = 432 + 168 + 150 = 750 \text{ m}^3$$

A 625 m³ reservoir will be constructed at Warren as part of the proposed system.

Utilizing the same calculations as above with a minimum fire flow of 30 L/s for two hours (Class 2, population 500-800), Woodlands will require a 380 m³ reservoir in order to ensure 20-year projected demand and fire storage.

1.1.5 Raw Water Source

The proposed water distribution system would connect to the CRWC satellite reservoir at Grosse Isle which receives treated water from the St. Eustache WTP. The Assiniboine River supplies raw water to the St. Eustache WTP. Water flows from the river via a 400 mm pipe to a concrete wet well on shore. Two submersible pumps convey the water through a 300 mm pipeline to the WTP. Water Rights Act License No. 2000-039 was issued to CWP Limited Partnership to permit withdrawal of water not exceeding 190 L/s or a total volume of 5,982 cubic decameters annually.

The raw water parameters that may impact treatment and influence operation of the system under the Guideline for Canadian Drinking Water Quality (GCDWQ) include ammonia, hardness, iron, manganese, total dissolved solids (TDS) and turbidity. Table 1.5 shows the raw water quality for the CRWC. The full water chemistry results can be found in Appendix F.

TABLE 1.5 – CRWC RAW WATER QUALITY SUMMARY

Parameter	Unit	CRWC (2014)	GCDWQ
Ammonia	mg/L	0.206	-
Arsenic	mg/L	0.00426	≤ 0.01
Fluoride	mg/L	0.17	≤ 1.5
Hardness	mg/L	570	200/500a
Iron	mg/L	0.77	≤ 0.3
Manganese	mg/L	0.0496	≤ 0.05
Nitrate	mg/L	0.316	≤ 10
pH		8.03	6.5-8.5
Total Dissolved Solids	mg/L	922	500
Total Organic Carbon	mg/L	14.8	-
True Color	CU	18.2	15
Turbidity	NTU	17.8	≤ 0.3 / 0.1c
Uranium	mg/L	0.00512	≤ 0.02
<small>^a Hardness levels greater than 200 are considered poor but tolerable. Hardness levels greater than 500 are generally considered unacceptable</small>			
<small>^b 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</small>			

1.1.6 Water Rights Act

Water Rights Licence (WRL) 2000-039 was issued to the CWP Limited Partnership and is attached in Appendix D. The maximum instantaneous rate of withdrawal as stated in the WRL is limited to 0.19 m³/s. Based on the 20 year projected demand for both the CRWC and the proposed project for the RM of Woodlands the required rate of water withdrawal from the Assiniboine River is 0.16 m³/s. This is below the allowable maximum instantaneous rate and no amendment to the WRL is required.

The maximum annual use stated in WRL 2000-039 is 5,982 cubic decameters. In 2013, the raw water consumption for the CRWC was 1415 cubic decameters which was well within the allowable annual use. The additional raw water demand attributed to the proposed development in the RM of Woodlands is 186 cubic decameters. This results in a total 20 year annual demand for CRWC of 1601 cubic decameters which will not require an amendment to the CRWC WRL as the increased consumption is still within the limits stipulated by WRL 2000-039.

1.1.7 Water Quality

The CRWC distributes surface water that is treated by ultra-filtration and reverse osmosis. The Office of Drinking Water (ODW) currently conducts annual audits of all public water systems which includes sampling and chemistry analysis once per year for surface water supply systems. In addition the operators tests chlorine residuals daily on

the treated water. WTPs using a surface water supply are subject to seasonal changes in raw water quality that may result in variable treated water quality. Table 1.6 summarizes the treated water quality results with focus on parameters of concern which include hardness, manganese, pH, sodium, true colour, sulfate, TDS, Trihalomethanes (THMs) and turbidity. The full water chemistry results can be found in Appendix F of this report.

TABLE 1.6 – SUMMARY OF TREATED WATER QUALITY

Parameter	Unit	CRWC (2014)	GCDWQ
Arsenic	mg/L	0.00094	≤ 0.01
Fluoride	mg/L	0.43	≤ 1.5
Hardness	mg/L	119	200/500a
Iron	mg/L	< 0.10	≤ 0.3
Manganese	mg/L	0.00223	≤ 0.05
Nitrate	mg/L	< 0.102	≤ 10
pH		7.08	6.5-8.5
Total Dissolved Solids	mg/L	275	500
Total Organic Carbon	mg/L	13.6	-
Total THMs	mg/L	0.102*	0.1b
True Color	CU	< 5.0	15
Turbidity	NTU	0.19	≤ 0.3 / 0.1c
Uranium	mg/L	< 0.00109	≤ 0.02

* THM taken for Grosse Isle Distribution System, 2013

^a Hardness levels greater than 200 are considered poor but tolerable. Hardness levels greater than 500 are generally considered unacceptable

^b THM based on average of quarterly samples

^c 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

The CRWC produces treated water to a quality that meets all health and aesthetic standards identified in the Guidelines for Canadian Drinking Water Quality. Improvements to the treatment process are being made to reduce THM levels which are at the regulatory limit. The proposed project will increase water flow through the CRWC system which will aid in the reduction of THM production as water will be replenished more frequently. No compliance plan is required by the ODW at this time.

1.1.8 Compliance to Drinking Water Regulations

The Drinking Water Safety Regulation and Drinking Water Quality Standards Regulation under the *Drinking Water Safety Act* were proclaimed in February 2007 to ensure public water systems provide safe drinking water. These regulations outline water quality standards, bacteriological and microbial standards, operating licence requirements, disinfection testing and monitoring, and reporting requirements.

Reporting requirements under the *Drinking Water Safety Act* include the submission of scheduled test results, events of non-compliance or emergencies, compliance plans, emergency response plans, public water system reports and public water system engineering assessments. Surface water has greater regulatory and operational requirements. Due to greater health concerns surface water supplies must be treated and disinfected to control viruses and parasites (*Giardia lamblia* cysts and *Cryptosporidium* oocysts). Generally this is achieved by having adequate surface water treatment technology, reservoir storage for chlorine contact time and UV disinfection for the destruction or inactivation of *Giardia* and *Cryptosporidium*.

Turbidity and THMs are a health concern with surface water systems and must satisfy regulatory standards. Trihalomethanes are a group of chemical compounds that form when chlorine reacts with dissolved organic material in water. The THM objective of 100 µg/L is based on a quarterly average of the total of the four most common THM compounds (dibromochloromethane, chloroform, bromodichloromethane, bromoform,) found in drinking water. THMs are linked to birth defects and are considered a human carcinogen. Additional pilot testing has been completed since the THM sample above to increase the efficiency of the process at the WTP and reduce THMs as much as possible throughout the system.

The Cartier Regional Water Co-op WTP is in general compliance with the DWSA, GCDWQ and the Ten State Standards.

2.0 Description of Proposed Development

2.1 Project Description

The proposed development involves the construction of a water distribution system to service the Communities of Woodlands and Warren from the Grosse Isle reservoir which is part of CRWC Public Water System. The Grosse Isle reservoir receives treated water piped from the St. Eustache WTP. Water will be supplied to 106 service connections in Woodlands and 205 service connections in Warren with the potential for future rural connections.

The water distribution system will include approximately 23 km of 150 mm pipeline installed along PTH 6 from Grosse Isle to Woodlands. The pipeline will join to an existing 150 mm pipeline that extends from the Grosse Isle reservoir to the junction of PR 321 along PTH 6 which has been installed for the purpose of future expansion. The proposed pipeline will be installed in government road allowances and PTH right-of-ways with some private easements to facilitate construction if necessary. The pipeline will be constructed of Polyvinyl Chloride (PVC) or High Density Polyethylene (HDPE) with a service life of more than 40 years. Due to the even elevation within the RM of Woodlands, the use of booster stations and pressure reducing stations will not be required. The proposed conceptual layout of the pipeline network is included in Appendix A.

The pipeline will deliver water to the existing WTP in Warren where it will be rechlorinated to maintain levels above 0.5 mg/L leaving the reservoir. To ensure adequate storage capacity is available to meet future water demands and fire flows in Warren, an 800 m³ reservoir will be constructed as part of the proposed development.

A pumphouse for possible rechlorination and a 315 m³ reservoir will be constructed in Woodlands. The reservoir will have the storage capacity to meet future water demands and provide fire flow protection.

2.1.1 The CRWC Treated Water Supply

The CRWC WTP was built in St. Eustache in 1998 and was upgraded in 2010. Raw water is withdrawn from the Assiniboine River and treated using an integrated membrane system which includes ultrafiltration and reverse osmosis. The WTP has a treatment capacity of 60 L/s and reservoir storage of 3000 m³. Treated water is supplied to the 400 m³ satellite reservoir at Grosse Isle which is part of the regional distribution system that includes seven other satellite reservoirs.

2.1.2 Operation and Maintenance

The RM of Woodlands will be responsible for maintaining the water distribution system. A certified operator will monitor and maintain the pipeline, pumphouses, and reservoirs.

The operator will also perform sampling and fulfill reporting requirements in accordance with the Manitoba *Drinking Water Quality Standards Regulation*. Water meters will be read on a quarterly basis by a remote radio frequency reader.

2.2 Certificate of Title

It is proposed to install the rural water pipeline within municipal and provincial road right-of-ways owned by the Crown. If necessary, private easements will be obtained to accommodate the pipeline installation. The pumphouses and reservoirs will be constructed on land owned by the local communities.

2.3 Existing and Adjacent Land Use

The proposed land for the development will be on municipal and provincially owned land in previously disturbed road right-of-ways. Adjacent land is used for mainly agricultural and related industries. The existing and adjacent land uses will not change as a result of the proposed development.

2.4 Land Use Designation and Zoning

The proposed development will be on municipal owned land, government road allowances and land adjacent to the development which is predominately agricultural land. Zoning designation for this development is not applicable.

2.5 Project Schedule

The project is scheduled to commence in the 2016 or 2017 construction season depending on the availability of 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 Woodlands subject to the approval of the project 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
Manitoba Infrastructure and Transportation

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 to present and discuss the proposed water distribution system with the citizens of the RM of Woodlands. It is not expected that there will be major concerns forwarded to the Municipality regarding the water distribution system.

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. Contractors will be required to ensure that all equipment is properly maintained to prevent leaks of fuel and motor fluids. Any spills will be reported to the governing authority.

3.0 Physical Environment

3.1 Physiographic Setting and Climate

The RM of Woodlands is located northwest of Winnipeg at the southeast corner of Lake Manitoba. The communities of Woodlands and Warren are both located within the RM and are situated along PTH 6. Grosse Isle is located further south also along PTH 6 in the RM of Rosser. The RM of Woodlands is seeking to construct a water distribution system extending from Grosse Isle to service Warren and Woodlands.

The elevation ranges from 250 m to 260 m within the RM of Woodlands which is situated in the Lake Manitoba Plain within the Prairies ecosystem. The area is drained by Sturgeon Creek and various smaller tributaries.

There is no local Environment Canada weather data available for the RM of Woodlands. Data for Portage la Prairie, which is the closest location to the RM of Woodlands with available data, demonstrates that the mean annual temperature for the area is 1.76°C with below zero average daily temperature from November through March. The mean annual precipitation is approximately 465 mm.

3.2 Hydrogeology

The RM of Woodlands is located in the Canadian Shield hydrogeological region. Early investigations during well digging in the area show that the hydrogeology of the area mainly consists of clay and limestone deposits.

The Lake Manitoba Plain Eco-region is typically underlain by limestone bedrock which is covered by extremely calcareous broadly ridged glacial tills in the northern half and by smooth level, lacustrine sands, silts and clays in the southern half.

3.3 Hydrology

Sturgeon Creek is the main waterway within the geography of the RM of Woodlands and within the area of the proposed development location. There are numerous drains within the RM of Woodlands. Appendix B shows a detailed map of the hydrology of the project area.

3.4 Fish and Fish Habitat

Sturgeon Creek and its associated tributaries are potential fish habitat within the project area. A list of fish species found in Sturgeon Creek has been included in Appendix C.

3.5 Wildlife Habitat and Vegetation

The project area is located within the Lake Manitoba Plain Eco-region of the Prairies Eco-zone (Agriculture and Agri-Food Canada). The mean annual temperature in this eco-zone ranges from 1.5°C to 3.5°C with a mean winter temperature of -10°C and a mean summer temperature of 15°C. It is mainly associated with trembling aspen, balsam poplar and intermittent grasslands on the Black Chernozemic soils that are very fertile. The soils in the eco-zone are also influenced by the Black, Dark Gray and Dark Brown Chernozems from the Aspen Parkland that constitutes the northern edge of the eco-zone. There is considerable agricultural production, mining, oil, and gas production in the eco-zone.

Characteristic mammals in the Prairies Eco-zone include mule deer, elk, coyote, pronghorn antelope, badger, white-tailed jack rabbit, Richardson's ground squirrel and the northern pocket gopher. The main bird species include ferruginous hawk, Swainson's hawk, American avocet, burrowing owl, great blue heron, black-billed magpie, northern oriole, veery and brown thrasher (National Ecological Framework Report). The CLI classification for this area is 4 to 5 which indicates there is slight to moderately severe limitations to waterfowl production (Agriculture and Agri-Food Canada).

3.6 Socioeconomic

The project area is located within the RM of Woodlands. The RM has an area of 1,177 km² and a population of 3,521 (2011 Census). The main economic base is agriculture. The project is anticipated to generate additional temporary employment and bring long-term positive economic benefits to the area by providing a sustainable potable water supply.

3.7 Heritage Resources

Construction 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 reservoirs and water treatment plants. 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. However, risks 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 groundwater quality.

4.5 Groundwater Levels

If required an amendment to the Water Rights Act Licence will be applied for prior to construction, though no significant impacts are anticipated from the project. Groundwater monitoring will be conducted by the CRWC 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 construction access to land 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 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 responsibilities exist for the Municipality

due to the costs of developing the water system, however, the development of a sustainable potable water supply will be an economic benefit for the RM. 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 the construction phase that are 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 deliver 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-establishing 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 will be implemented in the event of a 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

Potential groundwater impacts from petroleum products can be mitigated as described in Section 5.3. 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 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 the volume of water pumped and charged to ratepayers on a quarterly basis. Since 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 the construction phase.

6.0 References

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http://climate.weather.gc.ca/climateData/dailydata_e.html?StationID=10884&timeframe=2&Year=2013&Month=1&cmdB1=Go (accessed July 9, 2014)

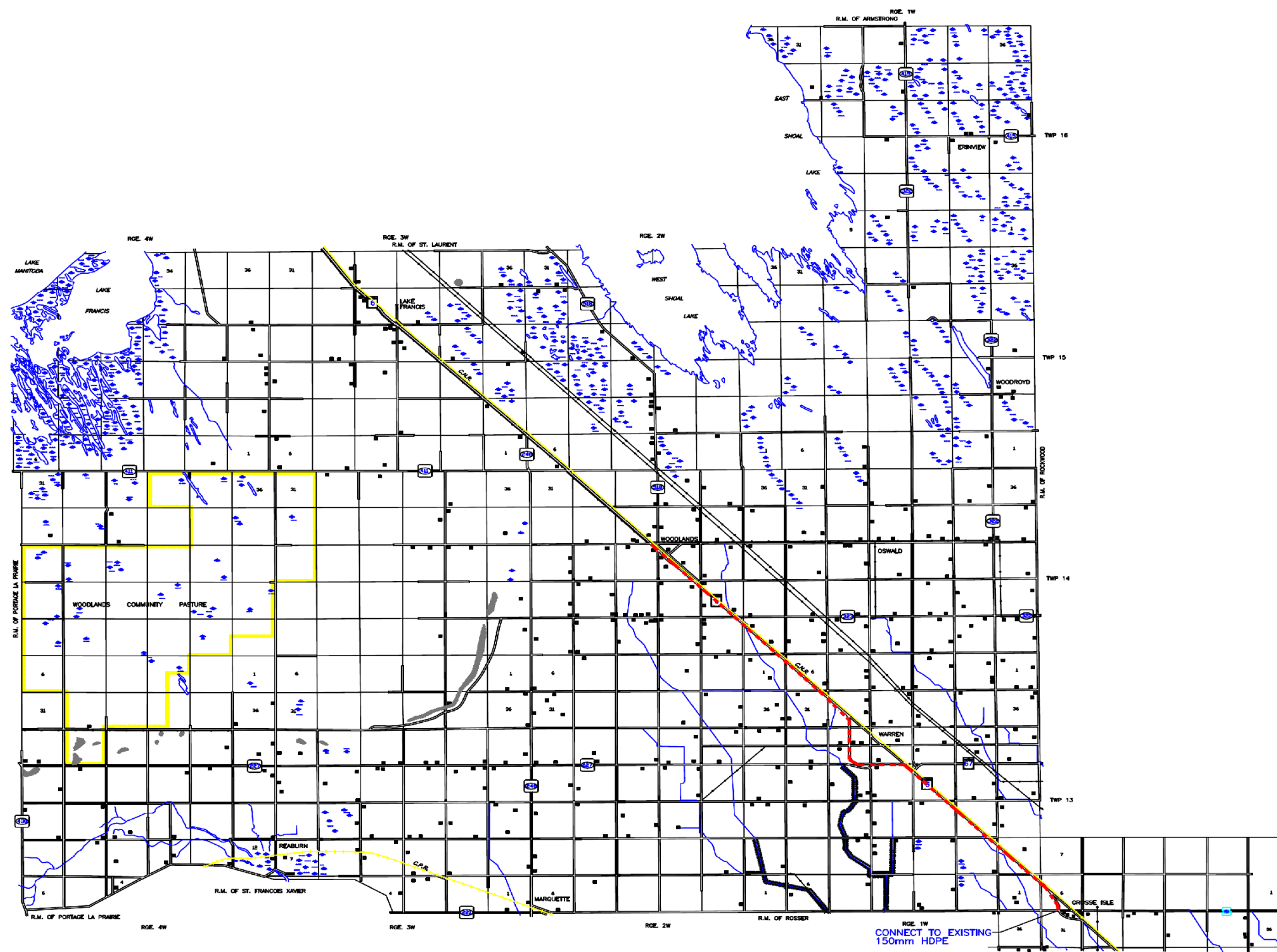
Cartier Regional Water Co-Op. Public Water System Annual Report. March 2014.

Cartier Regional Water Co-Op. Public Water System Annual Report. May 2012.

Cartier Regional Water Co-Op. Public Water System Annual Report. January 2012.

Appendix A - Preliminary Pipeline Route

Preliminary Pipeline Route



LEGEND

150mm WATER PIPELINE - - - - -

NO.	DESCRIPTION	BY	DATE



SURVEYED		BOOK NUMBER	
DRAWN		ABC	
DESIGNED		D. GENAILLE	
CHECKED			
REVIEWED			
SUBMITTED		APPROVED	
CHIEF ENGINEER	DATE	GENERAL MANAGER	DATE

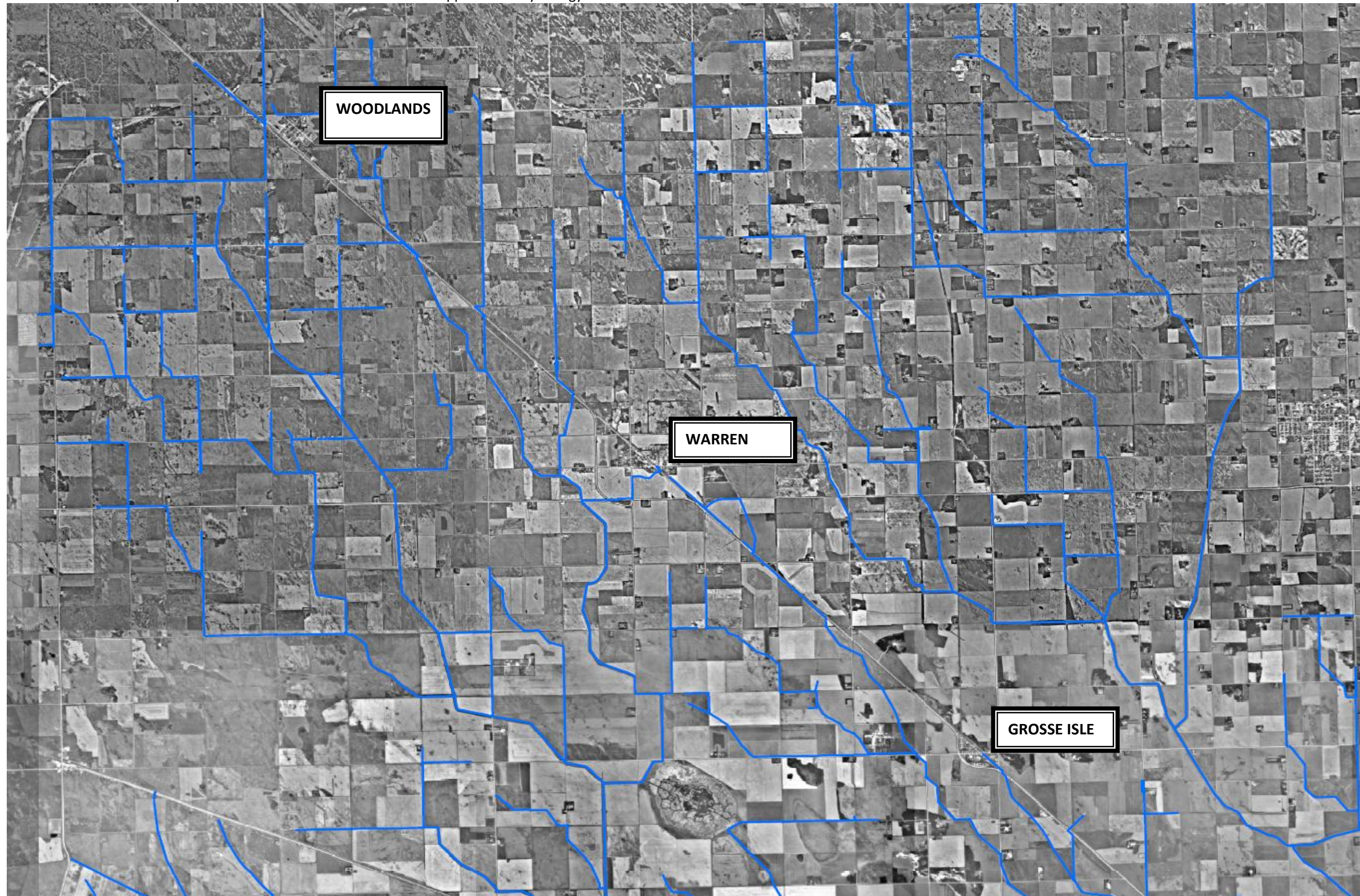
PROVINCE OF MANITOBA
 THE MANITOBA WATER SERVICES BOARD
 MANITOBA LOCAL GOVERNMENT

R.M. OF WOODLANDS
 RURAL WATER PIPELINES
 2013
 COST ESTIMATE

SCALE	DATE	PROJECT NUMBER	REVISION	SHEET
NTS	13-10-15			1 of 1

Appendix B - Hydrology of the RM of Woodlands

Hydrology of the RM of Woodlands



Appendix C - Fish Species

Fish Species in Sturgeon Creek

Waterbody: Sturgeon Creek

Provincial Waterbody Id # 2703.00 Watershed 5MJA Region Winnipeg District Winnipeg Map Sheet 62H14 Latitude: 49 53 2 Longitude: 97 16 13

BIOLOGY

Presence

BLACK BULLHEAD <i>Ictalurus melas</i>	Unknown
BLACK CRAPPIE <i>Pomoxis nigromaculatus</i>	Unknown
BLACKNOSE DACE <i>Rhinichthys atratulus</i>	Unknown
BLACKNOSE SHINER <i>Notropis heterolepis</i>	Unknown
BLUNTNOSE MINNOW <i>Pimephales notatus</i>	Unknown
BROOK STICKLEBACK <i>Culaea inconstans</i>	Common
BROWN BULLHEAD <i>Ictalurus nebulosus</i>	Unknown
CARP <i>Cyprinus carpio</i>	Unknown
CENTRAL MUDMINNOW <i>Umbra limi</i>	Unknown
CHANNEL CATFISH <i>Ictalurus punctatus</i>	Unknown
COMMON SHINER <i>Notropis cornutus</i>	Unknown
CREEK CHUB <i>Semotilus atromaculatus</i>	Common
EMERALD SHINER <i>Notropis atherinoides</i>	Unknown
FATHEAD MINNOW <i>Pimephales promelas</i>	Common
FLATHEAD CHUB <i>Platygobio gracilis</i>	Unknown
FRESHWATER DRUM <i>Aplodinotus grunniens</i>	Unknown
GOLDEN REDHORSE <i>Moxostoma erythrurum</i>	Unknown
GOLDEN SHINER <i>Notemigonus crysoleucas</i>	Unknown
GOLDEYE <i>Hiodon alosoides</i>	Unknown
JOHNNY DARTER <i>Etheostoma nigrum</i>	Unknown
LOGPERCH <i>Percina caprodes</i>	Unknown
LONGNOSE DACE <i>Rhinichthys cataractae</i>	Unknown
MOONEYE <i>Hiodon tergisus</i>	Unknown
NORTHERN PIKE <i>Esox lucius</i>	Common
QUILLBACK <i>Carioides cyprinus</i>	Unknown
RIVER SHINER <i>Notropis blennioides</i>	Unknown
ROCK BASS <i>Ambloplites rupestris</i>	Unknown

Creel

Year	Species	Catch/Unit Effort*
------	---------	--------------------

*Catch/Unit Effort = Catch/Hour

Waterbody: Sturgeon Creek

Provincial Waterbody Id # 2703.00 Watershed 5MJA Region Winnipeg District Winnipeg Map Sheet 62H14 Latitude: 49 53 2
 Longitude: 97 16 13

SAND SHINER <i>Notropis stramineus</i>	Common
SAUGER <i>Stizostedion canadense</i>	Unknown
SHORthead REDHORSE <i>Moxostoma</i>	Unknown
SILVER CHUB <i>Hybopsis storeriana</i>	Unknown
SILVER LAMPREY <i>Ichthyomyzon unicuspis</i>	Unknown
SILVER REDHORSE <i>Moxostoma anisurum</i>	Uncommon
SLIMY SCULPIN <i>Cottus cognatus</i>	Unknown
SPOTTAIL SHINER <i>Notropis hudsonius</i>	Unknown
STONECAT <i>Noturus flavus</i>	Common
TADPOLE MADTOM <i>Noturus gyrinus</i>	Unknown
TROUT PERCH <i>Percopsis omiscomaycus</i>	Unknown
WALLEYE <i>Stizostedion vitreum</i>	Common
WHITE SUCKER <i>Catostomus commersoni</i>	Common
YELLOW PERCH <i>Perca flavescens</i>	Unknown

Appendix D - Water Rights Licence

Cartier Regional Water Co-Operative Water Rights Act Licence

MG-14853 (English)

**Licence to Use Water for
Municipal
Purposes**



Project: Cartier Regional Water Distribution System

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

Licence No.: **2000-039**

U.T.M.: Zone 14 589094 E
5541068 N

Know all men by these presents that in consideration of and subject to the provisos, 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 **CWP Limited Partnership** (hereinafter called "the LICENSEE") to divert water from **Assiniboine River** for **municipal** purposes by means of a raw water Assiniboine River intake pipeline and wet well pumping installation constructed in the south side bank of the Assiniboine River within the east right-of-way of the north south government road allowance known as Provincial Road No. 248, adjoining the west limit of River Lot No. 36, in the Parish of Baie St. Paul, and, connected to the pumping installation a raw water conveyance pipeline (the said pumping installation and conveyance pipeline all hereinafter collectively called "the WORKS") constructed southerly within the east side right-of-way of the said Provincial Road No. 248 to a water treatment plant and raw water storage reservoir located on portions of land in River Lots 34, 35 and 36, Parish of Baie St. Paul.

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** purposes.
2. The collective WORKS shall be operated in accordance with the terms herein contained.
3. The raw Assiniboine River water diverted (withdrawn) pursuant hereto shall not exceed the instantaneous rate **0.19 cubic metres per second (6.7 cubic feet per second)** (160 litres per second) and the total quantity diverted in any one year shall not exceed **5,982 cubic decametres (4849.67 acre feet)**.
4. 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 raw water from the Assiniboine River for **municipal** water use purposes and any connection to the Cartier regional water distribution system.
5. 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 collective 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.
6. 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.
7. 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 collective 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 collective WORKS and appurtenances.
8. 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 **2600 Seven Evergreen Place, Winnipeg, MB, R3L 2T3, Canada** and thereafter this Licence shall be determined and at an end.
9. Notwithstanding anything preceding in this Licence the water shall be used, and the WORKS shall be placed, only on land owned by, or under the control of, the LICENSEE.
10. This Licence shall be effective for a term of **twenty (20) years** beginning from the date it is signed by the Director, Water Branch, on behalf of the Minister. 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. Records of 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 by February 1st of the following year.
12. For the purpose of recording water use, as noted in Term No. 11, the LICENSEE will be required to install on the pumping WORKS, a water measuring device, acceptable to the Director, Water Branch, that will accurately calculate the instantaneous water flow and the accumulated annual water quantity, withdrawn from the water source.
13. The LICENSEE must hold valid and subsisting approvals from all regulatory agencies that may be required, for the establishment, or construction, or operation and maintenance of the water diversion works and the diversion and use of water from the Assiniboine River.
14. The LICENSEE shall, at all times, comply with all regulatory requirements of Fisheries and Oceans Canada in respect to fish habitat protection provisions of Canada's Fisheries and Oceans Act, with respect to the establishment, or construction, or operation and maintenance of the water diversion works and the diversion and use of water from the Assiniboine River.

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 - Watercourse Crossings

MWSB Guidelines for Watercourse Crossings

WATERCOURSE CROSSINGS

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.

Appendix F - Water Quality Data

CRWC 2014 Water Quality Data



Manitoba Water Services Board - CRWC
ATTN: KALE BLACK
Cartier Regional Water Co-op
Box 271
St. Eustache MB R0H 1H0

Date Received: 07-JAN-14
Report Date: 10-JAN-14 14:27 (MT)
Version: FINAL

Client Phone: 204-353-4055

Certificate of Analysis

Lab Work Order #: L1408844
Project P.O. #: 28128
Job Reference: CARTIER REGIONAL - PWS 36.00
C of C Numbers:
Legal Site Desc:

Comments:

10-JAN-2014 Sending with revised report type

Paul Nicolas

Paul Nicolas
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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Environmental 

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER



ANALYTICAL REPORT

L1408844 CONTD....
 PAGE 2 of 6
 10-JAN-14 14:27 (MT)

Physical Tests (WATER)

Analyte	Unit	ALS ID		L1408844-1	L1408844-2
		Sampled Date	Sampled Time		
		Sample ID		CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
		Guide Limit #1	Guide Limit #2		
Colour, True	CU	15	-	18.2	<5.0
Conductivity	umhos/cm	-	-	1290	457
Hardness (as CaCO3)	mg/L	-	-	570	119
Langelier Index (4 C)	No Unit	-	-	0.81	-1.1
Langelier Index (60 C)	No Unit	-	-	1.6	-0.38
pH	pH units	6.5-8.5	-	8.03	7.08
Total Dissolved Solids	mg/L	500	-	922	275
Transmittance, UV (254 nm)	% T	-	-	40.4	88.4
Turbidity	NTU	-	-	17.8	0.19

Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (Pre-2003)

Anions and Nutrients (WATER)

Analyte	Unit	ALS ID		L1408844-1	L1408844-2
		Sampled Date	Sampled Time		
		Sample ID		CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
		Guide Limit #1	Guide Limit #2		
Alkalinity, Total (as CaCO3)	mg/L	-	-	348	113
Ammonia, Total (as N)	mg/L	-	-	0.206	<0.010
Bicarbonate (HCO3)	mg/L	-	-	425	138
Bromide (Br)	mg/L	-	-	<0.10	<0.10
Carbonate (CO3)	mg/L	-	-	<12	<12
Chloride	mg/L	250	-	30.5	10.3
Fluoride	mg/L	-	1.5	0.17	0.43
Hydroxide (OH)	mg/L	-	-	<6.8	<6.8
Nitrate-N	mg/L	-	10	0.316	0.102
Nitrite-N	mg/L	-	1	0.0032	<0.0010
Sulfate	mg/L	500	-	347	100

Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (Pre-2003)

Organic / Inorganic Carbon (WATER)

Analyte	Unit	ALS ID		L1408844-1	L1408844-2
		Sampled Date	Sampled Time		
		Sample ID		CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
		Guide Limit #1	Guide Limit #2		
Dissolved Organic Carbon	mg/L	-	-	14.5	13.4
Total Organic Carbon	mg/L	-	-	14.8	13.6

Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (Pre-2003)

 Detection Limit for result exceeds Guide Limit. Assessment against Guide Limit cannot be made.

 Analytical result for this parameter exceeds Guide Limit listed on this report.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.



ANALYTICAL REPORT

L1408844 CONTD....
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Total Metals (WATER)

Analyte	Unit	ALS ID		L1408844-1	L1408844-2
		Sampled Date	Sampled Time	07-JAN-14	07-JAN-14
Analyte	Unit	Guide Limit #1	Guide Limit #2	CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
				Aluminum (Al)-Total	mg/L
Antimony (Sb)-Total	mg/L	-	0.006	0.00025	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	0.00426	0.00094
Barium (Ba)-Total	mg/L	-	1	0.0913	0.0194
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	-	0.142	0.109
Cadmium (Cd)-Total	mg/L	-	0.005	0.000033	<0.000010
Calcium (Ca)-Total	mg/L	-	-	110 DLA	24.1
Cesium (Cs)-Total	mg/L	-	-	<0.00010	<0.00010
Chromium (Cr)-Total	mg/L	-	0.05	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	-	-	0.00054	<0.00020
Copper (Cu)-Total	mg/L	1	-	0.00317	0.0956
Iron (Fe)-Total	mg/L	0.3	-	0.77	<0.10
Lead (Pb)-Total	mg/L	-	0.01	0.000517	0.000639
Lithium (Li)-Total	mg/L	-	-	0.0763	0.0186
Magnesium (Mg)-Total	mg/L	-	-	71.5 DLA	14.4
Manganese (Mn)-Total	mg/L	0.05	-	0.0496	0.00223
Molybdenum (Mo)-Total	mg/L	-	-	0.00397	0.00092
Nickel (Ni)-Total	mg/L	-	-	0.0048	<0.0020
Phosphorus (P)-Total	mg/L	-	-	0.17	<0.10
Potassium (K)-Total	mg/L	-	-	14.3	3.37
Rubidium (Rb)-Total	mg/L	-	-	0.00325	0.00057
Selenium (Se)-Total	mg/L	-	0.01	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	5.98	1.13
Silver (Ag)-Total	mg/L	-	-	<0.00010	<0.00010
Sodium (Na)-Total	mg/L	200	-	103 DLA	52.8 DLA
Strontium (Sr)-Total	mg/L	-	-	0.449	0.0983
Tellurium (Te)-Total	mg/L	-	-	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	-	-	<0.00010	<0.00010
Thorium (Th)-Total	mg/L	-	-	0.00017	<0.00010
Tin (Sn)-Total	mg/L	-	-	<0.00020	<0.00020
Titanium (Ti)-Total	mg/L	-	-	0.0217	0.00142

Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (Pre-2003)

 Detection Limit for result exceeds Guide Limit. Assessment against Guide Limit cannot be made.

 Analytical result for this parameter exceeds Guide Limit listed on this report.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.



ANALYTICAL REPORT

L1408844 CONTD....
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Total Metals (WATER)

Analyte	Unit	Guide Limit		L1408844-1	L1408844-2
		#1	#2	CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
Tungsten (W)-Total	mg/L	-	-	<0.00010	<0.00010
Uranium (U)-Total	mg/L	-	0.02	0.00512	0.00109
Vanadium (V)-Total	mg/L	-	-	0.00335	0.00035
Zinc (Zn)-Total	mg/L	5	-	0.0029	0.0028
Zirconium (Zr)-Total	mg/L	-	-	0.00098	<0.00040

Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (Pre-2003)

Detection Limit for result exceeds Guide Limit. Assessment against Guide Limit cannot be made.

Analytical result for this parameter exceeds Guide Limit listed on this report.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TOT-WP	Water	Alkalinity	APHA 2320B
<p>Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. It is determined by titration with a standard solution of strong mineral acid to the successive HCO₃⁻ and H₂CO₃ endpoints indicated electrometrically.</p>			
BR-IC-WP	Water	Bromide by Ion Chromatography	EPA 300.1 (modified)
<p>Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.</p>			
C-TC,TIC,TOC-WP	Water	Carbons	APHA 5310 B-INSTRUMENTAL
<p>This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.</p> <p>The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC. TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.</p>			
C-TDC,DIC,DOC-WP	Water	Carbons Dissolved	APHA 5310 B-INSTRUMENTAL
<p>This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.</p> <p>The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC. TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.</p>			
CL-L-IC-WP	Water	Chloride by Ion Chromatography	EPA 300.1 (modified)
<p>Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.</p>			
COLOUR-TRUE-WP	Water	Colour, True	APHA 2120C
<p>True colour in water is analyzed by discrete analyzer using the platinum-cobalt colourimetric method. Colour is pH dependant; unless otherwise indicated, reported colour results pertain to the pH of the sample as received to within +/- 1 pH unit.</p>			
EC-WP	Water	Conductivity	APHA 2510B
<p>Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.</p>			
ETL-HARDNESS-TOT-WP	Water	Hardness Calculated	HARDNESS CALCULATED
ETL-LANGELIER-4-WP	Water	Langelier Index 4C	Calculated
ETL-LANGELIER-60-WP	Water	Langelier Index 60C	Calculated
F-IC-WP	Water	Fluoride by Ion Chromatography	EPA 300.1 (modified)
<p>Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.</p>			
IONBALANCE-CALC-WP	Water	Ion Balance Calculation	APHA 1030E
MET-T-L-MS-WP	Water	Total Metals by ICP-MS	U.S. EPA 200.8-TL
<p>Total Metals by ICP-MS: This analysis is carried out using sample preparation procedures adapted from Standard Methods for the examination of Water and Wastewater Method 3030E and analytical procedures adapted from U.S EPA Method 200.8 for analysis of metals by inductively coupled-</p>			

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
		mass spectrometry.	
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
		Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.	
NO2-L-IC-WP	Water	Nitrite as N by Ion Chromatography	EPA 300.1 (modified)
		Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.	
NO3-L-IC-WP	Water	Nitrate as N by Ion Chromatography	EPA 300.1 (modified)
		Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.	
PH-WP	Water	pH	APHA 4500H
		The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.	
SO4-IC-WP	Water	Sulfate by Ion Chromatography	EPA 300.1 (modified)
		Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.	
SOLIDS-TDS-WP	Water	Total Dissolved Solids	APHA 2540 C (modified)
		Total dissolved solids in aqueous matrices is determined gravimetrically after evaporation of the filtrate at 180 C.	
TRANSM-UV-WT	Water	Transmittance, UV (254 nm)	APHA 5910 B-Spectrophotometer
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
		Turbidity in aqueous matrices is determined by the nephelometric method.	

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.



Manitoba Conservation Water Stewardship
 Office of Drinking Water
 1007 Century Street, Winnipeg, Manitoba,
 Canada R3H 0W4

ONLY FOR USE

: Samples

Report to Operator (email pdf):				Owner billing (Email):				Regular Service (default):		Regular Service (is 5-7 Days):	
Contact:	Kale Black, Manager - Cartier Regional Water Co-op			Contact:	Kim Davey, MWWSB					<input checked="" type="checkbox"/> 1 Day, rush / priority	
Address:	Box 217 St. Eustache MB R0H 1H0			Address:	Box 22080 - 2010 Currie Blvd. Brandon MB R7A 6Y					<input type="checkbox"/> 2 Day, rush / priority	
Phone:	204-353-4055			Phone:	204-729-6094					<input type="checkbox"/> 3 Day, rush / priority	
Email:	crwc@mymts.net, angela.meier@gov.mb.ca			Email:	kim.davey@gov.mb.ca						
Operator contact update (if different then above):				Owner contact update (if different then above):				Email pdf copy to:			
Contact:				Contact:				DWO:		John Cronk	
Address:				Address:				DWO Address:		309 - 25 Tupper St. N. Portage la Prairie MB R1N 3K1	
Phone:				Phone:				DWO Phone:		204-239-3186	
Email:				Email:				DWO Email:		john.cronk@gov.mb.ca	
Account:		ODW Report type:	EMS (Lab-MWS)	Client / Project Information:				Analysis Request			
Agency Code:	382	Project:	DWQ-C	Operation Name:	CARTIER REGIONAL - PWS						
Lab:	ALS	Lab Work Order # / Job # (lab use only)		Operation Code (com code):	36.00			MB-CH-PWS-V2013 Number of Containers			
Lab Sample # (lab use only)	Sample Number (YYMMJJ9999)	Station Number (MB99XXD9999) / (MB99XXY9999)	Sample Identification	Operation Id:	28128						
	1401JC0033	MB05MJD041	Cartier regional 1 - Raw	Sampled by:	Kale Black						
	1401JC0034	MB05MJD042	Cartier regional 2 - Treated	Date	Time	Sample Matrix	Sample Type				
				dd-mmm-yyyy	hh:mm						
				7-Jan-14		6	1	X			
				7-Jan-14		10	1	X			
Failure to complete all portions of this form may delay analysis.				Sample Matrix:				Sample Type:			
Please fill in this form LEGIBLY.				6-Raw Water, 10-Treated Water				1-Grab Sample			
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified by the Laboratory.											
For ALL other testing, please use Laboratory specific forms.											
DO NOT COPY or RE-USE this form. Sample Numbers are unique to the Office of Drinking Water and provided by DWO.											
Relinquished By:	Date & Time:	Received By:	Date & Time:	Sample Condition (lab use only)							
		MS	Jan 7 / 14	Temperature	Samples Received in Good Condition? Y / N (if no provide details)						
Relinquished By:	Date & Time:	Received By:	Date & Time:	Temperature	6.1						

Operator mandatory Operator optional Operator to fill, if information above has changed Opr to fill, Lab specific pre-filled by DWO

Note: Cyanide and Mercury are not required and have been removed from the list.
 Please use the Rev. July 29, 2013 Water System Chemistry List.