

Manitoba Environment Act Proposal Cartier Regional Water Cooperative

July 2013



Dee Genaille, P.Eng

Environment Act Proposal Form

Name of the development: Cartier Regional Water Cooperative Water Treatment Plant Expansion	
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): Class II: Transportation and Transmission, Water Development and Control, Class I: Waste Disposal	
Legal name of the proponent of the development: Cartier Regional Water Cooperative Inc.	Mailing address: 1060 Hwy. #26 St. Francois Xavier, MB R4L 1A5
Location (street address, city, town, municipality, legal description) of the development: RM of Headingley (RL-35-HE, RL-36-HE, RL-37-HE, municipal right-of-ways) RM of Rosser (municipal right-of-ways)	
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Date: July 24, 2013	Signature of proponent, or corporate principal of corporate proponent:  Printed name: Dee Genaille, M.Sc., P.Eng

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 Manitoba Water Services Board (MWSB) has prepared the following Environment Act Proposal (EAP) for a Class 2 Development License under the Manitoba Environment Act for an expansion of the Cartier Regional Water Cooperative (CRWC). The expansion involves the construction of a new water treatment plant (WTP) in the RM of Headingley to allow the CRWC to meet the increasing water demands due to residential and commercial growth in the participating municipalities and supply treated water for future industrial development at CentrePort Canada in the RM of Rosser. This EAP is submitted for the construction of a WTP which will have the capacity to supply 120 L/s from the Assiniboine River, installation of approximately 21 kilometres of distribution pipeline and the return of membrane concentrate to the source water body.

The CRWC supplies potable water to rural residents and communities located in the municipalities of Cartier, Grey, Headingley, Portage la Prairie, Rockwood, Rosser, St. Francois Xavier and Woodlands. It consists of a central WTP located in St. Eustache, a regional distribution system and satellite reservoirs with local distribution mains. Satellite reservoirs are located at Elie, Grosse Isle, Headingley, Headingley Correctional Institute (HCI), Oakville, Fannystelle and St. Francois Xavier.

The expansion includes the construction of a new 120 L/s WTP in the RM of Headingley using the Assiniboine River as a surface water supply. The treatment process will consist of an integrated membrane system including ultrafiltration (UF) and low energy reverse osmosis (LERO) membranes. Reject water from the membrane process will be discharged back to the Assiniboine River via an existing outfall used by the Headingley wastewater treatment plant (WWTP). With the proposed expansion the operating capacity of the CRWC will increase from 60 L/s to 180 L/s.

The CRWC distribution system will be expanded with the installation of approximately 21 kms of 450 mm pressure pipeline to extend into the RM of Rosser (CentrePort Canada). A pumphouse and 7.5 ML below-grade concrete reservoir will be constructed to store treated water where it will be re-chlorinated prior to distribution. Reservoir capacity will provide equalization and emergency storage and supply a minimum fire flow of 285 L/s for 4 hours to meet the fire flow requirements of the CentrePort industrial development.

List of Acronyms

AO	Aesthetic Objective
ASL	Above Sea Level
CLI	Canada Land Inventory
DBP	Disinfection By-Product
DWSA	Drinking Water Safety Act
EAP	Environment Act Proposal
CRWC	Cartier Regional Water Cooperative
GCDWQ	Guidelines for Canadian Drinking Water Quality
GUDI	Groundwater Under Direct Influence of Surface Water
HCI	Headingley Correctional Institute
LERO	Low Energy Reverse Osmosis
MWSB	Manitoba Water Services Board
ODW	Office of Drinking Water
RM	Rural Municipality
RO	Reverse Osmosis
TDS	Total Dissolved Solids
THM	Trihalomethanes
TOC	Total Organic Carbon
UF	Ultrafiltration
UV	Ultraviolet
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

1.0 Introduction

On behalf of the CRWC, the MWSB has prepared an Environment Act Proposal (EAP) for a Class 2 Development License under the Manitoba Environment Act for an expansion of the current system. The proposed expansion will allow the CRWC to meet the increasing water demand due to residential and commercial growth and supply treated water for industrial development in CentrePort Canada. This EAP is submitted for the construction of a WTP which will have the capacity to withdraw greater than 200 dam³ of water annually from the Assiniboine River, installation of a distribution pipeline of greater than 10 kilometres and the discharge of membrane concentrate back to the Assiniboine River.

1.1 Background Information

The CRWC supplies potable water to rural residents and communities located in the municipalities of Cartier, Grey, Headingley, Portage la Prairie, Rockwood, Rosser, St. Francois Xavier and Woodlands. It consists of a central WTP located in St. Eustache, a regional distribution system and satellite reservoirs with local distribution mains. The satellite reservoirs are located at Elie, Grosse Isle, Headingley, HCI, Oakville, Fannystelle, St. Francois Xavier and Cartier. A map of the CRWC system is shown in Appendix A.

The original WTP was constructed at St. Eustache in 1998. Treatment of raw water drawn from the Assiniboine River consisted of a lime soda softening process including clarification, recarbonation, filtration and chlorination. The plant was rated at a maximum treatment capacity of 50 L/s with a treated water storage capacity of 1100 m³.

In 2012 the St. Eustache WTP was upgraded due to increased demand and the need to conform to the Drinking Water Safety Act (DWSA) and the Canadian Drinking Water Quality Standards (GCDWQ), in particular trihalomethane (THM) limits. The upgrades involved replacing the lime soda treatment process with an integrated membrane system including UF and LERO membranes. The treatment capacity was increased from 50 to 60 L/s and the reservoir storage was increased from 1100 to 2200 m³. Residential, commercial and industrial growth within the region continues to increase the demand for water and the CRWC WTP is near maximum treatment capacity.

1.1.1 Previous Studies

In 1990 the RM of Cartier retained J.R. Cousin Consultants Ltd. to prepare a preliminary feasibility and cost study for a regional water system. The system was to service community and rural residents as well as Hutterite farming enterprises in the RMs of Cartier and Portage la Prairie. The study looked at water demand, water sources, water quality and treatment, watermain routes and sizing, as well as reservoir storage.

In 1996 a geotechnical investigation was conducted by Dillon Consulting Ltd. as requested by the MWSB. The investigation assessed soil conditions for possible sites to

construct a raw water intake line, a raw water retention pond, the WTP with lime sludge ponds and concrete reservoir.

In 2009 Dillon Consulting Ltd. was engaged to complete a water supply assessment study for the CRWC in particular the St. Eustache WTP. The report evaluated the existing treatment process including the raw water intake, the raw water storage pond, water treatment equipment and lime sludge ponds. Based on report findings it was recommended that the treatment process be upgraded to membrane technology in order to achieve a higher organic removal rate. Organics serve as precursors to THM formation so a reduction in their levels would result in lower THM concentrations to conform to current regulations.

In 2012 KGS Group Consulting Engineers prepared a report for the MWSB on necessary upgrades to the remote reservoir at the RM of Headingley and HCI. The report included soils investigations, site surveys, system modelling, capacity calculations and cost estimates.

In 2012 the MWSB and RM of Headingley initiated a functional design report for a new 60 L/s WTP for the CRWC located in Headingley with Stantec Consulting Ltd. The report analyzed design criteria, the preferred treatment process, existing process components and included cost estimates.

1.1.2 Population

The CRWC provides water to the communities and rural distribution system within the RMs of Cartier, Grey, Headingley, Portage la Prairie, Rockwood, Rosser, St. Francois Xavier and Woodlands. Based on Statistics Canada data the combined populations of the serviced area is 11,570. The population trend demonstrates an increase of 27 % over the last 15 (Figure 1.1).

For design purposes, the potential for population growth is projected over a 20 year period. Population trends provide an estimated growth of the regional system though actual expansion occurs through connections to new customers. An annual growth rate of 0.5% was assumed for the RM of Cartier, Portage la Prairie, Rosser and Woodlands which experienced declining populations from 2006 to 2011. A growth rate of 1% was assumed for the RM of Grey, which had positive growth, while a 2.5% growth rate was assumed for the RMs of Headingley, Rockwood and St. Francois Xavier which experienced higher increases in population. The 20-year predicted population within the service area of the CRWC is 15,434. Growth in commercial and industrial development was not included in the population growth estimate.

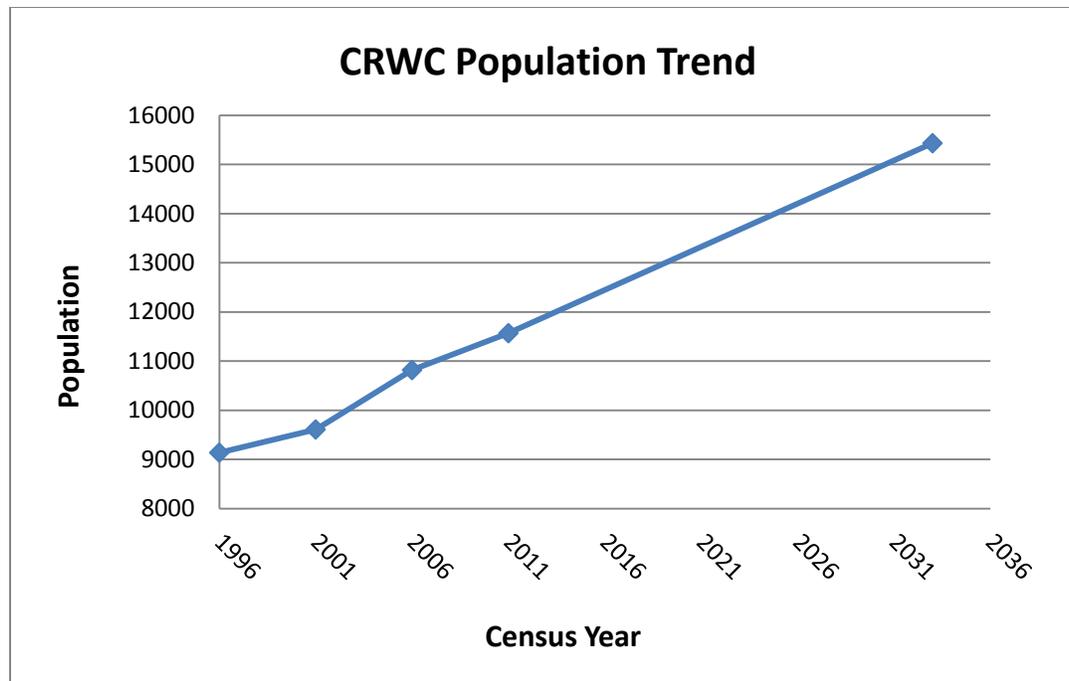


FIGURE 1.1 - POPULATION TREND

1.1.3 Current and Projected Water Use

Water treatment plant capacity is designed to meet the 20-year peak-day demand. Based on 2012 and 2013 water consumption records for the CRWC the average day water use is 255 L/capita/day with a peak day factor of 1.6. Using 20-year future growth rates of 0.5 to 2.5% the treatment capacity required to meet peak demand is 87.5 L/s based on a 20-hour operation day at the WTP (Table 1.1). The remaining four hours are dedicated to maintenance activities.

Water demands for the industrial development of CentrePort Canada in the RM of Rosser are estimated based on a combination of low and high-demand users. Businesses located on the existing 160 hectares of developed land are considered low-demand users due to lower employee numbers and the use of private wells. Of the remaining 159 hectares of land to be developed in the next 15 years, half are expected to be low-demand users with the remaining half being high-demand users. Low demand was estimated at 2000 L/ha/day based on a maximum number of employees and typical daily water use per employee. High demand use was based on the Ontario Ministry of Environment standard of 45,000 L/ha/day for light industrial users. The total estimated water demand is approximately 4.1 ML/day. Adding a peak factor of 1.6, the peak day demand for design purposes is approximately 90 L/s.

The combined water demand resulting from future population growth and industrial development is 177.6 L/s in 2033. The addition of the 120 L/s WTP in the RM of

Headingley combined with the 60 L/s capacity of the St. Eustache WTP will provide a total treatment capacity of 180 L/s for the CRWC.

TABLE 1.1 – CRWC PROJECTED WATER DEMANDS

Projected Water Demands		
	Unit	CRWC
20-Year Population		15,434
Consumption Rate	L/c/d	255
Average Day Demand	L/day	3,935,670
Peak Day Factor		1.6
Peak Day Demand	L/day	6,297,072
Average Day Flow (20 hr)	L/s	54.7
Treatment Capacity	L/s	87.5
		CentrePort
Low Demand Users	L/day	320,000
High Demand Users	L/day	3,736,500
Total Average Day Demand	L/day	4,056,500
Peak Day Factor		1.6
Peak Day Demand	L/s	90.1
Combined Treatment Capacity	L/s	177.6

1.1.4 Raw Water Source

The proposed Headingley WTP will divert raw water from the Assiniboine River using an existing intake at the HCI. The intake channel is a 3.0 m wide by 23.3 m long concrete channel that extends into the Assiniboine River (Figure 1.2). River water flows from the channel into a wet well which will be pumped to settling ponds prior to entering the WTP.

A study conducted by Genivar in 2012 assessed the current water demand on the Assiniboine River and projected municipal, industrial, irrigation and recreational water usage. This Study was intended to be used as a planning document when considering water demand allocation along the designated reaches of the Assiniboine River and what the potential effects of climate change may have on water demand. Climate change effects are not known at this time and the impacts are speculative. Factoring in presumed climate change effects, water demand would increase by 32% for municipal use and remain relatively constant for recreational and industrial use with a substantial increase in irrigation needs. Municipal and industrial water demands are protected under The Water Rights Act as a “first come, first serve” basis. Should additional water

allocation become available in the basin increased irrigation demand could be considered within the maximum allocation limit for the Assiniboine River.

Many municipalities and irrigator have implemented water conservation methods such as low flow fixtures, water rate utility costing and low pressure centre pivots which all contribute to significant reductions in water demand.

A total of 3805 dam³ of water is projected to be diverted from the Assiniboine River annually with the expansion of the CRWC system which includes the construction of the 120 L/s Headingley WTP. This amount is less than the current volume of 5982 dam³ allocated by the CRWC Water Rights Act Licence (See Section 1.1.5 below) and well below the 26,500 dam³ available in the Assiniboine River for new allocation.



FIGURE 1.2 –WATER SUPPLY INTAKE AT THE HEADINGLEY CORRECTIONAL INSTITUTE

1.1.5 Water Rights Act

Water Rights Act Licence 2000-039 (Appendix E) specifies that the water for the CRWC is diverted from the Assiniboine River by means of a raw water intake pipeline and wet well constructed in the south bank of the Assiniboine River within the 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. The annual volume of water diverted from the River shall not exceed 5982 dam³ and the maximum rate of withdrawal shall not exceed 0.19 m³/s.

In 2012 the CRWC diverted 1070 dam³ from the Assiniboine River which is below the allocated amount stated in their licence.

An application for a new Water Rights Act Licence for the RM of Headingley WTP will be required. Based on average day demand the current annual allocation of water to the CRWC would be sufficient to meet the needs of both the St. Eustache WTP (1070 dam³) and the Headingley WTP (2735 dam³).

1.1.6 Water Quality

The Office of Drinking Water (ODW) conducts audits of all public water systems which includes annual sampling and chemistry analysis for surface water supply systems. Water quality parameters of concern for the St. Eustache WTP are presented in Table 1.2 with complete results provided in Appendix H. These results are considered representative of the water quality for the proposed Headingley WTP as the raw water source will also be the Assiniboine River and the treatment process design is to be similar to the existing St. Eustache WTP.

While not a health concern, the high hardness and TDS levels can be aesthetically undesirable causing scaling and corrosion in the treated water. In Manitoba, potable water supplies with a total hardness in the range of 100 mg/l to 150 mg/l as CaCO₃ are considered acceptable.

Controlling turbidity in public drinking water supplies is important for both health and aesthetic reasons. Turbidity can interfere with the disinfection process and can be associated with unacceptable taste and odours. Turbidity, particularly those associated with organic matter can serve as a food source for bacteria, viruses and protozoa and can cause serious health problems. Turbidity in the raw water exceeds the drinking water quality standard. The standard indicates where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity from individual membranes, shall be less than or equal to 0.1 NTU in at least 99% of the measurements made, or at least 99% of the time each calendar month, and shall not exceed 0.3 NTU at any time.

Raw water quality data indicates high concentrations of total organic carbon (TOC) up to 12.6 mg/L. When disinfectants such as sodium hypochlorite react with organics they form disinfection by-products (DBPs) which may pose health risks. Common DBPs monitored are THMs and haloacetic acids. THMs are deemed to be carcinogenic and short-term exposure can lead to dizziness, headaches as well as problems related to the central nervous system. To ensure THM levels of less than 0.1 mg/L based on a quarterly sample average, TOC levels in the treated water prior to chlorination is targeted to be

less than 2.0 mg/L. Trihalomethane concentrations are also a function of contact time within reservoirs and pipelines. The CRWC distribution system conforms to THM removal limits.

The treatment process must meet 3-log removal/inactivation of *Cryptosporidium* and *Giardia lamblia* and 4-log removal of viruses.

TABLE 1.2 WATER QUALITY RESULTS CRWC WTP (2012 ODW SAMPLING)

Parameter	Unit	Raw Water	Treated Water	GCDWQ
Hardness (Total) as CaCO ₃	mg/L	508	130	≤ 200/500 ^a
Total Dissolved Solids	mg/L	709	196	≤ 500
Total Organic Carbon	mg/L	12.6	3.0	-
Trihalomethanes	mg/L	-	0.0892 ^c	0.1
True Colour	CU	21.6	<5.0	≤ 15
Turbidity	NTU	7.06	<0.10	≤ 0.3 / 0.1 ^b
E.Coli	MPN/100mL	3	0	0
Total Coliforms	MPN/100mL	48	0	0

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

^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.

^c THMs results for CRWC distribution system at Headingley.

2.0 Description of Proposed Development

2.1 Project Description

The CRWC currently provides potable water to the RMs of Cartier, Grey, Headingley, Portage la Prairie, Rockwood, Rosser, St. Francois Xavier and Woodlands. Due to increasing water demand resulting from residential and commercial growth in the region an expansion of the CRWC treatment capacity is required. The expansion will include the construction of a new WTP in the RM of Headingley, the installation of approximately 21 kms of 450 mm pressure pipeline and the construction of a pumphouse and reservoir in the RM of Rosser. A schematic of the WTP location and the distribution line are found in Appendix B.

The proposed 120 L/s WTP will be located in the RM of Headingley adjacent to the Headingley WWTP site on river lots RL-35-HE, RL-36-HE and RL-37-HE. The TransCanada Highway runs north of the project site while the Assiniboine River is located to the south. The plant will be constructed approximately 150 m north of the HCI and on the east side of Gaol Road as indicated in the site

plan in Appendix C. Site selection was based on the potential for growth in the area and the presence of existing infrastructure which includes:

- Access road
- Intake channel to divert water from the Assiniboine River
- Outfall line to be utilized to return membrane concentrate to the Assiniboine River
- Availability of utilities (Manitoba Hydro, telephone etc.)

The addition of a second WTP will increase treatment capacity within the CRWC from 60 L/s to 180 L/s. The new WTP will provide redundancy, acting as a second potable water supply to the existing CRWC distribution system and a water supply for Phase 1 and 2 developments at CentrePort located in the RM of Rosser.

Water will be diverted from the Assiniboine River through an existing concrete channel to a wet well which will feed two large settling ponds to be constructed east of the WTP. The ponds will allow solids to be naturally precipitated via settling to produce a consistent turbidity level, lessen the impact of seasonal fluctuations and prevent premature fouling of the membranes used in the water treatment process. Based on average day demand each pond will hold approximately 55 ML and together will provide 15 days of storage. An aeration system will control algae growth and prevent stagnation in the raw water.

The settled raw water will enter the WTP where it will undergo a pH adjustment and rapid mix flocculation process prior to a two-stage integrated membrane treatment process. The system will be comprised of flocculation tanks, UF membranes, a break tank and LERO membranes. A process diagram can be found in Appendix D. The treated water is chlorinated and stored in a reservoir that will provide 4.6 ML storage prior to entering the distribution system. The reservoir provides equalization storage but no fire storage.

By-products generated from the membrane treatment include backwash from the UF process and concentrate from the LERO membranes. Both waste streams will be combined and returned to the Assiniboine River via an existing outfall pipeline from the Headingley WWTP as shown in Appendix B.

The current CRWC distribution system will be expanded with the installation of approximately 21 km of 450 mm pressure pipeline that will extend into the RM of Rosser along Selkirk Avenue to the west of the City of Winnipeg (Appendix B). A pumphouse and 7.5 ML below-grade concrete reservoir will be constructed to store treated water. The water will be re-chlorinated as necessary prior to distribution through online instrumentation. Reservoir capacity will provide equalization, emergency storage and supply a minimum fire flow of 285 L/s for 4 hours to meet the requirements of the CentrePort Canada industrial development.

2.1.1 Operation and Maintenance

The CRWC will be responsible for the operation and maintenance of the Headingley WTP, reservoirs, distribution pipeline and membrane reject discharge. The WTP in Headingley will be classified as a Class 3 facility. The Cooperative ensures that all WTP operators are certified with the appropriate classification level.

The operators are required to operate the WTP and distribution system in a safe and efficient manner in accordance with relevant operations manuals and DWSA regulations. Operational requirements include treatment parameter measurements, monitoring, sampling, testing, record-keeping and reporting as per Operating Licence No. PWS-08-107-01 (Appendix F) issued by the ODW. As currently required, periodic inspection, maintenance, bacteriological sampling and chlorine residual testing of the distribution pipelines are necessary.

2.2 Certificate of Title

The proposed WTP will be located on land that currently is privately owned. The RM of Headingley has an option to purchase 13.48 acres of land but may need to increase the area to accommodate the footprint of the project.

The membrane reject pipeline will connect to the existing outfall pipeline coming from the Headingley WWTP which is on provincially owned land. The RM of Headingley has an easement for this property.

The pumphouse and water reservoir site (to be finalized) will be located in the RM of Rosser and will be constructed on Crown land.

The distribution pipeline will be located in municipal and provincial right-of-ways.

2.3 Existing and Adjacent Land Use

The site for the proposed WTP is adjacent to land currently used for agricultural purposes. The HCI is located approximately 150 m directly south of the project location while the Headingley WWTP is located 30 m west. Existing adjacent land use will not change as a result of this development.

2.4 Land Use Designation and Zoning

The land use designation for the proposed Headingley WTP site is General Agriculture (A) and the zoning is Rural Use (RU).

The reject pipeline is located on land designated and zoned as Institutional (I).

The land use designation for the proposed reservoir and pump house site is CentrePort Canada Area. The zoning by-law is currently Limited Agriculture (AL). There is a draft Manitoba Development Plan for the CentrePort Lands Proposed Policies and Land Use with a mix of general industrial-logistics parks to the north and recreation/open space and general industrial to the south.

The zoning designation for the pipelines in municipal right-of-ways is not applicable.

2.5 Project Schedule

The proposed project is scheduled for construction in Spring 2014 and will be completed by summer 2015 pending receipt of all approvals and finalizing financial arrangements.

2.6 Project Funding

Funding for this project is currently in negotiations and will be finalized at a future date. Local, Provincial and Federal Governments may all contribute to the project 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

Public consultation is not anticipated for this project as it is an expansion of the existing CRWC system. The CRWC Board of Directors is in support of the proposed expansion.

2.9 Storage of Petroleum Products and Other Chemicals

Fuel will not be stored on-site at any time in the proposed construction area. 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 including 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.

3.0 Physical Environment

Due to the significant area that the CRWC encompasses, the physical environment considered for this proposal focuses on the RMs of Headingley and Rosser where the proposed project sites are located.

3.1 Physiographic Setting and Climate

The RM of Headingley covers an area of 107 km² and is located directly west of the City of Winnipeg. It straddles approximately nine kilometres of the Assiniboine River. The TransCanada Highway runs through the centre of the RM for eight kilometres. The topography of the area decreases very gradually from a 241 metre above sea level (m asl) elevation at the west side of the RM to a 238 m asl elevation at the east side (Agriculture and Agri-Food Canada 1999).

The RM of Rosser is located directly north of the RM of Headingley on the north-west border of Winnipeg including the Perimeter Highway and covers an area of 441 km². The land is generally flat with an elevation decreasing gradually from 242 m asl in the west to 230 m asl in the southeast (Agriculture and Agri-Food Canada 1999).

The climate in the RM of Headingley and the east side of the RM of Rosser can be correlated to weather data collected by Environment Canada at the Winnipeg Richardson International Airport shown in Table 3.1. The mean annual temperature for the municipality is 2.6 degrees Celsius with below-zero average daily temperatures from November through March. Mean annual precipitation is 513.7 mm.

TABLE 3.1 ENVIRONMENT CANADA HISTORICAL WEATHER DATA – WINNIPEG RICHARDSON INTERNATIONAL AIRPORT

Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average (°C)	-17.8	-13.6	-6.1	4.0	12.0	17.0	19.5	18.5	12.3	5.3	-5.3	-14.4	2.6
Daily Max (°C)	-12.7	-8.5	-1.1	10.3	19.2	23.3	25.8	25.0	18.6	10.8	-0.9	-9.7	8.3
Daily Min (°C)	-22.8	-18.7	-11.0	-2.4	4.8	10.7	13.3	11.9	6.0	-0.3	-9.6	-19.1	-3.1
Precipitation													
Rainfall (mm)	0.2	2.5	7.5	21.5	58.0	89.5	70.6	75.1	51.9	31	6.1	1.6	415.6
Snowfall (cm)	23.1	14.2	15.8	10.1	0.8	0.0	0.0	0.0	0.4	5.0	21.4	19.8	110.6
Precipitation (mm)	19.7	14.9	21.5	31.9	58.8	89.5	70.6	75.1	52.3	36.0	25.0	18.5	513.7

3.2 Hydrogeology

In the Winnipeg area, groundwater is available from the carbonate rock aquifer which is the largest freshwater aquifer in Manitoba. It stretches from north of The Pas southward through the Interlake Region and continues into Minnesota. The aquifer is heavily utilized to supply

water for municipal, industrial, agricultural and residential purposes. It serves as the major source of water for communities near the City of Winnipeg and within the city it is utilized for heating and cooling systems. West of the freshwater zone the groundwater in the aquifer becomes increasingly saline (Grasby and Betcher 2002, 1053).

Within the aquifer there are three productive zones known as the Upper, Middle and Lower Carbonate Aquifers. Water quality varies within the middle aquifer which is generally the most productive zone in the RM of Rosser (W.L. Gibbons 2013).

Sand and gravel aquifers exist as long, narrow sand and gravel deposits at or near the surface as well as the sand and gravel lenses in the till deposits. These aquifers are not normally developed as it is more feasible to install wells in the carbonate rock aquifer (Gray and Rutulis 1974).

3.3 Hydrology

The Assiniboine River originates in eastern Saskatchewan and flows across the western portion of Manitoba. It travels 1070 km before its confluence with the Red River at the City of Winnipeg. Roughly 60% of the watershed is located within Manitoba and covers an area of approximately 41,500 km². The Assiniboine River experiences large variability in stream flows throughout the year. Peak flows occur during the spring with lower flows happening during the fall and winter months. Flow is regulated by the Shellmouth Dam which is located 24 km northwest of Russell, Manitoba and the Assiniboine River Diversion at Portage la Prairie. The hydrologic features for the project area of the RM of Headingley and Rosser are displayed in Figure 3.1.

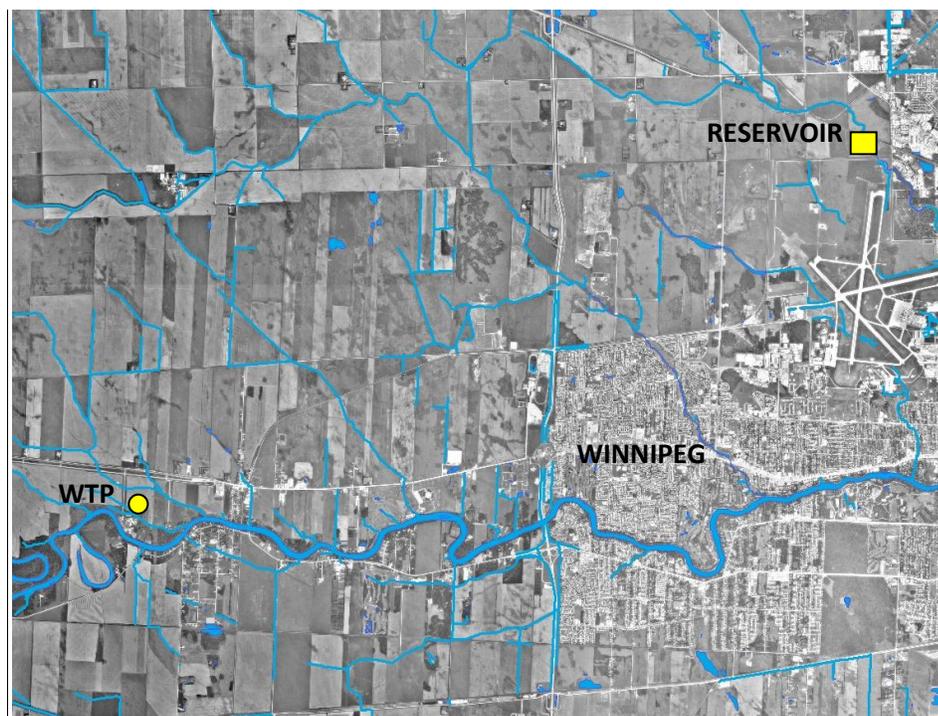


FIGURE 3.1- HYDROLOGY FEATURES NEAR PROPOSED DEVELOPMENT

3.4 Fish and Fish Habitat

Potential fish habitat in the project area includes the Assiniboine River. A list of fish species found in the Assiniboine River has been included in Appendix G.

3.5 Wildlife Habitat and Vegetation

The project area is located within the Lake Manitoba Plain ecoregion of the Prairies ecozone (Agriculture and Agri-Food Canada). This ecoregion is one of the warmest and most humid regions in the Canadian prairies. Trembling aspen and shrubs occur on moist sites and bur oak and grass species occupy increasingly drier sites on loamy to clayey, Black Chernozemic soils. Poorly drained areas support willow and sedge communities. The growing season length, available heat and precipitation permit the production of corn, spring wheat and other cereal grains. The topography and stoniness of the northern section of the ecoregion are more suitable to oilseeds, hay and livestock production. Hunting and water-oriented recreation are additional significant uses of the land.

Wildlife includes white-tailed deer, coyote, rabbit, ground squirrel and significant waterfowl. The CLI classification for this area is 3 to 5 which indicates there is slight to moderately severe limitations to waterfowl production (Agriculture and Agri-Food Canada). Nesting species include Mallard, Blue-winged Teal, Pintail, Ring-necked Duck, American Widgeon, Common Goldeneye, Lesser Scaup and Wood Duck.

3.6 Socio-Economic

The project area is located within the RMs of Headingley and Rosser. The RM of Headingley has a population of 3215 people with 936 private dwellings (Statistics Canada 2011). Agriculture activity is dominant in the municipality with the growth of grain and cereal crops. Local businesses include a k-8 elementary school, Credit Union, convenience stores, gas stations, car dealerships and several hotels and restaurants. Shelmerdine's Nursery and Taillieu Construction are prominent employers in the municipality. The HCI and the Women's Correctional Centre are also located in the RM. Recreational spots include the John Blumberg Sports Complex, Breezy Bend Golf and Country Club and the Assiniboia Downs race track.

The RM of Rosser has a population of 1352 with 476 private dwellings (Statistics Canada 2011). Communities within the RM include Rosser, Grosse Isle, Meadows and Marquette. Agriculture is a main economic base with residents either employed as farmers or in agricultural businesses. Due to its proximity to Winnipeg many trucking trailer services and terminals are located in the RM. Transport companies include Trans X, Pro Line Trailers and EBD Enterprises. Other prominent employers within the RM include BFI disposal grounds, Manitoba Hydro and Bel Acres Golf and Country Club. CentrePort Canada is a 20,000 acre inland port that will be located

in the RM west of the Winnipeg's Richardson International Airport. It will provide a commercial and industrial hub for business operations such as warehousing, distribution and manufacturing.

3.7 Heritage Resources

Most project activities will occur on previously disturbed lands. 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, gaseous and particulate emissions will be created by construction equipment. Dust suppression will be employed by the application of water to alleviate potential dust problems. Emissions of gases and particulate matter will be minimized by maintaining 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 on the construction site will not be allowed. Potential spills will be small and will follow standard construction spill clean-up procedures, including the removal of impacted soil.

During operation, activities are limited to regular monitoring and maintenance which have a negligible effect on soil disturbance and compaction. Regular monitoring and maintenance activities have a negligible effect on soil contamination since fuel trucks and other hazardous substances will not be required on-site. The potential adverse effect on soil quality is assessed to be minor.

4.3 Surface Water, Fish and Fish Habitat

Monthly average flow data from 2001-2011 collected at the hydrometric flow station (05MJ001) located on the Assiniboine River at Headingley, MB (Environment Canada) are summarized in Table 4.1.

TABLE 4.1 MONTHLY MEAN DISCHARGES FOR ASSINIBOINE RIVER (M³/S)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	41.3	39.9	39.8	131	287	112	89.9	44.5	26	22	23.7	16.4
2002	14.4	13	11.6	30	24.3	21.2	22.7	13.2	21.4	13.8	13.8	14.5
2003	13.4	14.3	23.9	145	113	63.8	29.7	16.6	17.7	11.1	8.02	4.33
2004	4.81	7.3	17.3	89.8	41.2	109	84.2	36	32.6	30.1	27.3	20.5
2005	17.6	20.8	24.5	212	132	217	215	152	50.9	37.3	35.8	27.5
2006	31.6	34.8	40.3	167	162	130	69.9	49.6	28.2	20.8	16.9	15
2007	24.7	30.4	52.7	158	122	116	82.6	63.2	34.5	21.1	28.9	25
2008	23	23.1	23.5	62.2	51.8	51.2	34.3	36.3	29.9	24.5	18.3	16
2009	13.9	24.3	29.6	103	74.9	92.1	40.1	25.9	27.2	26.4	31.1	30.5
2010	27	25.1	46.3	43.7	84.4	84.4	185	167	141	161	155	108
2011	86.7	78.1	64.3	210	507	512	470	349	175	108	63.5	62.2

The UF backwash and RO membrane concentrate contain hardness causing minerals such as calcium and magnesium. The reject quality data of the combined backwash and membrane concentrate from the St. Eustache WTP is shown in Table 4.2 with complete results displayed in Appendix I. The combined volume of reject discharged annually to the Assiniboine River is estimated to be 1130 dam³. Based on average annual flow conditions for the Assiniboine River the impact of the discharged concentrate reject is negligible (Table 4.2). This is due to the significant flow rate of the Assiniboine River, even at times of low flow, compared to the rate of reject discharge. Reject from similar systems has been discharged to surface water bodies in other locations across Manitoba without significant adverse effects on water quality. The CRWC will perform long-term sampling of the river water to verify water quality impacts.

Impacts to fisheries and fish habitat are considered minor.

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.

No disturbance of the riverbank is expected as both the WTP raw water intake and membrane concentrate discharge will use existing infrastructure.

TABLE 4.2 EFFECTS OF MEMBRANE REJECT ON RIVER QUALITY

Parameter	UF and RO Combined Reject	Assiniboine River	Combined Average Flow
	(L/s)		(L/s)
Flow Rate	43	-	72,294
Low	-	27,128	-
High	-	145,418	-
	(mg/L)	(mg/L)	(mg/L)
Hardness	818	508	508
TDS	1340	709	709
Calcium	161	96	96
Magnesium	101	65	65
Sodium	97	52	52
Sulphate	611	279	279

4.4 Groundwater Quality

Groundwater quality can be impacted by surface activities and surface water quality. Mitigation measures will be implemented to protect groundwater quality during construction activities.

4.5 Groundwater Levels

There are no changes to ground water withdrawal and no anticipated impact to groundwater levels as a result of this project.

4.6 Vegetation

Construction of the WTP and settling ponds will occur primarily in an area of cultivated farmland. Pipelines will run through land that has been previously disturbed or within right-of-way ditches. The reservoir will be built in an area used for agriculture and industrial purposes. The amount of vegetation disturbance is expected to be minimal. Potential effects to vegetation are considered to be negligible.

4.7 Wildlife Habitat

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

4.8 Species at Risk

Based only on existing data known to the Manitoba Conservation Data Centre no occurrences of rare plant or animal species exist in the project area at the time the request for information was made (Friesen, Chris. 2013. Personal communication. July 19).

4.9 Noise and Vibration

During the construction phase of the project, there will be several sources of sound emissions from the 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 noises and the effects are considered minor.

Scheduling of site activities can minimize the impact of noise, including scheduling construction during day-time hours. All equipment used on site will be fitted with appropriate mufflers and will be maintained in good working order to minimize noise levels.

4.10 Employment/Economy

Socio-economic implications may exist for the CRWC due to the initial costs of expanding the regional system. However the expansion will create opportunity for future customers which will generate revenue.

The RMs of Headingley and Rosser are not expected to experience significant changes as a result of the project as environmental impacts are considered minor and short term. Positive local economic benefit may occur during construction. The potential effects of the project on employment and the economy were assessed to be positive.

4.11 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 are considered to be minor effects. The potential effects are considered minor.

4.12 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 vehicles and 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

Mitigating potential soil contamination from petroleum products will be accomplished by the preparation of a response plan for potential spills, using spill clean-up equipment and materials, properly maintained equipment and appropriate fuelling equipment.

Re-establishing vegetation as quickly as possible following construction will limit loss of soil due to wind or water erosion.

5.3 Surface Water

Mitigation of surface water issues will be achieved by redirecting surface water runoff and employing erosion control practices and silt fencing as required.

Petroleum leaks or spills will be mitigated by using properly maintained equipment, spill clean-up equipment and materials and appropriate fuelling equipment. The emergency response will follow guidelines from the specification 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 taken according to Manitoba Conservation and Water Stewardship requirements.

A 100 m setback from watercourses will be maintained for fuelling activities.

5.4 Groundwater

No impacts or environmental measures are anticipated.

5.5 Vegetation and Wildlife

Re-establishing vegetation will occur as soon as possible in disturbed areas. Impacts to wildlife habitat will 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 and limiting idling.

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.

5.7 Noise and Vibration

Limiting any noise-creating activities, including regular maintenance and monitoring activities to normal working hours and unnecessary 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 the volume of water pumped and charged to ratepayers on a quarterly basis. Since all service connections 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. The proposed project may provide some economic benefits to the area for local businesses and employment opportunities during the construction phase.

References

Statistics Canada, 2011 Census Profiles, RM of Headingley, Manitoba. <http://www12.statcan.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E> (accessed June 27, 2013).

Statistics Canada, 2011 Census Profiles, RM of Rosser, Manitoba. <http://www12.statcan.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E> (accessed June 27, 2013).

Genivar, Stantec, and Associated Engineering. 2012. *Assiniboine River Water Demand Study Climate Change Assessment*.

Agriculture and Agri-Food Canada. 1999. *Rural Municipality of Headingley Information Bulletin 99-2, Soils and Terrain*.

Agriculture and Agri-Food Canada. 1999. *Rural Municipality of Rosser Information Bulletin 99-4, Soils and Terrain*.

Environment Canada Historical Weather, Climate Normals and Averages, Winnipeg Richardson International Airport. http://climate.weatheroffice.gc.ca/climate_normals/index_e.html (accessed June 27, 2013).

Grasby, Stephen E. and Robert N. Betcher. "Regional Hydrogeochemistry of the Carbonate Rock Aquifer, Southern Manitoba." *Canadian Journal of Earth Science* 39 (2002): 1053-1063.
<http://www.nrcresearchpress.com/doi/pdf/10.1139/e02-021> (accessed June 28, 2013).

W.L. Gibbons & Associates Inc. 2013. *CentrePort Industrial Park – Conceptual Groundwater Sourcing Study Preliminary Assessment of the Potential to Develop a Groundwater Supply*.

Gray, L. and M. Rutulis. 1974. *Water Resources in the Winnipeg Region*.
<http://www.gov.mb.ca/ia/pdf/historic/waterresources.pdf> (accessed June 28, 2013).

Agriculture and Agri-Food Canada. *A National Ecological Framework for Canada*.
<http://sis.agr.gc.ca/cansis/nsdb/ecostrat/intro.html> (accessed June 27, 2013).

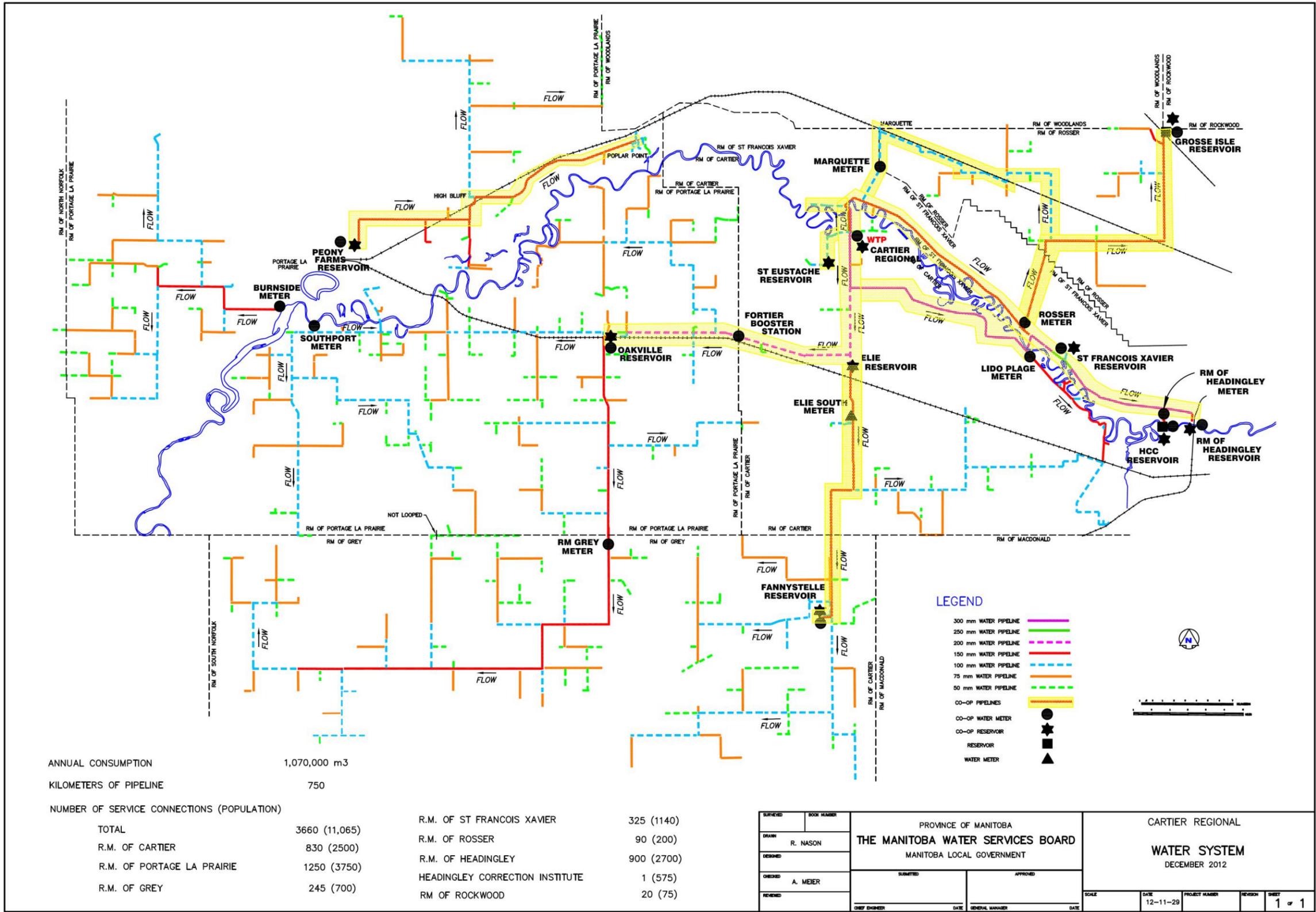
Natural Resources Canada. Canada Land Inventory, Land Capability for Waterfowl.
http://sis.agr.gc.ca/cansis/publications/maps/cli/250k/wat/cli_250k_wat_62h.jpg (accessed June 27, 2013).

Environment Canada. Assiniboine River at Headingley (05MJ001).

<http://www.wsc.ec.gc.ca/applications/H2O/report-eng.cfm?yearb=&yeare=&station=05MJ001&report=monthly&data=flow&year=2011> (accessed June 27, 2013).

Appendix A

Cartier Regional Water Cooperative System



ANNUAL CONSUMPTION	1,070,000 m ³
KILOMETERS OF PIPELINE	750
NUMBER OF SERVICE CONNECTIONS (POPULATION)	
TOTAL	3660 (11,065)
R.M. OF CARTIER	830 (2500)
R.M. OF PORTAGE LA PRAIRIE	1250 (3750)
R.M. OF GREY	245 (700)

R.M. OF ST FRANCOIS XAVIER	325 (1140)
R.M. OF ROSSER	90 (200)
R.M. OF HEADINGLEY	900 (2700)
HEADINGLEY CORRECTION INSTITUTE	1 (575)
RM OF ROCKWOOD	20 (75)

SURVEYED	BOOK NUMBER	PROVINCE OF MANITOBA		CARTIER REGIONAL	
DRAWN	R. NASON	THE MANITOBA WATER SERVICES BOARD		WATER SYSTEM	
DESIGNED		MANITOBA LOCAL GOVERNMENT		DECEMBER 2012	
CHECKED	A. MEIER	SUBMITTED	APPROVED	SCALE	DATE
REVIEWED		DATE	DATE	12-11-29	PROJECT NUMBER
		DATE	DATE	REVISION	SHEET
					1 of 1

Appendix B

Cartier Regional Water Cooperative Expansion

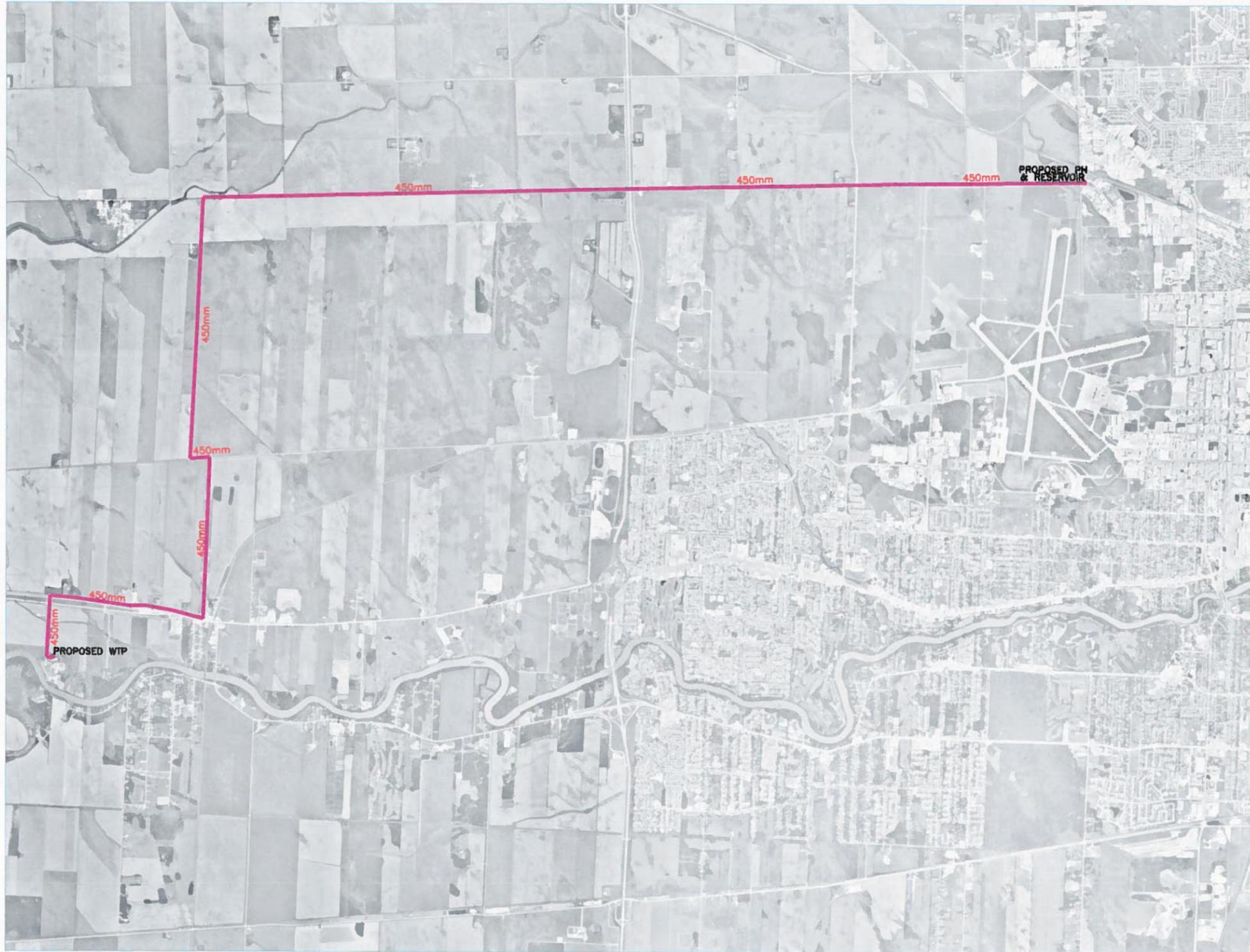


NO.	DESCRIPTION	BY	DATE

DESIGNED	DOCK NUMBER
DRAWN	ABC
DESIGNED	D. GENALLE
CHECKED	L. CIAPALA
REVISION	

PROVINCE OF MANITOBA THE MANITOBA WATER SERVICES BOARD MANITOBA LOCAL GOVERNMENT	
DESIGNED	APPROVED
_____ CHIEF ENGINEER	_____ GENERAL MANAGER

CARTIER REGIONAL WATER CO-OP EXPANSION HEADINGLEY WTP SITE PLAN			
SCALE	DATE	PROJECT NUMBER	SHEET
AS SHOWN	13-07-12		2 of 2



PROPOSED WATER PIPELINE



NO.	DESCRIPTION	BY	DATE

DRAWN	BOOK NUMBER
ABC	
DESIGNED	
D. GENAILLE	
CHECKED	
L. CIAPALA	
REVIEWED	

PROVINCE OF MANITOBA
THE MANITOBA WATER SERVICES BOARD
 MANITOBA LOCAL GOVERNMENT

QUANTITY	APPROVED
DATE	DATE

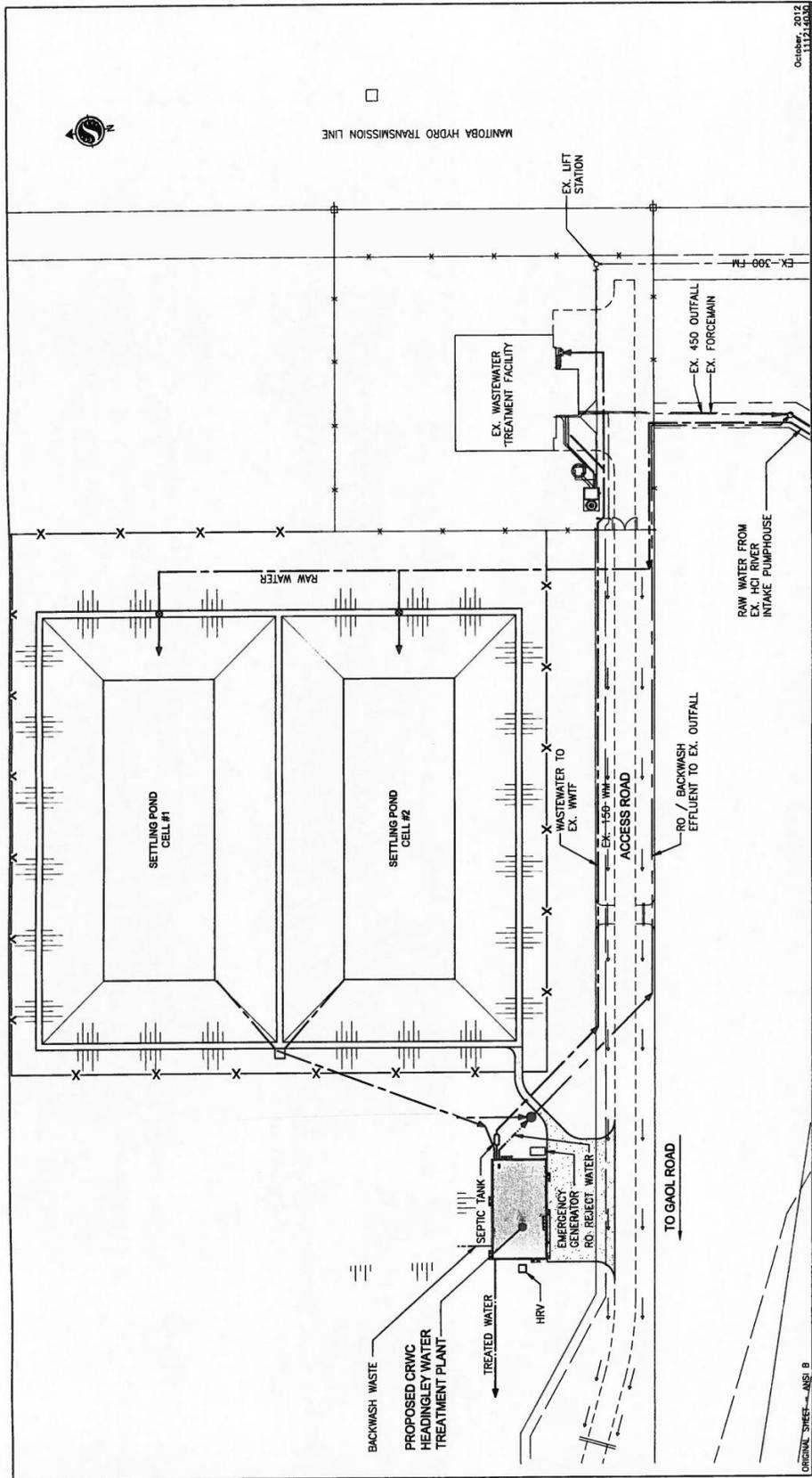
CARTIER REGIONAL WATER CO-OP EXPANSION

SITE PLAN

SCALE	DATE	PROJECT NUMBER	REVISION	SHEET
AS SHOWN	13-07-12			1 of 2

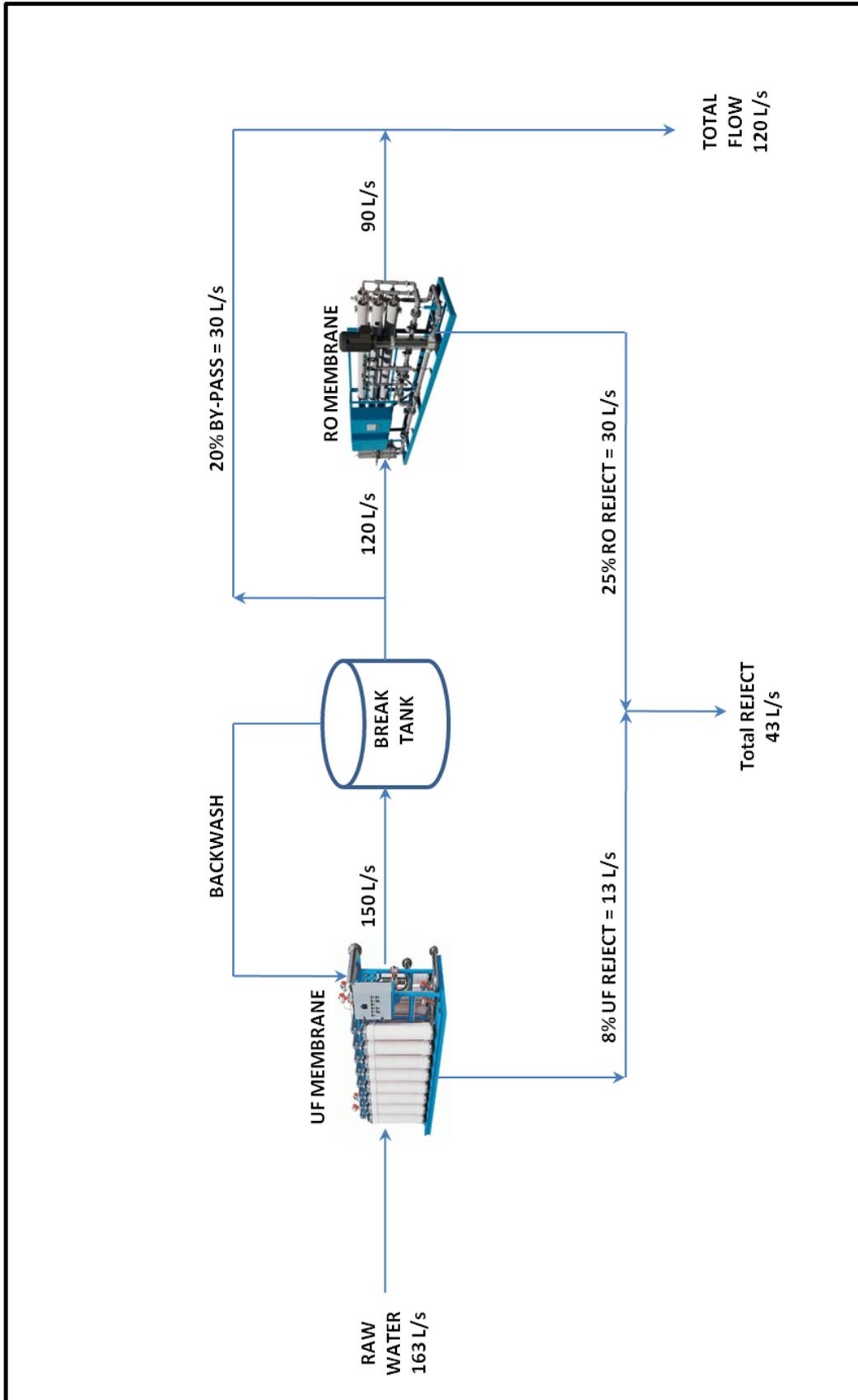
Appendix C

Headingley WTP Site Plan



Appendix D

Treatment Process Flow Diagram



Appendix E

Water Rights 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

Witness } _____ (Seal)
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 } _____
in and for the Province of Manitoba Witness

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 F

Operating Licence for a Public Water System



Water Stewardship
Office of Drinking Water
1007 Century Street, Winnipeg MB R3H 0W4

**OPERATING LICENCE FOR
A PUBLIC WATER SYSTEM**

LICENCE NUMBER: PWS-08-107-01

**THE DRINKING WATER SAFETY ACT
CHAPTER D101, C.C.S.M.**

WATER SYSTEM CODE: 36.00 62.00 89.75 157.00 162.75 211.00 211.75

OPERATION ID: 28128 28103 28535 28115 28549 28140 28605

EFFECTIVE DATE: FEBRUARY 1, 2012

EXPIRY DATE: JANUARY 31, 2017

IN ACCORDANCE WITH *THE DRINKING WATER SAFETY ACT*, THIS OPERATING LICENCE IS ISSUED PURSUANT TO SUBSECTION 8(1) TO:

CARTIER REGIONAL WATER CO-OP, INC.: "THE LICENSEE"

FOR THE OPERATION OF THE **CARTIER REGIONAL PUBLIC WATER SYSTEM**, WHICH INCLUDES INTAKE STRUCTURES, TREATMENT FACILITIES, WATER STORAGE RESERVOIRS IN HEADINGLEY, ELIE, OAKVILLE, PEONY FARM, ST. FRANÇOIS XAVIER, ST. EUSTACHE, AND TRANSMISSION LINES TO THE STORAGE RESERVOIRS, INCLUDING LINES TO HIGH BLUFF AND POPLAR POINT, SUBJECT TO THE ATTACHED TERMS AND CONDITIONS.

THIS LICENCE DOES NOT AFFECT THE LICENSEE'S OBLIGATIONS WITH RESPECT TO COMPLIANCE WITH ALL APPLICABLE MUNICIPAL, PROVINCIAL, AND FEDERAL LEGISLATION. THIS LICENCE SUPERSEDES ALL PREVIOUS LICENSES FOR THIS PUBLIC WATER SYSTEM.

Original signed by:

DATE: January 24, 2012

Kim Philip, P.Eng.
Director

Page 1 of 6

TERMS AND CONDITIONS

1. GENERAL

- 1.1. The Licensee shall operate the public water system in accordance with all applicable requirements of *The Drinking Water Safety Act* and its regulations, and the requirements of this Licence. In the event that specific terms and conditions of this Licence imposed under the authority of subsection 8(3) of the Act exceed the general requirements of the Act and regulations, the specific requirements of this Licence shall apply.
- 1.2. The Licensee shall obtain approval from the Office of Drinking Water prior to making any significant alterations to the water source, the water treatment process, the water storage facilities, or the water distribution system.
- 1.3. This Licence may be amended by the Director where, in the opinion of the Director, an amendment is necessary and the amendment will not negatively impact the safety of water obtained from the water system, or effective environmental management.
- 1.4. The Licensee may request an amendment to this licence by submitting an amendment application to the Office of Drinking Water.
- 1.5. This Licence may be suspended or cancelled by the Director for any of the reasons identified in Section 11 of *Manitoba Regulation 40/2007, Drinking Water Safety Regulation* or due to a failure to comply with any term or condition of this Licence.
- 1.6. The Licensee shall provide written notice to the Office of Drinking Water of any change in title/ownership of the water system within seven days of the transfer of title/ownership.
- 1.7. The Director of the Office of Drinking Water, Medical Officer of Health or Drinking Water Officer may enter any water system facility as necessary to carry out the provisions of *The Drinking Water Safety Act* and its regulations.
- 1.8. The Licensee shall post a copy of this Licence in its entirety at the water treatment facility and ensure all operators are familiar with its terms and conditions.
- 1.9. The Licensee shall apply for renewal of this Licence at least 60 days prior to its expiry.

2. OPERATION - GENERAL

- 2.1. The Licensee shall operate all water system facilities, control systems and equipment as efficiently as possible, inspect them on a regular basis, maintain them in good working order, and ensure that the water system is protected from the risks associated with cross-contamination.
- 2.2. The Licensee shall ensure that all chemicals and components that may come into contact with potable water are certified safe for potable water use through AWWA Standards, ANSI/NSF Standard 60 or 61, Health Canada, or other standards acceptable to the Director.
- 2.3. The Licensee shall have a re-assessment of the water system infrastructure and water supply sources completed and submitted by a qualified professional engineer, who is

not an employee of the water system, in a form satisfactory to the Director by March 1, 2015, and every five years thereafter.

- 2.4. The Licensee shall submit a compliance plan in a form satisfactory to the Director by March 31, 2010 addressing the total trihalomethanes in the distribution system
- 2.5. The Licensee shall update and re-submit the compliance plan in a form and timeframe satisfactory to the Director if the contents and schedule of the plan have changed significantly and a revised plan has become necessary.

3. OPERATION – EMERGENCIES

- 3.1. The Licensee shall ensure that disinfection is undertaken following construction, repair or maintenance activities on the water system, in accordance with applicable AWWA standards, or Manitoba Water Services Board specifications, or any other standards approved by the Director. A copy of all associated test results must be kept available for review by the Office of Drinking Water for a minimum of 24 months.
- 3.2. The Licensee shall ensure that all equipment used for filtration and disinfection is maintained in effective working order and keep available for immediate use all spare parts and chemical supplies as may be necessary to ensure continuous filtration and disinfection, including a spare disinfection unit, if necessary.
- 3.3. The Licensee shall immediately notify the Office of Drinking Water of any condition that may affect the ability of the water system to produce or deliver safe drinking water including treatment upsets or bypass conditions, contamination of the source water or treated water, a filtration or disinfection system failure, or a distribution system failure.
- 3.4. If a Medical Officer of Health, the Director of the Office of Drinking Water, or a Drinking Water Officer issues a water advisory on the water system, the Licensee shall provide notice of the advisory to all water users by a method acceptable to the issuer.

4. WATER QUALITY STANDARDS

- 4.1. The Licensee shall operate the water system in a manner that achieves the water quality standards specified in Table 1, as determined through the monitoring requirements specified in Table 2:

Table 1: Water Quality Standards

Parameter	Quality Standard
Total coliform	Less than one total coliform bacteria detectable per 100 mL in all treated and distributed water
E. coli	Less than one E. coli bacteria detectable per 100 mL in all treated and distributed water
Chlorine residual	<ul style="list-style-type: none"> ▪ A free chlorine residual of at least 0.5 mg/L in water entering the distribution system following a minimum contact time of 20 minutes ▪ A free chlorine residual of at least 0.1 mg/L at all times, at any point in the water distribution system
Turbidity	<ul style="list-style-type: none"> ▪ Less than or equal to 0.1 NTU in 99% of the measurements in a month of the effluent from each membrane filtration unit ▪ Not exceed 0.3 NTU for any continuous measurement

Parameter	Quality Standard
Total trihalomethanes (THMs)	Less than or equal to 0.10 mg/L as locational running annual average of quarterly samples
Lead	Less than or equal to 0.01 mg/L in the water distribution system

- 4.2. The Licensee shall have in place and maintain in effective working order, filtration and disinfection equipment and controls designed to provide reduction or inactivation of 99.9% (3-log) of *Cryptosporidium* oocysts and 99.9% (3-log) of *Giardia lamblia* cysts.
- 4.3. The Licensee shall have in place and maintain in effective working order, filtration and/or disinfection equipment and controls designed to provide reduction or inactivation of 99.99% (4-log) of viruses.
- 4.4. If a bacteriological standard is not met, the Licensee shall immediately undertake the applicable corrective actions as listed in "Schedule A" of Manitoba Regulation 41/2007, *Drinking Water Quality Standards Regulation*.
- 4.5. If a microbial, chemical, radiological, or physical standard is not met, the Licensee shall immediately undertake the applicable corrective actions specified in "Schedule C" of Manitoba Regulation 41/2007, the *Drinking Water Quality Standards Regulation*.
- 4.6. Where corrective actions are required for minor exceedance as described in the most recent version of the Office of Drinking Water "Operational Guidelines for Public and Semi-public Water Systems", a Corrective Actions Form must be completed and submitted to the regional Drinking Water Officer.

5. WATER QUALITY MONITORING

- 5.1. Where water quality analysis is required to be undertaken by a laboratory, the Licensee shall ensure that the analysis is carried out by an accredited laboratory as specified in section 35 of Manitoba Regulation 40/2007, the *Drinking Water Safety Regulation*.
- 5.2. The Licensee shall ensure that all water quality monitoring equipment is properly maintained and calibrated by a qualified person according to manufacturer recommendations and that records are maintained to that effect.
- 5.3. The Licensee shall operate equipment capable of continuously monitoring the free chlorine residual at no more than five-minute intervals in water entering the water distribution system following a minimum of 20 minutes of contact time.
- 5.4. In instances where continuous disinfectant residual monitoring equipment is offline, the Licensee shall ensure that a minimum of one sample per day is tested at the affected location using an approved portable analysis unit and that the results are recorded in a form satisfactory to the Director.
- 5.5. The Licensee shall operate equipment capable of continuously monitoring the turbidity level at no more than five-minute intervals in the effluent from each membrane filtration unit.
- 5.6. In instances where continuous turbidity monitoring equipment is offline, the Licensee shall ensure that a minimum of one sample per day is tested at the affected location

using an approved portable analysis unit and that the results are recorded in a form satisfactory to the Director.

- 5.7. The Licensee shall ensure that sampling within the distribution system takes place at locations acceptable to the Drinking Water Officer.
- 5.8. The Licensee shall ensure that all samples are collected, handled, and submitted in a manner that complies with the requirements of the laboratory undertaking the analyses.
- 5.9. The Licensee shall ensure monitoring is completed as set out in Table 2.

Table 2. Monitoring Schedule

Parameter	Monitoring Requirement
Bacteriological (total coliform and E. coli)	For the regional water treatment plant only: <ul style="list-style-type: none"> ▪ Weekly sampling program with each set of samples consisting of one raw and one treated sample ▪ Consecutive samples sets to be separated by at least 5 days For each satellite reservoir: <ul style="list-style-type: none"> ▪ Weekly sampling program with each set of samples consisting of one outgoing and one distribution sample ▪ Consecutive samples sets to be separated by at least 5 days
Free chlorine (treated water)	<ul style="list-style-type: none"> ▪ Continuous sampling of water entering the distribution system following at least twenty minutes of contact time, at the regional water treatment plant ▪ A confirmatory sample to be taken weekly at a location established by the Drinking Water Officer ▪ Once a day sampling of water at each satellite reservoir
Free chlorine (distribution system)	At the same time and location(s) as bacteriological distribution system sampling
Total chlorine (treated water)	One sample per week of water entering the distribution system following at least twenty minutes of contact time
Total chlorine (distribution system)	At the same time and location(s) as bacteriological distribution system sampling
Turbidity	For the regional water treatment plant only: <ul style="list-style-type: none"> ▪ One raw water sample per day ▪ Continuous sampling of the effluent from each operating membrane filtration unit ▪ A confirmatory sample to be taken weekly at locations established by the Drinking Water Officer
General chemistry	One raw and one treated water sample once every six months
Total trihalomethanes (THMs)	Four preserved distribution system samples taken on a quarterly basis during February, May, August, and November
Lead	As per the instructions of the Drinking Water Officer

6. RECORD-KEEPING AND REPORTING

- 6.1. The Licensee shall record disinfectant residual and turbidity measurements on the monthly report forms or other forms satisfactory to the Director; keep one copy for records and forward the original copies to the Drinking Water Officer within seven days after the end of each calendar month.

- 6.2. The Licensee shall ensure that water metering devices are maintained in good working order and that meter readings are recorded at least on a weekly basis and such records are made available for inspection by a Drinking Water Officer.
- 6.3. The Licensee shall record distribution system disinfectant residual measurements on the chain of custody form (laboratory submission form) which accompanies the bacteriological sample bottles to the laboratory.
- 6.4. The Licensee shall record corrective actions for minor exceedances as discussed in clause 4.7 of this Licence and complete a Corrective Actions Report form. The Licensee shall keep one copy for records and forward the original copy to the Drinking Water Officer along with the monthly disinfection, or turbidity report form.
- 6.5. The Licensee shall retain in chronological order for a minimum of 24 months the following operational records for the water system:
 - a) all laboratory analysis reports
 - b) monthly disinfection report forms
 - c) turbidity report forms
 - d) corrective action forms
 - e) other report(s) as directed by the Drinking Water Officer
- 6.6. The Licensee shall maintain in a secure location all construction drawings for the life of the water system components.
- 6.7. The Licensee shall ensure the following information is available to the public for inspection: a copy of every water quality analysis result required to be performed over the last 24 months, a copy of every permit, order, advisory and licence in effect, and a copy of every annual report required in relation to the water system.
- 6.8. The Licensee shall submit an annual report to the Director by March 31st of each year on the operation of the water system in the immediately preceding calendar year. The report shall include the information as set out in subsection 32(2) of *Manitoba Regulation 40/2007, Drinking Water Safety Regulation*.
- 6.9. The Licensee shall inform the public, in a form satisfactory to the Director, when an annual report has been prepared and identify how a free copy can be obtained.
- 6.10. The Licensee shall make a copy of each annual report available to the public at no charge on an internet website within two weeks of the issuance of the report, unless otherwise approved by the Director. The annual report shall remain available to the public for at least one year.

Appendix G

Fish Species for Assiniboine River

Waterbody: Assiniboine River

Provincial Waterbody Id # 2706.00 Watershed 5MJA Region Winnipeg District Winnipeg Map Sheet 62H14 Latitude: 49 53 9 Longitude: 97 7 41

BIOLOGY

BIGMOUTH BUFFALO <i>Ictiobus cyprinellus</i>	Unknown
BIGMOUTH SHINER <i>Notropis dorsalis</i>	Common
BLACK BULLHEAD <i>Ictalurus melas</i>	Unknown
BLACK CRAPPIE <i>Pomoxis nigromaculatus</i>	Unknown
BLACKCHIN SHINER <i>Notropis heterodon</i>	Common
BLACKNOSE DACE <i>Rhinichthys atratulus</i>	Common
BLACKNOSE SHINER <i>Notropis heterolepis</i>	Common
BLACKSIDED DARTER <i>Percina maculata</i>	Uncommon
BROOK STICKLEBACK <i>Culaea inconstans</i>	Common
BROWN BULLHEAD <i>Ictalurus nebulosus</i>	Common
BURBOT <i>Lota lota</i>	Unknown
CARP <i>Cyprinus carpio</i>	Common
CENTRAL MUDMINNOW <i>Umbra limi</i>	Unknown
CHANNEL CATFISH <i>Ictalurus punctatus</i>	Common
CHESTNUT LAMPREY <i>Ichthyomyzon castaneus</i>	Unknown
COMMON SHINER <i>Notropis cornutus</i>	Common
CREEK CHUB <i>Semotilus atromaculatus</i>	Common
EMERALD SHINER <i>Notropis atherinoides</i>	Common
FATHEAD MINNOW <i>Pimephales promelas</i>	Common
FINESCALE DACE <i>Phoxinus neogaeus</i>	Common
FLATHEAD CHUB <i>Platygobio gracilis</i>	Common
FRESHWATER DRUM <i>Aplodinotus grunniens</i>	Common
GOLDEN REDHORSE <i>Moxostoma erythrurum</i>	Rare
GOLDEN SHINER <i>Notemigonus crysoleucas</i>	Common
GOLDEYE <i>Hiodon alosoides</i>	Common
IOWA DARTER <i>IOWA DARTER exile</i>	Common
JOHNNY DARTER <i>Etheostoma nigrum</i>	Uncommon

Creel

Year	Species	Catch/Unit Effort*
1968	Goldeye	0.28
	Northern Pike	0.09
	Sauger	0.01
	Walleye	0.03
1995	Channel Catfish	2.11

*Catch/Unit Effort = Catch/Hour

Waterbody: Assiniboine River

Provincial Waterbody Id # 2706.00 Watershed 5MJA Region Winnipeg District Winnipeg Map Sheet 62H14 Latitude: 49 53 9 Longitude: 97 7 41

LAKE STURGEON <i>Acipenser fulvescens</i>	Unknown
LOGPERCH <i>Percina caprodes</i>	Rare
LONGNOSE DACE <i>Rhinichthys cataractae</i>	Common
MIMIC SHINER <i>Notropis volucellus</i>	Common
MOONEYE <i>Hiodon tergisus</i>	Unknown
NINESPINE STICKLEBACK <i>Pungitius pungitius</i>	Uncommon
NORTHERN PIKE <i>Esox lucius</i>	Common
PEARL DACE <i>Semotilus margarita</i>	Common
QUILLBACK <i>Cariodes cyprinus</i>	Common
RIVER DARTER <i>Percina shumardi</i>	Common
RIVER SHINER <i>Notropis biennis</i>	Common
ROCK BASS <i>Ambloplites rupestris</i>	Unknown
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 REDHORSE <i>Moxostoma anisurum</i>	Unknown
SPOTFIN SHINER <i>Cyprinella spiloptera</i>	Unknown
SPOTTAIL SHINER <i>Notropis hudsonius</i>	Uncommon
STONECAT <i>Noturus flavus</i>	Uncommon
TADPOLE MADTOM <i>Noturus gyrinus</i>	Uncommon
TROUT PERCH <i>Percopsis omiscomaycus</i>	Common
WALLEYE <i>Stizostedion vitreum</i>	Common
WHITE SUCKER <i>Catostomus commersoni</i>	Common
YELLOW PERCH <i>Perca flavescens</i>	Unknown

Appendix H

2012 Water Quality Results



ANALYTICAL REPORT

L1231555 CONTD....
 PAGE 2 of 8
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Physical Tests (WATER)

Analyte	Unit	ALS ID		L1231555-1	L1231555-2
		Guide Limit #1	Guide Limit #2	CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
Colour, True	CU	15	-	21.6	<5.0
Conductivity	umhos/cm	-	-	1040	370
Hardness (as CaCO3)	mg/L	-	-	508	130
Langelier Index (4 C)	No Unit	-	-	1.1	-0.85
Langelier Index (60 C)	No Unit	-	-	1.9	-0.079
pH	pH units	6.5-8.5	-	8.43	7.44
Total Dissolved Solids	mg/L	500	-	709	196
Transmittance, UV (254 nm)	% T	-	-	92.6	86.6
Turbidity	NTU	-	-	7.06	<0.10

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Anions and Nutrients (WATER)

Analyte	Unit	ALS ID		L1231555-1	L1231555-2
		Guide Limit #1	Guide Limit #2	CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
Alkalinity, Total (as CaCO3)	mg/L	-	-	289	88
Ammonia, Total (as N)	mg/L	-	-	0.093	0.015
Bicarbonate (HCO3)	mg/L	-	-	337	107
Bromide (Br)	mg/L	-	-	<0.10	<0.10
Carbonate (CO3)	mg/L	-	-	<12	<12
Chloride	mg/L	250	-	19.0	14.5
Fluoride	mg/L	-	1.5	0.167	0.387
Hydroxide (OH)	mg/L	-	-	<6.8	<6.8
Iodide (I)	mg/L	-	-	<2.0	<2.0
Nitrate and Nitrite as N	mg/L	-	10	0.263	0.0940
Nitrate-N	mg/L	-	10	0.259	0.0940
Nitrite-N	mg/L	-	1	0.0042	<0.0010
Total Kjeldahl Nitrogen	mg/L	-	-	1.11	<0.20
Total Nitrogen	mg/L	-	-	1.37	<0.20
Sulfate	mg/L	500	-	279	75.4
Anion Sum	me/L	-	-	11.9	3.76
Cation Sum	me/L	-	-	12.7	3.40
Cation - Anion Balance	%	-	-	3.4	-5.0

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

 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

L1231555 CONTD....
 PAGE 3 of 8
 13-NOV-12 15:31 (MT)

Organic / Inorganic Carbon (WATER)

Analyte	Unit	Guide		ALS ID	L1231555-1	L1231555-2
		Limit #1	Limit #2	Sampled Date	31-OCT-12	31-OCT-12
				Sampled Time	11:30	11:25
				Sample ID		
					CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
Dissolved Organic Carbon	mg/L	-	-		12.6	2.9
Total Inorganic Carbon	mg/L	-	-		66.7	25.1
Total Organic Carbon	mg/L	-	-		12.6	3.0

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Bacteriological Tests (WATER)

Analyte	Unit	Guide		ALS ID	L1231555-1	L1231555-2	L1231555-3	L1231555-4
		Limit #1	Limit #2	Sampled Date	31-OCT-12	31-OCT-12	31-OCT-12	31-OCT-12
				Sampled Time	11:30	11:25	13:00	12:20
				Sample ID				
					CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED	CARTIER REGIONAL 3 - DIST (HEADINGLY)	CARTIER REGIONAL 3 - DIST (ST FRANCOIS)
Escherichia Coli	MPN/100mL	-	0		3	0	0	0
Total Coliforms	MPN/100mL	-	0		48	0	0	0

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

L1231555 CONTD....
 PAGE 4 of 8
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Total Metals (WATER)

Analyte	Unit	ALS ID		L1231555-1	L1231555-2
		Guide Limit #1	Guide Limit #2	31-OCT-12 11:30 Sample ID	31-OCT-12 11:25 Sample ID
				CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
Aluminum (Al)-Total	mg/L	0.1	-	0.182	<0.0050
Antimony (Sb)-Total	mg/L	-	0.006	0.00028	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	0.00567	0.00142
Barium (Ba)-Total	mg/L	-	1	0.0602	0.0170
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	5	0.095	0.073
Cadmium (Cd)-Total	mg/L	-	0.005	0.000016	<0.000010
Calcium (Ca)-Total	mg/L	-	-	96.0	26.0
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	-	-	0.00033	<0.00020
Copper (Cu)-Total	mg/L	1	-	0.00286	0.208
Iron (Fe)-Total	mg/L	0.3	-	0.22	<0.010
Lead (Pb)-Total	mg/L	-	0.01	0.000179	0.00182
Lithium (Li)-Total	mg/L	-	-	0.0597	0.0171
Magnesium (Mg)-Total	mg/L	-	-	65.1 ^{DLA}	15.9
Manganese (Mn)-Total	mg/L	0.05	-	0.0269	0.00211
Molybdenum (Mo)-Total	mg/L	-	-	0.00343	0.00088
Nickel (Ni)-Total	mg/L	-	-	0.0042	<0.0020
Phosphorus (P)-Total	mg/L	-	-	0.15	<0.10
Potassium (K)-Total	mg/L	-	-	11.9	3.43
Rubidium (Rb)-Total	mg/L	-	-	0.00214	0.00055
Selenium (Se)-Total	mg/L	-	0.01	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	5.85	1.61
Silver (Ag)-Total	mg/L	-	-	<0.00010	<0.00010
Sodium (Na)-Total	mg/L	200	-	52.3 ^{DLA}	23.9
Strontium (Sr)-Total	mg/L	-	-	0.369	0.0976
Tellurium (Te)-Total	mg/L	-	-	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	-	-	<0.00010	<0.00010
Thorium (Th)-Total	mg/L	-	-	<0.00010	<0.00010
Tin (Sn)-Total	mg/L	-	-	<0.00020	<0.00020
Titanium (Ti)-Total	mg/L	-	-	0.00963	0.00121

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

L1231555 CONTD....
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Total Metals (WATER)

Analyte	Unit	ALS ID		L1231555-1 31-OCT-12 11:30 Sample ID	L1231555-2 31-OCT-12 11:25 Sample ID
		Guide Limit #1	Guide Limit #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	0.00573	0.00127
Vanadium (V)-Total	mg/L	-	-	0.00274	0.00049
Zinc (Zn)-Total	mg/L	5	-	<0.0020	0.0071
Zirconium (Zr)-Total	mg/L	-	-	0.00051	<0.00040

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Dissolved Metals (WATER)

Analyte	Unit	ALS ID		L1231555-1 31-OCT-12 11:30 Sample ID	L1231555-2 31-OCT-12 11:25 Sample ID
		Guide Limit #1	Guide Limit #2		
				CARTIER REGIONAL 1 - RAW	CARTIER REGIONAL 2 - TREATED
Aluminum (Al)-Dissolved	mg/L	0.1	-	0.0021	<0.0020

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Trihalomethanes (WATER)

Analyte	Unit	ALS ID		L1231555-3 31-OCT-12 13:00 Sample ID	L1231555-4 31-OCT-12 12:20 Sample ID
		Guide Limit #1	Guide Limit #2		
				CARTIER REGIONAL 3 - DIST (HEADINGLY)	CARTIER REGIONAL 3 - DIST (ST FRANCOIS)
Bromodichloromethane	mg/L	-	-	0.0142	0.0139
Bromoform	mg/L	-	-	<0.00050	<0.00050
Chlorodibromomethane	mg/L	-	-	0.00099	0.00100
Chloroform	mg/L	-	-	0.0740	0.0714
Total THMs	mg/L	-	0.1	0.0892	0.0863
Surrogate: Toluene-d8 (SURR)	%	-	-	109.8	113.9

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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.

Appendix I

Membrane Concentrate Data

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1298092-1 WASTEWATER LIFTSTATION (WTP) Sampled By: CLIENT on 07-MAY-13 @ 09:00 Matrix: Water							
Miscellaneous Parameters							
Hardness (as CaCO3)	818		0.30	mg/L		09-MAY-13	
Sulfate	611		2.5	mg/L		07-MAY-13	R2602761
Total Dissolved Solids	1340		5.0	mg/L		08-MAY-13	R2601628
Total Suspended Solids	152		5.0	mg/L		08-MAY-13	R2601628
pH	8.08		0.10	pH units		07-MAY-13	R2599697
Alkalinity							
Alkalinity, Total (as CaCO3)	425		20	mg/L		07-MAY-13	R2599697
Bicarbonate (HCO3)	518		24	mg/L		07-MAY-13	R2599697
Carbonate (CO3)	<12		12	mg/L		07-MAY-13	R2599697
Hydroxide (OH)	<6.8		6.8	mg/L		07-MAY-13	R2599697
Total Metals by ICP-MS							
Calcium (Ca)-Total	161		0.20	mg/L	08-MAY-13	08-MAY-13	R2600868
Magnesium (Mg)-Total	101		0.050	mg/L	08-MAY-13	08-MAY-13	R2600868
Sodium (Na)-Total	96.8		0.050	mg/L	08-MAY-13	08-MAY-13	R2600868
L1298092-2 BACKWASH HOLDING POND EFFL Sampled By: CLIENT on 07-MAY-13 @ 08:30 Matrix: Water							
Miscellaneous Parameters							
Hardness (as CaCO3)	120		0.30	mg/L		09-MAY-13	
Sulfate	517		2.5	mg/L		07-MAY-13	R2602761
Total Dissolved Solids	1220		5.0	mg/L		08-MAY-13	R2601628
Total Suspended Solids	146		5.0	mg/L		08-MAY-13	R2601628
pH	8.21		0.10	pH units		07-MAY-13	R2599697
Alkalinity							
Alkalinity, Total (as CaCO3)	407		20	mg/L		07-MAY-13	R2599697
Bicarbonate (HCO3)	496		24	mg/L		07-MAY-13	R2599697
Carbonate (CO3)	<12		12	mg/L		07-MAY-13	R2599697
Hydroxide (OH)	<6.8		6.8	mg/L		07-MAY-13	R2599697
Total Metals by ICP-MS							
Calcium (Ca)-Total	28.4		0.20	mg/L	08-MAY-13	08-MAY-13	R2600868
Magnesium (Mg)-Total	11.9		0.050	mg/L	08-MAY-13	08-MAY-13	R2600868
Sodium (Na)-Total	9.72		0.050	mg/L	08-MAY-13	08-MAY-13	R2600868
L1298092-3 MILL CREEK HWY #248 UPSTREAM OF EFFLUENT Sampled By: CLIENT on 07-MAY-13 @ 09:00 Matrix: Water							
Miscellaneous Parameters							
Hardness (as CaCO3)	113		0.30	mg/L		09-MAY-13	
Sulfate	45.9		0.50	mg/L		07-MAY-13	R2602761
Total Dissolved Solids	212		5.0	mg/L		08-MAY-13	R2601628
Total Suspended Solids	8.0		5.0	mg/L		08-MAY-13	R2601628
pH	7.92		0.10	pH units		07-MAY-13	R2599697
Alkalinity							
Alkalinity, Total (as CaCO3)	92		20	mg/L		07-MAY-13	R2599697
Bicarbonate (HCO3)	113		24	mg/L		07-MAY-13	R2599697
Carbonate (CO3)	<12		12	mg/L		07-MAY-13	R2599697
Hydroxide (OH)	<6.8		6.8	mg/L		07-MAY-13	R2599697
Total Metals by ICP-MS							
Calcium (Ca)-Total	27.2		0.20	mg/L	08-MAY-13	08-MAY-13	R2600868
Magnesium (Mg)-Total	11.0		0.050	mg/L	08-MAY-13	08-MAY-13	R2600868
Sodium (Na)-Total	9.10		0.050	mg/L	08-MAY-13	08-MAY-13	R2600868

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1298092-3 MILL CREEK HWY #248 UPSTREAM OF EFFLUENT Sampled By: CLIENT on 07-MAY-13 @ 09:00 Matrix: Water							
L1298092-4 MILL CREEK DOWNSTREAM OF WTP EFFLUENT Sampled By: CLIENT on 07-MAY-13 @ 09:00 Matrix: Water							
Miscellaneous Parameters							
Hardness (as CaCO3)	122		0.30	mg/L		09-MAY-13	
Sulfate	49.7		0.50	mg/L		07-MAY-13	R2602761
Total Dissolved Solids	215		5.0	mg/L		08-MAY-13	R2601628
Total Suspended Solids	8.0		5.0	mg/L		08-MAY-13	R2601628
pH	7.96		0.10	pH units		07-MAY-13	R2599697
Alkalinity							
Alkalinity, Total (as CaCO3)	98		20	mg/L		07-MAY-13	R2599697
Bicarbonate (HCO3)	119		24	mg/L		07-MAY-13	R2599697
Carbonate (CO3)	<12		12	mg/L		07-MAY-13	R2599697
Hydroxide (OH)	<6.8		6.8	mg/L		07-MAY-13	R2599697
Total Metals by ICP-MS							
Calcium (Ca)-Total	28.7		0.20	mg/L	08-MAY-13	08-MAY-13	R2600868
Magnesium (Mg)-Total	12.2		0.050	mg/L	08-MAY-13	08-MAY-13	R2600868
Sodium (Na)-Total	9.87		0.050	mg/L	08-MAY-13	08-MAY-13	R2600868
L1298092-5 UF BREAKTANK Sampled By: CLIENT on 07-MAY-13 @ 09:00 Matrix: Water							
Miscellaneous Parameters							
Total Organic Carbon	9.7		1.0	mg/L		09-MAY-13	R2602655

* Refer to Referenced Information for Qualifiers (if any) and Methodology.