

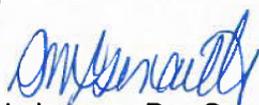
Manitoba Environment Act Proposal Town of Grand Rapids

June 2013

Dee Genaille, P.Eng



Environment Act Proposal Form

Name of the development: Town of Grand Rapids Water Treatment Plant Upgrade	
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): Waste Disposal	
Legal name of the proponent of the development: Town of Grand Rapids	Mailing address: Box 301 Grand Rapids, MB R0C 1E0
Location (street address, city, town, municipality, legal description) of the development: Town of Grand Rapids NE 27-48-13 W	
Name of proponent contact person for purposes of the environmental assessment: Dee Genaille, P. Eng	
Phone: (204) 726-6080 Fax: (204) 726-7196	Mailing address: The Manitoba Water Services Board P.O. Box 22080 Brandon, MB R7A 6Y9
Email address: dee.genaille@gov.mb.ca	
Webpage address:	
Date: June 12, 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 Town of Grand Rapids requested The Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal for a Class 1 Development License under the Manitoba Environment Act for an upgrade to the Grand Rapids water treatment plant (WTP). This Environment Act proposal is submitted for the discharge of membrane concentrate resulting from the process equipment of the water treatment plant.

The Grand Rapids WTP was constructed in 2010 and commissioned in 2011. It has a rated capacity of 7.1 L/s and 730 m³ of reservoir storage capacity. The WTP provides treatment and disinfection for approximately 479 people located in the Town of Grand Rapids and the Manitoba Hydro Generating Station staffing quarters known as Hybord.

Raw water is supplied from a groundwater well that was installed in 2012 at the Grand Rapids WTP site. The treatment process utilizes a reverse osmosis (RO) system to reduce hardness and total dissolved solids (TDS) in the water. Chlorination is used to maintain a disinfection residual. Treatment parameters meet the Guidelines for Canadian Drinking Water Quality (GCDWQ).

The treatment system generates a highly mineralized membrane concentrate which is currently discharged to the sewage lagoon located in the southwest corner of Grand Rapids between Hybord and the town. In order to conserve lagoon storage capacity this reject water will be diverted from the lagoon and discharged via a pipeline to the Saskatchewan River. The point of discharge is located approximately 195 m east of the WTP.

List of Acronyms

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

1.0 Introduction

The Town of Grand Rapids requested The Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal (EAP) to obtain a Class 1 Development License under the Manitoba Environment Act for an upgrade to the water treatment plant (WTP). This document provides the compiled information required in Manitoba Conservation's Environment Act Proposal Report Guidelines and Supplementary Guidelines for Municipal Water Supply Systems. This Environment Act Proposal is submitted for the discharge of membrane concentrate resulting from the WTP process to the Saskatchewan River.

1.1 Background Information

Until 2011 the residents of Grand Rapids used private and community wells for their water supply (UMA Engineering Ltd., 1999). The water drawn from the underlying limestone bedrock aquifer was untreated except for some homes which used individual water softeners. A fire truck provided fire protection for the Town.

The Manitoba Hydro Generating Station staffing quarters known as Hybord located approximately 1 km southwest of Grand Rapids used a groundwater well as its water supply (UMA Engineering Ltd., 1999). Water was softened, chlorinated and then stored in a water tower prior to distribution. The fire fighting capacity of the Hybord WTP and water tower was 60 L/s for 1.5 hours.

Construction of the WTP in the Town of Grand Rapids was completed in 2011. A floor plan of the WTP is shown in Appendix A. In 2012 a groundwater well located 13.5 m west of the WTP building was installed to supply water for the Town and Hybord. The water treatment process consists of reverse osmosis (RO) to reduce hardness and TDS while chlorination maintains a disinfection residual in the distribution system (Appendix B). A 730 m³ reservoir located beneath the WTP building provides storage for fire protection and to allow for future growth of the town. A water distribution system is being installed in phases to pipe water to residences, community buildings and Hybord.

Currently the membrane concentrate resulting from the water treatment process is discharged to the sanitary sewer system which empties into the sewage lagoon located in the southwest corner of Grand Rapids between Hybord and the town. The lagoon was constructed to service the original construction camp when the hydro electric dam was built in the 1960s. An expansion of the lagoon is required to provide sufficient capacity for wastewater collected from Hybord and Grand Rapids.

1.1.1 Previous Studies

In 1999 the Manitoba Water Services Board retained UMA Engineering Ltd. to conduct a sewer and water feasibility study for the Town of Grand Rapids. The construction of a new WTP and reservoir was recommended to service both the Town of Grand Rapids and Manitoba Hydro's Hybord site while an expansion of the existing sewage lagoon would provide wastewater treatment for both locations.

In March 2009, AECOM Canada Ltd. prepared a Sewer and Water System Pre-Design Report for the Town of Grand Rapids. This report refined the concepts presented in the 1999 UMA Engineering report and considered the results of site investigations, including survey, well drilling and geotechnical programs.

1.1.2 Population

As per Statistics Canada 2011 Census, the Town of Grand Rapids has a population of 279 residents. Although Figure 1.1 demonstrates a slight decline in population since the 1990s, for design purpose, considerations were made for potential future growth. Assuming an annual growth rate of 0.5% over 20 years the predicted population of Grand Rapids would be 308. Combined with the 200 people that may occupy the Manitoba Hydro Hybord site, the total estimated population is 508.

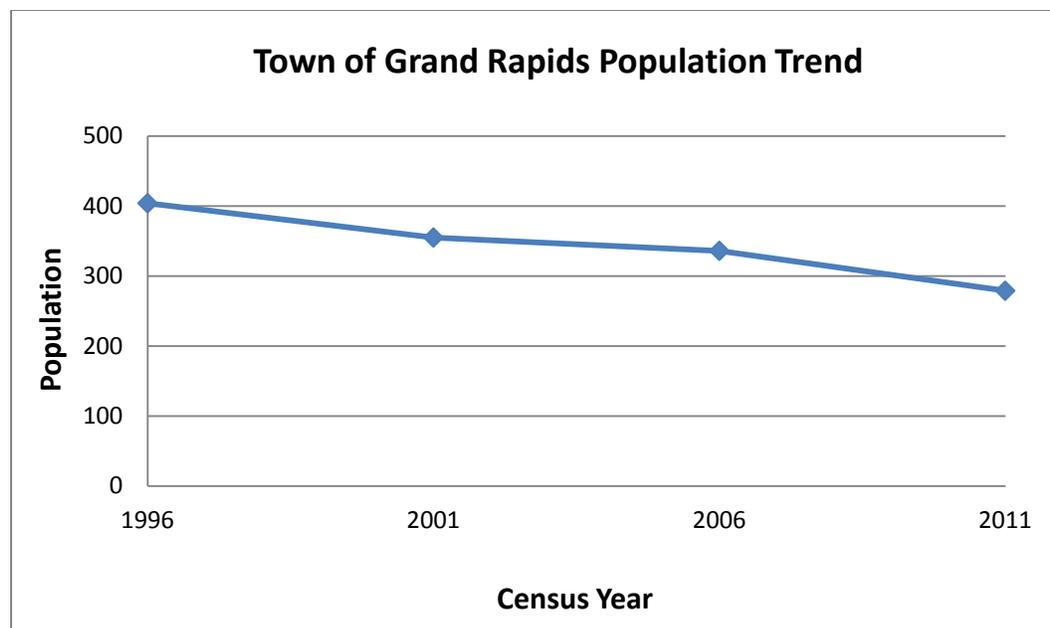


FIGURE 1.1 - POPULATION TRENDS

1.1.3 Current and Projected Water Use

Water treatment plant capacity is designed based on peak day demand. Water consumption records for Grand Rapids from 2012 and 2013 indicate an average daily water usage of 298 L/capita/day and a peak day factor of 4. The required treatment capacity is 8.4 L/s based on the projected water demand for a 20 year future population and a 20 hour WTP operating day (Table 1.1). The remaining four hours of the day are dedicated to maintenance operations.

TABLE 1.1 – GRAND RAPIDS PROJECTED WATER DEMANDS

Projected Water Demands		
	Unit	Town of Grand Rapids
20 Year Population		508
Consumption Rate	L/c/d	298
Average Day Demand	L/day	151 134
Average Day Flow	L/s	2.1
Peak Day Factor		4
Peak Day Demand	L/day	605 536
Treatment Capacity	L/s	8.4

1.1.4 Raw Water Source

The raw water source is provided by a groundwater well that diverts water from a fractured limestone aquifer. The well is located at NE 27-48-13 W approximately 13.5 m west of the Grand Rapids WTP (Figure 1.2).



FIGURE 1.2 – GROUNDWATER SUPPLY WELL LOCATED NEAR GRAND RAPIDS WTP

1.1.5 Water Rights Act

Water Rights Act Licence 2011-033 (Appendix C) specifies that the water diverted from the groundwater well located at NE 27-48-13 W adjacent to the Grand Rapids WTP shall not exceed 76,000 m³ annually or a maximum rate of 0.0076 m³/s. Water shall not be diverted during any period when the water level in the aquifer as measured at the well is more than 28.0416 m beneath the surface of the ground. Based on water meter records for the Grand Rapids WTP, the water supply is currently being operated within its Licence limits.

1.1.6 Water Quality

The Office of Drinking Water (ODW) conducts annual audits of all public water systems which includes sampling and chemistry analysis every three years for secure groundwater sources. Raw and treated water quality data as sampled by the Office of Drinking Water on November 2, 2011 is presented in Table 1.2. Complete results are provided in Appendix F.

TABLE 1.2 WATER QUALITY RESULTS (2011 ODW SAMPLING)

Parameter	Unit	Raw Water	Treated Water	GCDWQ
Hardness (Total) as CaCO ₃	mg/L	270	4.9	≤ 200/500 ^a
Iron	mg/L	0.14	< 0.10	≤ 0.3
Manganese	mg/L	0.00563	<0.00030	≤ 0.05
Sodium	mg/L	15.5	10.7	200
Sulphate	mg/L	24.2	<0.50	500
Fluoride	mg/L	0.626	<0.020	1.5
Chloride	mg/L	14.9	4.77	250
Nitrate-Nitrite	mg/L	<0.0051	<0.0051	10
Total Dissolved Solids	mg/L	318	36	≤ 500
Total Organic Carbon	mg/L	2.0	<1.0	-
True Colour	CU	<5.0	<5.0	≤ 15
Turbidity	NTU	<0.10	0.24	≤ 0.3 / 0.1 ^b
pH	-	7.67	7.36	6.5-8.5

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

^bTurbidity 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 raw water is high in hardness according to the GCDWQ. While not a health concern, hardness above 200 mg/l can cause staining and scum deposits on bathroom fixtures. Hardness levels between 80 to 100 mg/l are acceptable, levels greater than 200 mg/l are considered poor but tolerable and those in excess of 500 mg/l are considered

unacceptable. 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.

Total dissolved solids (TDS) in the raw water do not exceed GCDWQ levels but are moderately high. TDS is not considered a health concern but is an aesthetic element that can make water undesirable.

2.0 Description of Proposed Development

2.1 Project Description

The membrane treatment process at the Grand Rapids WTP produces a highly mineralized reject concentrate which is currently being sent to the sewage lagoon. This EAP pertains to the diversion of the membrane concentrate from the lagoon to the Saskatchewan River in order to conserve capacity of the lagoon. A gravity fed pipeline will be installed along an existing road that will discharge the concentrate to the river 195 m east of the WTP as shown in Figures 2.1 and 2.2. The discharge outlet will protrude from the river embankment at an elevation approximately one meter about the water level. To prevent erosion at the outflow rock rip-rap will be installed. Construction of the pipeline/outlet will not impact other watercourses.



FIGURE 2.1 - PROPOSED MEMBRANE CONCENTRATE DISCHARGE ROUTE



FIGURE 2.2 - ROAD TOWARD SASKATCHEWN RIVER THAT PROPOSED DISCHARGE ROUTE WILL FOLLOW

2.1.1 Operation and Maintenance

The Town of Grand Rapids is responsible for the operation and maintenance of the WTP, distribution pipelines and reject water discharge. The existing WTP in Grand Rapids is classified as a Class 2 facility. The Town 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. Operation requirements include measurements, monitoring, sampling, testing, record-keeping and reporting as per Operating Licence No. PWS-11-506 (Appendix D). As currently required, periodic inspection, maintenance, bacteriological sampling and chlorine residual testing of the distribution pipelines are necessary.

2.2 Certificate of Title

The WTP is located on land owned by the Town of Grand Rapids on Lot No. 38, NE 27-48-13 W. The Certificate of Title No. 2087255 is provided in Appendix E.

It is proposed that the membrane concentrate pipeline will be located on land in the road right of way which is owned by the Crown.

2.3 Existing and Adjacent Land Use

The land for the proposed membrane concentrate discharge route and adjacent land is currently used for residential purposes. Existing adjacent land use will not change as a result of this development.

2.4 Land Use Designation and Zoning

Zoning designation for the pipelines in Town right of ways is not applicable.

2.5 Project Schedule

The project is scheduled to commence and be completed in 2013 with the receipt of all approvals.

2.6 Project Funding

This project will be cost shared between the MWSB and the Town of Grand Rapids.

2.7 Regulatory Approvals

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

Manitoba Conservation and Water Stewardship
Office of Drinking Water

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

2.8 Public Consultation

Public consultation will not be conducted since no significant changes are anticipated with the proposed discharge of the membrane concentrate water.

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

3.1 Physiographic Setting and Climate

The Town of Grand Rapids is located in central Manitoba approximately 450 kilometres north of Winnipeg. It is situated on the north-western shore of Lake Winnipeg where the Saskatchewan River enters the Lake. The town is divided by Provincial Trunk Highway No. 6 with Hybord primarily making up the west portion of the community.

The topography of the area decreases from a 267 metre elevation at Cedar Lake, which is east of Grand Rapids, to a 229 metre elevation at the town. The significant drop in elevation made this an ideal location to build the hydro generating station on the Saskatchewan River.

Based on Environment Canada climatic data shown in Table 3.1, the mean annual temperature in the area is 0.8 degrees Celsius with below zero average daily temperatures from November through March. Mean annual precipitation is 473.7 mm.

TABLE 3.1 ENVIRONMENT CANADA HISTORICAL WEATHER DATA – GRAND RAPIDS, MANITOBA

Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average (°C)	-19.7	-15.4	-8.6	0.9	8.6	15.0	18.6	17.6	11.1	4.0	-6.7	-16.0	0.8
Daily Maximum (°C)	-15.0	-10.3	-3.1	6.2	14.2	20.2	23.5	22.4	15.3	7.7	-3.4	-11.8	5.5
Daily Minimum (°C)	-24.4	-20.4	-14	-4.4	3.0	9.9	13.7	12.7	6.7	0.3	-10.0	-20.3	-3.9
Precipitation (mm)													
Rainfall (mm)	0.0	0.2	2.9	12.0	39.6	78.4	72.3	63.7	58.2	30.7	4.3	0.0	362.4
Snowfall (cm)	16.6	12.6	19.3	12.7	4.0	0.0	0.0	0.0	0.3	8.1	19.1	18.7	111.5
Precipitation (mm)	16.5	13.0	22.2	24.6	43.6	78.4	72.3	63.7	58.5	38.7	23.6	18.6	473.7

3.2 Hydrogeology

Drill records for water wells installed in and around the Town of Grand Rapids between 1965 and 1995 show that the limestone bedrock is the only exploitable aquifer in the area (UMA Engineering Ltd., 1999). The aquifer is considered to be confined due to the dense layer and low permeability of the 9 to 19 m of overlying till material. In locations where the bedrock extends to the ground surface the aquifer is considered unconfined.

In December 2008 a test well was installed at the site of the proposed Grand Rapids WTP to determine the presence of a viable water supply for the community. The well flowed under artesian head conditions and demonstrated the capability to flow under non-pumping conditions in excess of 7.6 L/s (W.L. Gibbons & Associates Inc., 2009).

The supply well for the Town of Grand Rapids was installed at the WTP site in October 2012. The stratigraphy encountered consisted of 21.0 m of clay and till overburden followed by limestone to a depth of 66.1 m (W.L. Gibbons & Associates Inc., 2012). This well is capable of pumping at rates higher than 9.0 L/s.

3.3 Hydrology

The Saskatchewan River is the fourth largest river in Canada originating in the Rocky Mountains of Alberta. It travels approximately 1940 km east and enters Lake Winnipeg at Grand Rapids as shown in Figure 3.1 (Manitoba Hydro). The drainage area of the river is about 340,000 km².

The Manitoba Hydro Grand Rapids Generating Station is located on the Saskatchewan River between Cedar Lake and Lake Winnipeg. This spot was chosen for the generating station due to the significant drop in elevation between the two lakes. The length of the river between the generating station and Lake Winnipeg, which flows by Grand Rapids, is approximately 3000 m. The width of this section of the River is approximately 430 m (Figure 3.2).

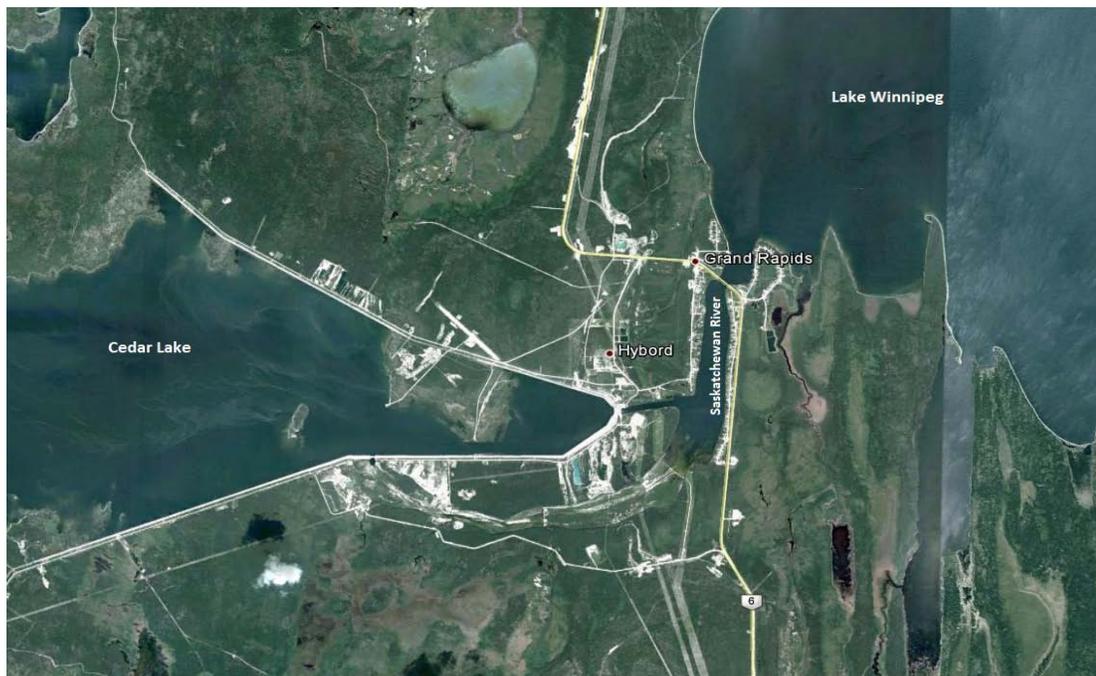


FIGURE 3.1 - HYDROLOGY FEATURES NEAR THE PROPOSED DEVELOPMENT



FIGURE 3.2 - SASKATCHEWAN RIVER AT GRAND RAPIDS, MANITOBA

3.4 Fish and Fish Habitat

The Fisheries Branch of Conservation and Water Stewardship was contacted regarding fish and fish habitat of the Saskatchewan River within the project area. Year round the Saskatchewan River provides habitat for a number of resident large and small bodied fish species. These species consist of Lake Sturgeon, White Sucker, Longnose Sucker, Walleye, Burbot, Goldeye, Cisco, Lake Whitefish, Northern Pike, Sauger, Shorthead Redhorse, Yellow Perch, Longnose Dace, Spottail Shiner, Emerald Shiner, Ninespine Stickleback, Pearl Dace, Lake Chub, Trout Perch, Brook Stickleback, Common Carp, Central Mudminnow, Johnny Darter, Logperch, Spoonhead Sculpin, Blacknose Dace and Mottled Sculpin (Laureen Janusz, personal communication, April 9, 2013).

3.5 Wildlife Habitat and Vegetation

The project area is located within the Mid-Boreal Lowland ecoregion of the Boreal Plains ecozone (Agriculture and Agri-Food Canada). The ecoregion is classified as having a subhumid mid-boreal ecoclimate. It is a relatively flat, low-lying region with extensive wetlands covering approximately half the area. The cold and poorly drained fens and bogs are covered with tamarack and black spruce. The mixed deciduous and coniferous forest is characterized by medium to tall, closed stands of trembling aspen, balsam poplar with white and black spruce and balsam fir occurring in late successional stages. Permafrost occurs in isolated patches in peatlands and is more prevalent in the region's northeastern section. Pulpwood and local forestry, some commercial fishing, water-oriented recreation and wildlife trapping and hunting

are the dominate uses of land in this region although seed grains, oilseeds and forage crops are produced where soils and drainage are suitable. Wildlife within the ecoregion includes moose, black bear, wolf, lynx, snowshoe hare and birds such as the ruffed grouse.

The Canada Land Inventory (CLI) indicates that the production of waterfowl in the project area is severely limited or nonexistent. Located approximately eight kilometres from the project area are two sections along the shores of Lake Winnipeg that are important for migration and wintering. Species of waterfowl found in the area include duck, goose, pelican, sandhill crane and gulls (Natural Resources Canada).

3.6 Socio-economic

The project area is located within the Town of Grand Rapids. The Town covers an area of 85.95 km² and has a population of 279 people with 93 private dwellings (Statistics Canada, 2011). Grand Rapids is downstream from the Manitoba Hydro generating station which has been operational since 1968. The Manitoba Hydro staffing quarters known as Hybord is capable of contributing an additional 200 people for a total population of 479. Grand Rapids 33, a reserve located south east of the community on the opposite side of the Saskatchewan River has a population of 716.

Businesses in the Town of Grand Rapids include lodgings, gas stations, banking institutions and restaurants, as well as a school, churches and recreational activities such as camping and fishing.

3.7 Heritage Resources

Most project activities will occur on previously disturbed Town 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 and gaseous and particulate emissions will be created by the 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 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 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 2000-2010 collected at the hydrometric flow station (05KL001) located on the Saskatchewan River at Grand Rapids, MB (Environment Canada) are summarized in Table 4.1.

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

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	978	790	653	442	342	289	334	260	205	316	416	883
2001	260	390	194	348	258	116	133	133	76.8	113	152	172
2002	227	243	576	374	372	360	395	393	246	382	349	287
2003	630	894	567	291	274	377	514	510	80	46	41.7	55.8
2004	254	159	315	445	388	167	387	451	613	521	431	828
2005	795	682	924	434	621	1410	1330	767	1350	1510	945	1060
2006	1030	1440	908	449	922	997	970	758	303	536	641	665
2007	1120	1420	771	692	775	1290	957	704	469	463	590	1060
2008	1060	1200	648	324	370	472	660	513	431	299	342	647
2009	783	827	392	128	276	200	193	223	403	508	253	761
2010	-	796	557	281	152	339	1070	919	704	790	700	785

Membrane concentrate contains hardness causing minerals such as calcium and magnesium. The quality data of the membrane concentrate from the Grand Rapids WTP is shown in Table 4.2 with complete results displayed in Appendix G. The estimated concentrate discharged to the

Saskatchewan River annually is 37,000 m³. Reject concentrate from similar systems has been discharged to surface water bodies in other locations across Manitoba without having significant adverse effects on water quality. The Town of Grand Rapids will perform long-term sampling of the river water to verify water quality impacts.

Surface water quality data for Cedar Lake upstream of the Saskatchewan River at the Grand Rapids Generating Station was provided by Manitoba Hydro (Allison Zacharias, personal communication, March 27, 2013). Using this information in combination with the flow rates and membrane concentrate data the potential impact of the proposed reject water discharge on the Saskatchewan River was determined (Table 4.2). During both high and low flow conditions the impact of the discharged concentrate is negligible. This is due to the large volume of water and high flow rate of the Saskatchewan River.

TABLE 4.2 EFFECTS OF CONCENTRATE REJECT ON RIVER QUALITY

Parameter	Concentrate	Saskatchewan River	Blended Flow
	(L/s)	(L/s)	(L/s)
Flow Rate Low	1.4	382 545	382 547
High	1.4	803 727	803 729
	(mg/L)	(mg/L)	(mg/L)
Hardness	1420.0	228.0	228.0
TDS	1540.0	302.0	302.0
Sodium	77.0	26.9	26.9
Potassium	10.0	4.35	4.35
Iron	0.6	0.15	0.15
Manganese	0.03	0.03	0.03
Sulphate	115.0	64.3	64.3
Chloride	77.6	18.6	18.6
Fluoride	2.85	0.14	0.14
Total Kjeldahl Nitrogen	0.22	0.51	0.51
Total Phosphorus	<0.20	0.01	0.01

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. Horizontal directional drilling will be conducted to install the pipeline at the drain outlet. This will eliminate excavation within the

riparian zone and minimize impacts. There is potential for some loss of drilling mud to surface water.

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 will occur primarily in a residential area where land has been previously disturbed. As the area is already disturbed, it is unlikely to contain rare plant species. 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 urban 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 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 for 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.

4.9 Employment/Economy

Socio-economic implications are not expected as a result of environmental impacts as impacts are considered minor and short term. Some economic implications may exist for Grand Rapids due to the costs of upgrading the WTP. There may be some positive local economic benefit

during construction. The potential effects of the project on employment and the economy were assessed to be positive.

4.10 Human Health and Well Being

The potential adverse effects of the project on human health are assessed to be negligible to minor. Short term temporary increases in noise and dust emissions will occur during construction that are considered to be minor effects. The potential effects are considered minor.

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 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 providing 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 on a quarterly basis the volume of water pumped and charged to ratepayers. Since these services are metered, abnormalities can be identified and rectified. These measures result in reduced concentrate flows to the River.

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

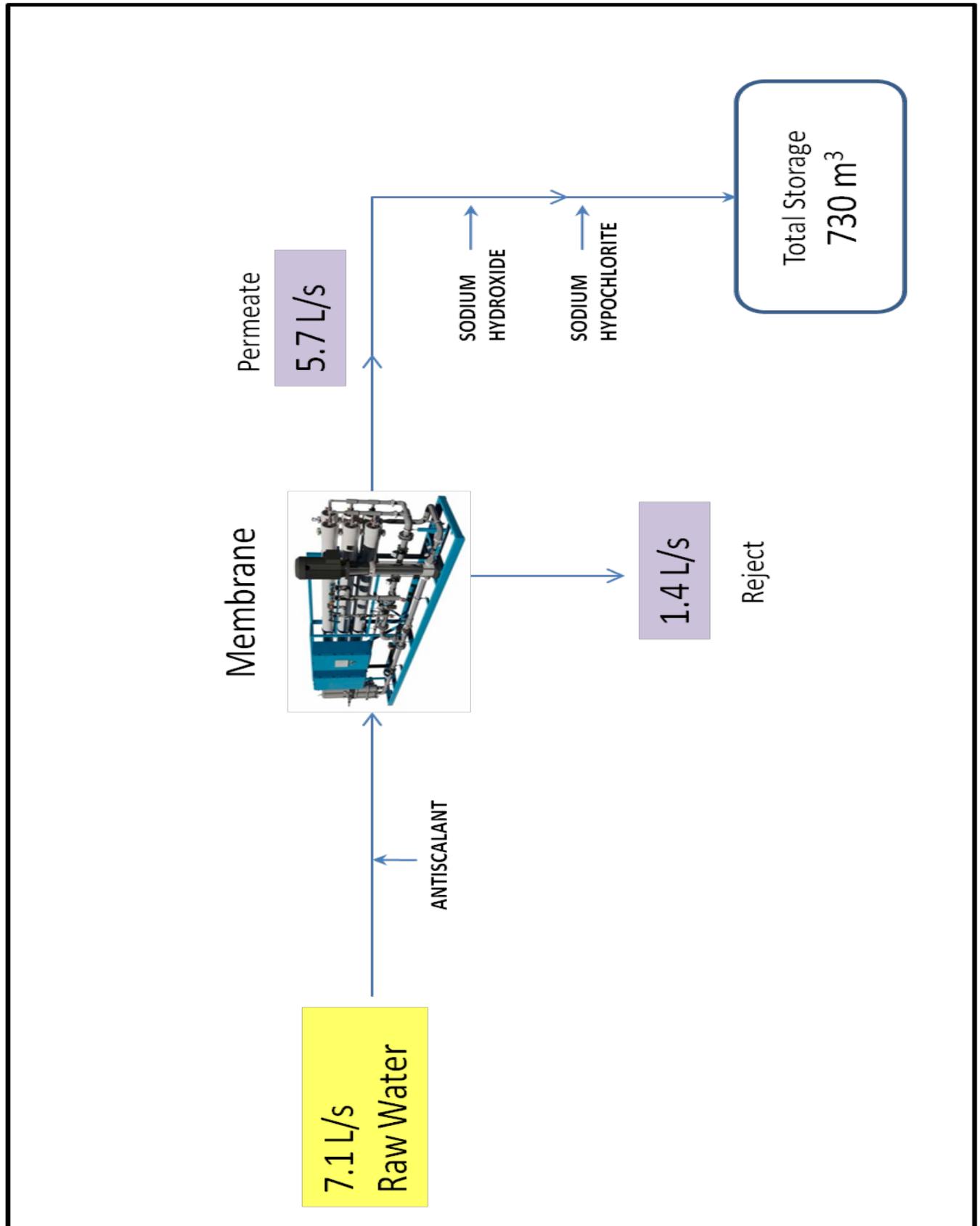
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Appendix A

Floor Plan

Appendix B

Membrane Flow Diagram



Appendix C

Water Rights Licence

MG-14854 (English)

**Licence to Use Water for
Municipal
Purposes**



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

Licence No.: **2011-033**

U.T.M.: Zone 14 481977 E
5891473 N

Know all men by these presents that in consideration of and subject to the provisos, conditions and restrictions hereinafter contained, the Minister of Water Stewardship for the Province of Manitoba does by these presents give full right and liberty, leave and licence to **Town of Grand Rapids** in the Province of Manitoba (hereinafter called "the LICENSEE") to divert water from a **fractured limestone** aquifer by means of a water well, pump, pipeline(s) and other appurtenances (hereinafter called "the WORKS"), located on the following described lands:

the Northeast Quarter of Section 27, in Township 48 and Range 13, West of the Principal Meridian in Manitoba more particularly described on Certificate of Title No. 2087255 PLTO,

and more particularly shown on a plan filed in the office of the Executive Director, Regulatory and Operational Services Division, a copy of which plan is hereto attached and marked Exhibit "A" for **municipal** purposes on the following described lands:

Town of Grand Rapids.

1. The water shall be used solely for **municipal** purposes.
2. The WORKS shall be operated in accordance with the terms herein contained.
3. a) The maximum rate at which water may be diverted pursuant hereto shall not exceed **0.0076 cubic metres per second (0.3 cubic feet per second)**
b) The total quantity of water diverted in any one year shall not exceed **76.0 cubic decametres (61.61 acre feet)**
4. Water shall not be diverted during any period when the water level in the aquifer as measured at the well is more than **28.0416 metres (92.0 feet)** beneath the surface of the ground.
5. The LICENSEE does hereby remise, release and forever discharge Her Majesty the Queen in Right of the Province of Manitoba, of and from all manner of action, causes of action, claims and demands whatsoever which against Her Majesty the LICENSEE ever had, now has or may hereafter have, resulting from the use of water for **municipal** purposes.
6. In the event that the rights of others are infringed upon and/or damage to the property of others is sustained as a result of the operation or maintenance of the WORKS and the rights herein granted, the LICENSEE shall be solely responsible and shall save harmless and fully indemnify Her Majesty the Queen in Right of the Province of Manitoba, from and against any liability to which Her Majesty may become liable by virtue of the issue of this Licence and anything done pursuant hereto.
7. This Licence is not assignable or transferable by the LICENSEE and when no longer required by the LICENSEE this Licence shall be returned to the Executive Director, Regulatory and Operational Services Division, for cancellation on behalf of the Minister.
8. Upon the execution of this Licence the LICENSEE hereby grants the Minister or the Minister's agents the right of ingress and egress to and from the lands on which the WORKS are located for the purpose of inspection of the WORKS and the LICENSEE shall at all times comply with such directions and/or orders that may be given by the Minister or the Minister's agents in writing from time to time with regard to the operation and maintenance of the WORKS.
9. This Licence may be amended, suspended or cancelled by the Minister in accordance with The Water Rights Act by letter addressed to the LICENSEE at **Box 301, Grand Rapids, MB, R0C 1E0, Canada** and thereafter this Licence shall be determined to be at an end.
10. Notwithstanding anything preceding in this Licence, the LICENSEE must have legal control, by ownership or by rental, lease, or other agreement, of the lands on which the WORKS shall be placed and the water shall be used.
11. The term of this Licence shall be **twenty (20) years** and this Licence shall become effective only on the date of execution hereof by a person so authorized in the Department of Water Stewardship. 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.
12. This Licence expires automatically upon the loss of the legal control of any of the lands on which the WORKS are located or on which water is used, unless the Licence is transferred or amended by the Minister upon application for Licence transfer or amendment.
13. The LICENSEE shall keep records of daily and annual water use and shall provide a copy of such records to the Executive Director, Regulatory and Operational Services Division, not later than February 1st of the following year.
14. A flow meter must be installed, positioned to accurately measure instantaneous pumping rate and accumulative withdrawals from the water source.

- 15. The LICENSEE does hereby agree to correct, to the satisfaction of the Minister, any water supply problems to other currently existing wells, dugouts, or other forms of supply, which are partly or wholly attributable, in the opinion of the Minister, to the diversion of water as authorized by this Licence.
- 16. The LICENSEE shall hold and maintain all other regulatory approvals that may be required and shall comply with all other regulatory requirements for the construction, operation, or maintenance of the WORKS or to divert or use water as provided by this Licence.

In witness whereof I the undersigned hereby agree to accept the aforesaid Licence on the terms and conditions set forth therein and hereby set my hand and seal this 15th day of June A.D. 20 11.

SIGNED, SEALED AND DELIVERED
in the presence of

_____ } Karen Turner (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.

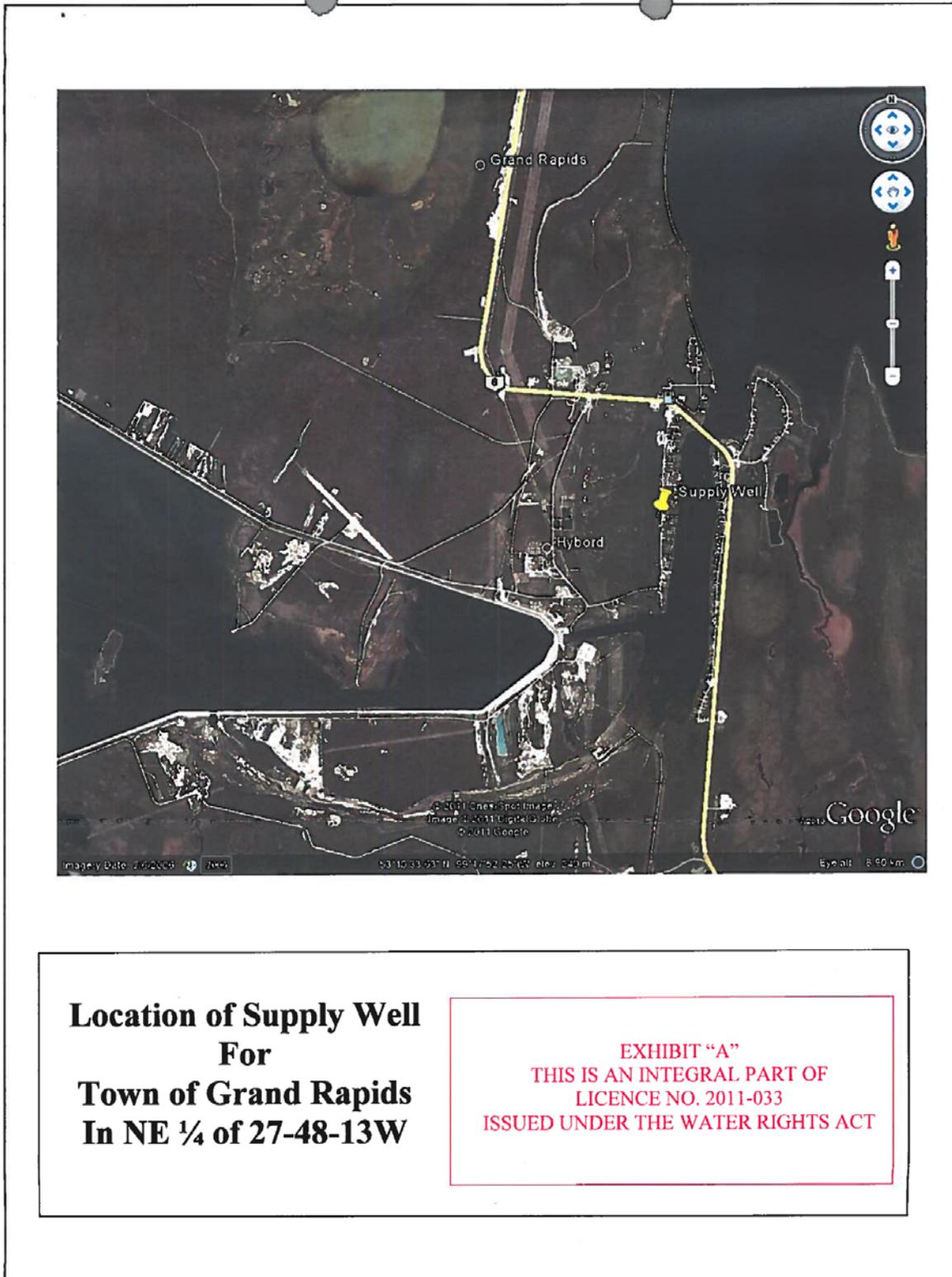
SWORN BEFORE me at the _____
in the Province of Manitoba this _____ day of _____ A.D. 20 _____.

_____ } _____
 A COMMISSIONER FOR OATHS
 in and for the Province of Manitoba
 Witness

My Commission expires _____

Issued at the City of Winnipeg, in the Province of Manitoba, this 7 day of June A.D. 20 11.

[Signature]
 The Honourable the Minister of Water Stewardship



**Location of Supply Well
For
Town of Grand Rapids
In NE ¼ of 27-48-13W**

**EXHIBIT "A"
THIS IS AN INTEGRAL PART OF
LICENCE NO. 2011-033
ISSUED UNDER THE WATER RIGHTS ACT**

Appendix D

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-11-506

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

WATER SYSTEM CODE: 81.40
OPERATION ID: 48010
EFFECTIVE DATE: DECEMBER 1, 2011
EXPIRY DATE: NOVEMBER 30, 2016

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

TOWN OF GRAND RAPIDS: "THE LICENSEE"

FOR THE OPERATION OF THE **GRAND RAPIDS PUBLIC WATER SYSTEM**, WHICH INCLUDES WELLS, TREATMENT FACILITIES, WATER STORAGE RESERVOIRS, AND DISTRIBUTION LINES, 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: November 15, 2011

Kim Philip, P.Eng.
Director

Page 1 of 5

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. No alternate water source, such as a backup well, shall be brought into service without the consent of the Drinking Water Officer and physical separation between the backup source and the primary source shall be maintained as a cross-connection control mechanism.

- 2.3. 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.
- 2.4. The Licensee shall have an 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 November 30, 2016.

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 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 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 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
Arsenic	Less than or equal to 0.01 mg/L
Benzene	Less than or equal to 0.005 mg/L
Fluoride	Less than or equal to 1.5 mg/L

Parameter	Quality Standard
Lead	Less than or equal to 0.01 mg/L in the water distribution system
Nitrate	Less than or equal to 45 mg/L measured as nitrate (10 mg/L measured as nitrogen)
Trichloroethylene	Less than or equal to 0.005 mg/L
Tetrachloroethylene	Less than or equal to 0.03 mg/L
Uranium	Less than or equal to 0.02 mg/L

- 4.2. 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*.
- 4.3. 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*.
- 4.4. Where corrective actions are required for minor exceedance events 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 and that records are maintained to that effect.
- 5.3. The Licensee shall ensure that sampling within the distribution system takes place at locations acceptable to the Drinking Water Officer.
- 5.4. 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.
- 5.5. 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)	<ul style="list-style-type: none"> ▪ Bi-weekly sampling program with each set of samples consisting of one raw, one treated and a minimum of one distribution sample ▪ Consecutive sample sets to be separated by at least 12 days
Free chlorine (treated water)	One sample per day of water entering the distribution system following at least twenty minutes of contact time.
Free chlorine (distribution system)	On a bi-weekly basis, at the same time and location(s) as bacteriological distribution system sampling

Parameter	Monitoring Requirement
Total chlorine (treated water)	One sample per day of water entering the distribution system following at least twenty minutes of contact time
Total chlorine (distribution system)	At the same times and location(s) as bacteriological distribution system sampling
General chemistry (to include arsenic, benzene, fluoride, nitrate, trichloroethylene, tetrachloroethylene, and uranium)	One raw and one treated water sample once every three years.
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 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) corrective action forms
 - d) 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 the most recent water chemistry analysis, a copy of every permit, order, advisory and licence in effect, in relation to the water system.

Appendix E

Certificate of Title

DATE: 2013/04/23
TIME: 13:21

MANITOBA

TITLE NO: 2087255/3

STATUS OF TITLE

PAGE: 1

STATUS OF TITLE..... ACCEPTED PRODUCED FOR... COUNTER
ORIGINATING OFFICE... PORTAGE LA PRAIRIE ADDRESS.....
REGISTERING OFFICE... PORTAGE LA PRAIRIE
REGISTRATION DATE.... 2005/05/18
COMPLETION DATE..... 2005/05/25

CLIENT FILE... NA
PRODUCED BY... BRANDON

LEGAL DESCRIPTION:

THE TOWN OF GRAND RAPIDS

IS REGISTERED OWNER, SUBJECT TO SUCH ENTRIES RECORDED
HEREON IN THE FOLLOWING DESCRIBED LAND:

PARCEL 1
LOTS 33, 34, 35, 40 AND 41 GRAND RAPIDS SETTLEMENT, EKC
FIRSTLY: PLAN 6571 PLTO (N DIV)
SECONDLY: ALL MINES, MINERALS AND OTHER MATTERS
 AS SET FORTH IN THE CROWN LANDS ACT

PARCEL 2
LOT 36 GRAND RAPIDS SETTLEMENT, EKC
FIRSTLY: THE ELY 100 FEET OF THE ELY 3.8 FEET
SECONDLY: ALL MINES, MINERALS AND OTHER MATTERS
 AS SET FORTH IN THE CROWN LANDS ACT

PARCEL 3
LOTS 37, 38, 42 & 43 GRAND RAPIDS SETTLEMENT
EKC ALL MINES, MINERALS AND OTHER MATTERS
AS SET FORTH IN THE CROWN LANDS ACT

ACTIVE TITLE CHARGE(S):

NO ACTIVE TITLE CHARGES EXIST ON THIS TITLE

ADDRESS(ES) FOR SERVICE:

EFFECT	NAME AND ADDRESS	POSTAL CODE
ACTIVE	THE TOWN OF GRAND RAPIDS BOX 301 GRAND RAPIDS MB	ROC 1E0

ORIGINATING INSTRUMENT(S):

REGISTRATION NUMBER	TYPE	REG. DATE	CONSIDERATION	SHOWN VALUE
1083719/3	EREQ	2005/05/18	\$0.00	\$0.00

PRESENTED BY: PLTO
FROM: PLTO CONVERSION
TO:

FROM TITLE NUMBER(S):

115842/3 BAL

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 2013/04/23 OF TITLE NUMBER 2087255/3

***** STATUS OF TITLE 2087255/3 CONTINUED ON NEXT PAGE *****

DATE: 2013/04/23
TIME: 13:21

MANITOBA
STATUS OF TITLE

TITLE NO: 2087255/3

PAGE: 2

STATUS OF TITLE..... ACCEPTED PRODUCED FOR.. COUNTER
ORIGINATING OFFICE... PORTAGE LA PRAIRIE ADDRESS.....
REGISTERING OFFICE... PORTAGE LA PRAIRIE
REGISTRATION DATE.... 2005/05/18
COMPLETION DATE..... 2005/05/25

CLIENT FILE... NA
PRODUCED BY... BRANDON

LAND INDEX:

LOT	TYPE	PARISH
33	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC PLAN 6571 & RES	
34	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC PLAN 6571 & RES	
35	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC PLAN 6571 & RES	
36	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC ELY 100' OF NLY 3.8' & RES	
37	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC RES	
38	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC RES	
40	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC PLAN 6571 & RES	
41	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC PLAN 6571 & RES	
42	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC RES	
43	SETTLEMENT LOT	GRAND RAPIDS
NOTE:	EXC RES	

DUPLICATE PRODUCED FOR.. HOLD FOR PROD OF DUPL CT NO(S) ON 2005/05/26
ADDRESS..... 115842

POSTAL CODE.....

ACCEPTED THIS 18TH DAY OF MAY, 2005
BY C.TROST FOR THE DISTRICT REGISTRAR OF
THE LAND TITLES DISTRICT OF PORTAGE LA PRAIRIE.

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 2013/04/23 OF TITLE NUMBER 2087255/3.

***** END OF STATUS OF TITLE 2087255/3 *****

Appendix F

2011 Water Quality Results



ANALYTICAL REPORT

L1081204 CONTD....
PAGE 2 of 6
10-NOV-11 12:19 (MT)

Physical Tests (WATER)

		ALS ID		L1081204-1	L1081204-2
		Sampled Date		02-NOV-11	02-NOV-11
		Sampled Time		11:30	11:30
		Sample ID			
Analyte	Unit	Guide Limit #1	Guide Limit #2	GRAND RAPIDS 1 - RAW	GRAND RAPIDS 2 - TREATED
Colour, True	CU	15	-	<5.0	<5.0
Conductivity	umhos/cm	-	-	541	61
Langelier Index (4 C)	No Unit	-	-	0.18	-2.6
Langelier Index (60 C)	No Unit	-	-	0.95	-1.9
pH	pH units	6.5-8.5	-	7.67	7.36
Total Dissolved Solids	mg/L	500	-	318	36.0
Turbidity	NTU	-	-	<0.10	0.24

Federal Guidelines for Canadian Drinking Water Quality (JUN, 2008)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum and Interim Maximum Acceptable Concentrations

Anions and Nutrients (WATER)

		ALS ID		L1081204-1	L1081204-2
		Sampled Date		02-NOV-11	02-NOV-11
		Sampled Time		11:30	11:30
		Sample ID			
Analyte	Unit	Guide Limit #1	Guide Limit #2	GRAND RAPIDS 1 - RAW	GRAND RAPIDS 2 - TREATED
Alkalinity, Total (as CaCO3)	mg/L	-	-	283	24.3
Ammonia as N	mg/L	-	-	0.023	<0.010
Bicarbonate (HCO3)	mg/L	-	-	345	29.6
Carbonate (CO3)	mg/L	-	-	<0.60	<0.60
Chloride	mg/L	250	-	14.9	4.77
Fluoride	mg/L	-	1.5	0.626	<0.020
Hardness (as CaCO3)	mg/L	-	-	270	4.9
Hydroxide (OH)	mg/L	-	-	<0.40	<0.40
Ion Balance	%	-	-	92.8	Low EC
Nitrate and Nitrite as N	mg/L	-	10	<0.0051	<0.0051
Nitrate-N	mg/L	-	10	<0.0050	<0.0050
Nitrite-N	mg/L	-	1	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	-	-	<0.20	<0.20
TDS (Calculated)	mg/L	500	-	315	32.7
Sulfate	mg/L	500	-	24.2	<0.50

Federal Guidelines for Canadian Drinking Water Quality (JUN, 2008)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum and Interim Maximum Acceptable Concentrations

Organic / Inorganic Carbon (WATER)

		ALS ID		L1081204-1	L1081204-2
		Sampled Date		02-NOV-11	02-NOV-11
		Sampled Time		11:30	11:30
		Sample ID			
Analyte	Unit	Guide Limit #1	Guide Limit #2	GRAND RAPIDS 1 - RAW	GRAND RAPIDS 2 - TREATED
Total Carbon	mg/L	-	-	68.7	7.1
Total Inorganic Carbon	mg/L	-	-	66.7	6.9
Total Organic Carbon	mg/L	-	-	2.0	<1.0

Federal Guidelines for Canadian Drinking Water Quality (JUN, 2008)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum and Interim Maximum Acceptable Concentrations

- 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.



ANALYTICAL REPORT

L1081204 CONTD....
 PAGE 3 of 6
 10-NOV-11 12:19 (MT)

Total Metals (WATER)

Analyte	Unit	ALS ID		L1081204-1	L1081204-2
		Guide Limit #1	Guide Limit #2	02-NOV-11 11:30 Sample ID	02-NOV-11 11:30 Sample ID
				GRAND RAPIDS 1 - RAW	GRAND RAPIDS 2 - TREATED
Aluminum (Al)-Total	mg/L	0.1	-	<0.0050	0.0368
Antimony (Sb)-Total	mg/L	-	0.006	<0.00020	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	<0.00020	<0.00020
Barium (Ba)-Total	mg/L	-	1	0.0871	0.00136
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	5	0.048	0.042
Cadmium (Cd)-Total	mg/L	-	0.005	<0.000010	<0.000010
Calcium (Ca)-Total	mg/L	-	-	55.7	1.42
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	-	-	<0.00020	<0.00020
Copper (Cu)-Total	mg/L	1	-	0.00023	0.0215
Iron (Fe)-Total	mg/L	0.3	-	0.14	<0.10
Lead (Pb)-Total	mg/L	-	0.01	<0.000090	0.00119
Lithium (Li)-Total	mg/L	-	-	0.0088	0.0020
Magnesium (Mg)-Total	mg/L	-	-	31.8	0.324
Manganese (Mn)-Total	mg/L	0.05	-	0.00563	<0.00030
Molybdenum (Mo)-Total	mg/L	-	-	0.00025	<0.00020
Nickel (Ni)-Total	mg/L	-	-	<0.0020	<0.0020
Phosphorus (P)-Total	mg/L	-	-	<0.20	<0.20
Potassium (K)-Total	mg/L	-	-	2.36	0.868
Rubidium (Rb)-Total	mg/L	-	-	0.00150	0.00205
Selenium (Se)-Total	mg/L	-	0.01	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	3.56	0.364
Silver (Ag)-Total	mg/L	-	-	<0.00010	<0.00010
Sodium (Na)-Total	mg/L	200	-	15.5	10.7
Strontium (Sr)-Total	mg/L	-	-	0.156	0.00472
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	-	-	0.00027	<0.00020

Federal Guidelines for Canadian Drinking Water Quality (JUN, 2008)
 #1: GCDWQ - Aesthetic Objective
 #2: GCDWQ - Maximum and Interim Maximum Acceptable Concentrations

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.



ANALYTICAL REPORT

L1081204 CONTD....
 PAGE 4 of 6
 10-NOV-11 12:19 (MT)

Total Metals (WATER)

Analyte	Unit	ALS ID		L1081204-1 02-NOV-11 11:30 Sample ID	L1081204-2 02-NOV-11 11:30 Sample ID
		Guide Limit #1	Guide Limit #2		
				GRAND RAPIDS 1 - RAW	GRAND RAPIDS 2 - TREATED
Tungsten (W)-Total	mg/L	-	-	<0.0010	<0.0010
Uranium (U)-Total	mg/L	-	0.02	<0.00010	<0.00010
Vanadium (V)-Total	mg/L	-	-	<0.00020	<0.00020
Zinc (Zn)-Total	mg/L	5	-	<0.0050	<0.0050
Zirconium (Zr)-Total	mg/L	-	-	<0.00040	<0.00040

Federal Guidelines for Canadian Drinking Water Quality (JUN, 2008)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum and Interim Maximum Acceptable Concentrations

Volatile Organic Compounds (WATER)

Analyte	Unit	ALS ID		L1081204-1 02-NOV-11 11:30 Sample ID
		Guide Limit #1	Guide Limit #2	
				GRAND RAPIDS 1 - RAW
Benzene	ug/L	-	5	<0.50
1,1-Dichloroethylene	ug/L	-	14	<0.50
Dichloromethane	ug/L	-	50	1.58
Ethyl Benzene	ug/L	2.4	-	<0.50
MTBE	ug/L	-	15	<0.50
Tetrachloroethylene	ug/L	-	30	<0.50
Toluene	ug/L	24	-	<0.50
1,1,1-Trichloroethane	ug/L	-	-	<0.50
1,1,2-Trichloroethane	ug/L	-	-	<0.50
Trichloroethylene	ug/L	-	5	<0.50
o-Xylene	ug/L	-	-	<0.50
m+p-Xylenes	ug/L	-	-	<1.0
Xylenes (Total)	ug/L	300	-	<1.5

Federal Guidelines for Canadian Drinking Water Quality (JUN, 2008)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum and Interim Maximum Acceptable Concentrations

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.

Appendix G

Membrane Concentrate Quality



Environmental Operations
ATTN: DEE GENAILLE
1129 Queens Avenue
Brandon MB R7A 1L9

Date Received: 23-APR-13
Report Date: 26-APR-13 12:53 (MT)
Version: FINAL

Client Phone: 204-726-6032

Certificate of Analysis

Lab Work Order #: L1292380
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

A handwritten signature in black ink that reads 'Craig Riddell'.

Craig Riddell
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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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1292380-1 MTU CONCENTRATE							
Sampled By: CLIENT on 22-APR-13 @ 14:00							
Matrix: Water							
MB Conservation test 72D							
Alkalinity							
Alkalinity, Total (as CaCO3)	1270		20	mg/L		23-APR-13	R2586088
Bicarbonate (HCO3)	1550		24	mg/L		23-APR-13	R2586088
Carbonate (CO3)	<12		12	mg/L		23-APR-13	R2586088
Hydroxide (OH)	<6.8		6.8	mg/L		23-APR-13	R2586088
Ammonia by colour							
Ammonia, Total (as N)	0.095		0.010	mg/L		23-APR-13	R2586269
Carbons							
Total Carbon	308		1.0	mg/L		25-APR-13	R2589117
Total Inorganic Carbon	304		1.0	mg/L		25-APR-13	R2589117
Total Organic Carbon	3.3		1.0	mg/L		25-APR-13	R2589117
Chloride by Ion Chromatography							
Chloride	77.6		2.5	mg/L		23-APR-13	R2586489
Colour, True							
Colour, True	<5.0		5.0	CU		23-APR-13	R2586171
Conductivity							
Conductivity	2230		20	umhos/cm		23-APR-13	R2586088
Fluoride by Ion Chromatography							
Fluoride	2.85		0.50	mg/L		23-APR-13	R2586489
Hardness Calculated							
Hardness (as CaCO3)	1420		0.30	mg/L		25-APR-13	
Ion Balance Calculation							
Cation - Anion Balance	2.9			%		25-APR-13	
Anion Sum	30.1			me/L		25-APR-13	
Cation Sum	32.0			me/L		25-APR-13	
Langelier Index 4C							
Langelier Index (4 C)	1.8					25-APR-13	
Langelier Index 60C							
Langelier Index (60 C)	2.6					25-APR-13	
Nitrate as N by Ion Chromatography							
Nitrate-N	<0.25	DLM	0.25	mg/L		23-APR-13	R2586489
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.35		0.35	mg/L		24-APR-13	
Nitrite as N by Ion Chromatography							
Nitrite-N	<0.25	DLM	0.25	mg/L		23-APR-13	R2586489
Sulfate by Ion Chromatography							
Sulfate	115		2.5	mg/L		23-APR-13	R2586489
Total Dissolved Solids							
Total Dissolved Solids	1540		5.0	mg/L		24-APR-13	R2588030
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	0.22		0.20	mg/L	23-APR-13	24-APR-13	R2586850
Total Metals by ICP-MS							
Aluminum (Al)-Total	<0.0050		0.0050	mg/L	24-APR-13	24-APR-13	R2587688
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Arsenic (As)-Total	0.00051		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Barium (Ba)-Total	0.422		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Boron (B)-Total	0.075		0.010	mg/L	24-APR-13	24-APR-13	R2587688
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	24-APR-13	24-APR-13	R2587688
Calcium (Ca)-Total	286	DLA	10	mg/L	24-APR-13	24-APR-13	R2587688

* 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
L1292380-1 MTU CONCENTRATE							
Sampled By: CLIENT on 22-APR-13 @ 14:00							
Matrix: Water							
Total Metals by ICP-MS							
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	24-APR-13	24-APR-13	R2587688
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	24-APR-13	24-APR-13	R2587688
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Copper (Cu)-Total	0.00077		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Iron (Fe)-Total	0.63		0.10	mg/L	24-APR-13	24-APR-13	R2587688
Lead (Pb)-Total	<0.000090		0.000090	mg/L	24-APR-13	24-APR-13	R2587688
Lithium (Li)-Total	0.0384		0.0020	mg/L	24-APR-13	24-APR-13	R2587688
Magnesium (Mg)-Total	171	DLA	1.0	mg/L	24-APR-13	24-APR-13	R2587688
Manganese (Mn)-Total	0.0287		0.00030	mg/L	24-APR-13	24-APR-13	R2587688
Molybdenum (Mo)-Total	0.00160		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Nickel (Ni)-Total	0.0038		0.0020	mg/L	24-APR-13	24-APR-13	R2587688
Phosphorus (P)-Total	<0.20		0.20	mg/L	24-APR-13	24-APR-13	R2587688
Potassium (K)-Total	10.0		0.020	mg/L	24-APR-13	24-APR-13	R2587688
Rubidium (Rb)-Total	0.00910		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Selenium (Se)-Total	<0.0010		0.0010	mg/L	24-APR-13	24-APR-13	R2587688
Silicon (Si)-Total	14.7		0.050	mg/L	24-APR-13	24-APR-13	R2587688
Silver (Ag)-Total	<0.00010		0.00010	mg/L	24-APR-13	24-APR-13	R2587688
Sodium (Na)-Total	77.0	DLA	3.0	mg/L	24-APR-13	24-APR-13	R2587688
Strontium (Sr)-Total	0.811	DLA	0.010	mg/L	24-APR-13	24-APR-13	R2587688
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	24-APR-13	24-APR-13	R2587688
Thorium (Th)-Total	<0.00010		0.00010	mg/L	24-APR-13	24-APR-13	R2587688
Tin (Sn)-Total	<0.00020		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Titanium (Ti)-Total	0.00252		0.00050	mg/L	24-APR-13	24-APR-13	R2587688
Tungsten (W)-Total	<0.0010		0.0010	mg/L	24-APR-13	24-APR-13	R2587688
Uranium (U)-Total	0.00039		0.00010	mg/L	24-APR-13	24-APR-13	R2587688
Vanadium (V)-Total	<0.00020		0.00020	mg/L	24-APR-13	24-APR-13	R2587688
Zinc (Zn)-Total	<0.00050		0.00050	mg/L	24-APR-13	24-APR-13	R2587688
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	24-APR-13	24-APR-13	R2587688
Transmittance, UV (254 nm)							
Transmittance, UV (254 nm)	79.6		1.0	% T	24-APR-13	24-APR-13	R2586612
Turbidity							
Turbidity	2.08		0.10	NTU		23-APR-13	R2585549
pH							
pH	8.13		0.10	pH units		23-APR-13	R2586088

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