Manitoba Environment Act Proposal RM of Rosedale Rural Water Pipeline

July 2016

Dee Genaille, M. Sc., P. Eng.
The Manitoba Water Services Board

Environment Act Proposal Form

Manitoba
Conservation and Water Stewardship

Name of the development:
RM of Rosedale Rural Water Pipeline

Type of development per Classes of Development Regulation (Manitoba Regulation 164/88):
Class 2 - Transportation and Transmission

Legal name of the applicant:
Rural Municipality of Rosedale

Mailing address of the applicant: Box 100

Contact Person: Kara Sylvester

City: Neepawa Province: Manitoba Postal Code: R0J 1H0

Phone Number: 204-476-5414 Fax: 204-476-5431 email: rosedale@mts.net

Location of the development: Rural Municipality of Rosedale

Contact Person: Kara Sylvester

Street Address:

Legal Description: Water supply pipelines will be located in the municipal and provincial right-of-ways and in the Community of Eden. The Booster Station will be located in the RM of Rosedale with location to be determined during final design.

City/Town: Neepawa/Eden Province: Manitoba Postal Code: R0J 1H0

Phone Number: 204-476-5414 Fax: 204-476-5431 email: rosedale@mts.net

Name of proponent contact person for purposes of the environmental assessment:
Dee Genaille

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Brandon, MB R7B 4E7

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Webpage address: http://www.gov.mb.ca/ia/mwsb

Date: July 27, 2016

Signature of proponent, or corporate principal of corporate proponent: D. Genaille

Printed name: D. M. Genaille

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

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

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

Class 1 Developments	$1,000
Class 2 Developments	$7,500
Class 3 Developments:	
Transportation and Transmission Lines	$10,000
Water Developments	$60,000
Energy and Mining	$120,000

Submit the complete EAP to:

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

For more information:
Phone: (204) 945-8321
Fax: (204) 945-5229
http://www.gov.mb.ca/conservation/eal

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Executive Summary

The Rural Municipality (RM) of Rosedale requested The Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal (EAP) for a Class 2 Development License under the Manitoba Environment Act for construction of a rural water supply system.

The proposed development is an expansion of the Town of Neepawa Public Water System (PWS) involving the installation of approximately 44 km of pipeline, construction of a booster station north of Neepawa and 38 service connections. Of these 38 connections 1 will supply water to the Community of Eden while 37 will service rural residences and a Hutterite Colony within the RM. A preliminary pipeline route is included in Appendix A.

The RM of Rosedale is situated in the Westman Region of the province of Manitoba approximately 75 km northeast of the City of Brandon. The Community of Eden is located in the RM 18.5 km directly north of the Town of Neepawa along PTH 5. The Eden PWS receives its supply from a groundwater source and currently exceeds acceptable levels of arsenic within the Guidelines for Canadian Drinking Water Quality (GCDWQ) as well as having high ammonia levels that interfere with primary disinfection. In response to a letter sent by the Office of Drinking Water (ODW) in 2013 that required a Compliance Plan be submitted, the RM investigated options to address Eden's water quality issues. It was determined that the most feasible option was to connect to the Neepawa system.

The Town of Neepawa receives water from two well sites located south of Neepawa at Oberon and Hummerston. The combined well capacity of these two sites is 92 L/s. The water treatment plant has of a membrane system with bypass filtration with a treatment capacity of 75 L/s. The system provides water to the Town of Neepawa distribution system, a truck fill, and rural residences in the RM of Langford. As per the 2014 Annual Audit conducted by the ODW, the Town of Neepawa treatment process reduces all parameters below maximum acceptable concentrations and aesthetic objectives.

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

List of Acronyms

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

1.0 Introduction

The Rural Municipality (RM) of Rosedale requested The Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal (EAP) for a Class 2 Development License under the Manitoba Environment Act for the construction of a booster station and rural water distribution pipeline greater than 10 km in length. This document provides the compiled information required on Sustainable Development's Environment Act Proposal Report Guidelines and Supplementary Guidelines for Municipal Water Supply Systems. This EAP includes components for a rural water distribution pipeline.

1.1 Background Information

The RM of Rosedale is situated in the Westman Region of the province of Manitoba approximately 75 km northeast of the City of Brandon. Within the RM, the Community of Eden is located 18.5 km directly north of the Town of Neepawa along PTH 5. The Eden PWS receives its supply from a groundwater source and currently exceeds acceptable levels of arsenic within the Guidelines for Canadian Drinking Water Quality (GCDWQ) as well as having high ammonia levels that interfere with primary disinfection.

In 2013 the Office of Drinking Water (ODW) issued a letter to the RM of Rosedale stating that an updated Compliance Plan must be submitted that addresses both the arsenic exceedance and the lack of disinfection in the Eden water supply. Three options were considered to provide the Community of Eden with water that meets current regulatory standards. These included developing a new groundwater source, installing a treatment process at the current water treatment plant (WTP) or connecting to Neepawa's water system. Of the three options the most feasible was to connect to the Neepawa water system.

The Town of Neepawa receives water from two well sites located south of Neepawa at Oberon and Hummerston. The combined well capacity of these two sites is 92 L/s. The water treatment plant has of a membrane system with bypass filtration with a treatment capacity of 75 L/s. The system provides water to the Town of Neepawa distribution system, a truck fill, and rural residences in the RM of Langford. As per the 2014 Annual Audit conducted by the ODW, the Town of Neepawa treatment process reduces all parameters below maximum acceptable concentrations and aesthetic objectives.

1.1.1 Previous Studies

The Town of Neepawa retained Genivar Inc. in 2007 to conduct a water supply system assessment study. The assessment examined the water supply from Lake Irwin and the Neepawa WTP operating conditions as well as the proposed new groundwater source at Oberon. The current water demand as well as future demands due to the expansion of surrounding municipalities was also reviewed.

In 2009 W.L. Gibbons & Associates Inc. prepared a report for the Town of Neepawa documenting the installation and testing of production and monitoring wells at Oberon and Hummerston.

In 2104 W.L. Gibbons & Associates Inc. provided a report for the Town of Neepawa documenting the installation and testing of a third production well at Hummerston which would contribute to the overall Town of Neepawa groundwater supply system.

An Engineering Assessment for the Eden Public Water System (PWS) was prepared by the MWSB in 2009. High arsenic concentrations in the treated water and a lack of primary disinfection due to high ammonia levels were identified in the assessment.

In 2014 MWSB conducted a water supply study for the Community of Eden which examined options to deal with high arsenic levels and no disinfection in the treated water. The option identified as the most feasible was the construction of a regional water pipeline from Neepawa to service the Eden water system.

1.1.2 Population

Based on 2011 Census data, the RM of Rosedale has an estimated population of 1627 (Figure 1.1). Although there has been a slight decline in population over the last decade, an allowance for future growth has been considered. Applying an annual population growth rate factor of 0.5% per year over 20 years results in a future total population of 1798 in the RM.

The Community of Eden has an estimated population of 85 people. Assuming an annual population growth of 0.5% per year over 20 years equates to a future population of 94 people serviced by the Eden PWS.

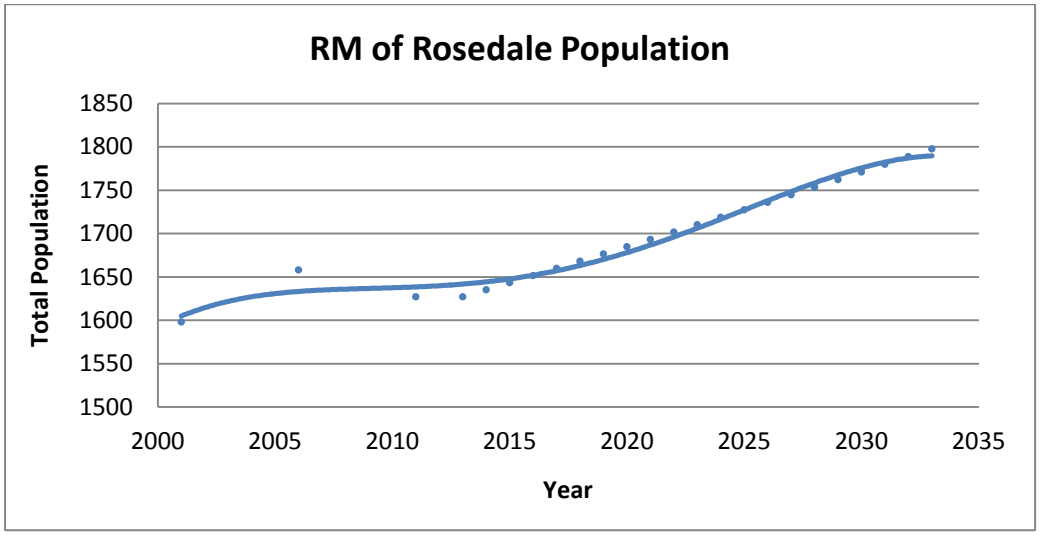

FIGURE 1.1 – RM OF ROSEDALE POPULATION TRENDS

1.1.3 Current and Projected Water Use

When calculating water consumption, the typical daily average water use ranges from 250 to 300 L/person/day and the peak day use is typically 1.5 to 2.0 times greater. Consumptions of 300 L/person/day and a peak day factor of 1.8 were used to determine a peak day water demand of 0.71 L/s for Eden and 0.75 L/s for the rural residences. The Hutterite Colony estimates their average daily demand to be 2.4 L/s. Since they will be utilizing to a reservoir no peak day was calculated as it would not impact the fill rate. The total peak demand for the system will be 3.8 as shown in Table 1.1.

The current average flow rate for the Neepawa WTP is 36 L/s (Town of Neepawa PWS Annual Report 2015, July 11 2016). Assuming a peak factor of 1.6, the maximum flow from the Neepawa WTP is 58 L/s. The combined peak day demand of the Neepawa water system and the proposed expansion is 61.8 L/s, which is below the current 75 L/s operating capacity of the plant.

TABLE 1.1 – RM OF ROSEDALE FUTURE 20-YEAR WATER DEMAND

Parameter	Units	Projected Water Demands
20 Year Population		
RM of Rosedale (rural)		99
Eden		94
Total		193
Consumption Rate	L/c/day	x 300
Average Day	L/day	57,900
Peak Factor		1.8
Peak Day	L/day	104,220
Springhill Colony		
Average Day	L/day	170,343
Peak Day	L/day	170,343
Total Average Day Flow (20 hour Day)	L/day	3.2
Total Peak Day Flow (20 hour day)	L/s	3.8

1.1.4 Raw Water Source

Groundwater drawn from the Assiniboine Delta Aquifer serves as the raw water supply for the Neepawa PWS. The aquifer is a water bearing deposit of sand and gravel covering a 3885 km^2 area. The aquifer is unconfined by any overlying impermeable

layers and is recharged by precipitation. It contains approximately 14,801,760 dam^3 of water.

Two groundwater well fields located within the aquifer supply water approximately 20 km north to the Neepawa WTP. The Oberon well field is located at SW 04-13-15W and consists of two wells with a pumping rate of 45 L/s. The Hummerston well field located at NW 22-13-14W and SW 22-13-14W consists of three wells with a pumping rate of 50 L/s.

1.1.5 Water Rights Act

Water Rights Act Licence 2016-027 for the Oberon well field issued to the Town of Neepawa specifies that the rate water is diverted from the sand and gravel aquifer shall not exceed 0.045 m^3/s. The annual allocation of water is 1200 dam^3 (Appendix B).

Water Rights Act Licence 2016-021 for the Hummerston well field issued to the Town of Neepawa specifies that the rate water is diverted from the sand and gravel aquifer shall not exceed 0.030 m^3/s. The annual allocation of water is 617 dam^3 (Appendix B).

It is estimated that the Neepawa WTP currently uses approximately 1125 dam^3/year and pumps at a rate of 0.045 m^3/s on a peak day. The additional 20 year demand required for the pipeline expansion project would increase the annual use to 1269 dam^3/year with a peak daily rate of 0.075 m^3/s. Both the projected annual volume and daily rate are within the total allocations of 1817 dam^3 and 0.075 m^3/s issued in the *Water Rights Act* Licences. No amendment to the current licence for the Neepawa WTP water supply will be required as a result of the additional water demand of the project.

1.1.6 Water Quality

The ODW currently conducts audits of all public water systems which includes sampling and chemistry analysis every three years for secure groundwater sources and once per year for surface water and GUDI supply systems. Table 1.2 outlines raw water quality parameters of concern for the Community of Eden PWS which include arsenic, pH and ammonia. Water quality parameters for the Town of Neepawa PWS are also shown in Table 1.2 including turbidity, hardness and manganese. Complete results of the analyses are attached in Appendix D.

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 matters can serve as a food source for bacteria, viruses and protozoa and can cause serious health problems. Turbidity standards for surface water indicate that

where possible, filtration systems reduce turbidity levels as low as possible, with a target of less than 0.1 NTU at all times. Treated water turbidity levels from individual filters:

1. For **membrane filtration**, 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. If membrane filtration is the sole treatment technology employed, some form of virus inactivation should follow the filtration process.

When disinfectants such as sodium hypochlorite react with organics they form disinfection by-products (DBPs) which may pose health risks. Common compounds formed are THMs and haloacetic acids. THMs are 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 100 µg/L based on a quarterly sample average are met, total organic levels in treated water prior to chlorination would need to be reduced to less than 2.0 mg/L. Water quality data for Neepawa indicates a high concentration of total organic carbon (TOC) at 13.8 mg/L which could impact THM levels. The 2014 annual audit for the Town of Neepawa PWS states that all parameters measured in the treated water met the applicable health-based maximum concentrations and aesthetic objectives set by the GCDWQ.

TABLE 1.2 TOWN OF NEEPAWA AND EDEN WATER QUALITY RESULTS

Parameter	**Unit**	**Eden Water Data**		**Neepawa Water Data**		**GCDWQ**
		Raw	**Treated**	**Raw**	**Treated**	
Hardness (Total) as CaCO3	mg/L	53.8	53.3	**255**	105	≤ 200/500 [a]
Iron	mg/L	0.11	0.12	<0.10	<0.10	≤ 0.3
Manganese	mg/L	**0.0550**	**0.0542**	**0.453**	0.0277	≤ 0.05
Arsenic	mg/L	**0.0334**	**0.0341**	0.00508	0.00144	0.01
Ammonia	mg/L	**1.53**	**1.49**	0.089	<0.010	
Total Dissolved Solids (TDS)	mg/L	**1030**	**1080**	314	174	≤ 500
Total Organic Carbon (TOC)	mg/L	<1.0	<1.0	13.8	11.5	
True Colour	CU	6.2	6.3	<5.0	<5.0	≤ 15
Turbidity	NTU	**0.40**	**0.93**	**0.53**	**0.12**	≤ 0.3 / 0.1[c]
pH		8.45	8.48	7.52	8.28	6.5 – 8.5

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

[b] THM based on average of quarterly samples

[c] Turbidity limits as follows: 1.0 NTU for slow sand or diatomaceous earth filtration, 0.3 NTU for chemically assisted filtration, and 0.1 NTU for membrane filtration

1.1.7 Compliance Plan

In February 2012 the Town of Neepawa submitted a Statement of Compliance to the ODW in lieu of a Compliance Plan. The purpose of the document was to verify that the Neepawa water system was meeting the applicable water quality standards at that time and will continue to meet the standards as per their Operating Licence. The ODW approved the Statement of Compliance on August 2012. As per the 2014 Annual Audit the Town of Neepawa treatment system reduces all parameters below maximum acceptable concentrations and aesthetic objectives.

2.0 Description of Proposed Development

2.1 Project Description

The proposed development involves the extension of the Neepawa water system to service the RM of Rosedale. The installation of approximately 44 km of pressure pipeline will deliver water to the Community of Eden, 36 rural residences and the Springhill Hutterite Colony within the RM. A booster station will be constructed north of Neepawa with the exact location being determined during the final design.

The Neepawa WTP shown in Figure 2.1 will supply water to the rural pipeline expansion. The new rural water pipeline will be installed in provincial and municipal road right-of-ways as well as private easements if required. The preliminary pipeline route is included in Appendix A.

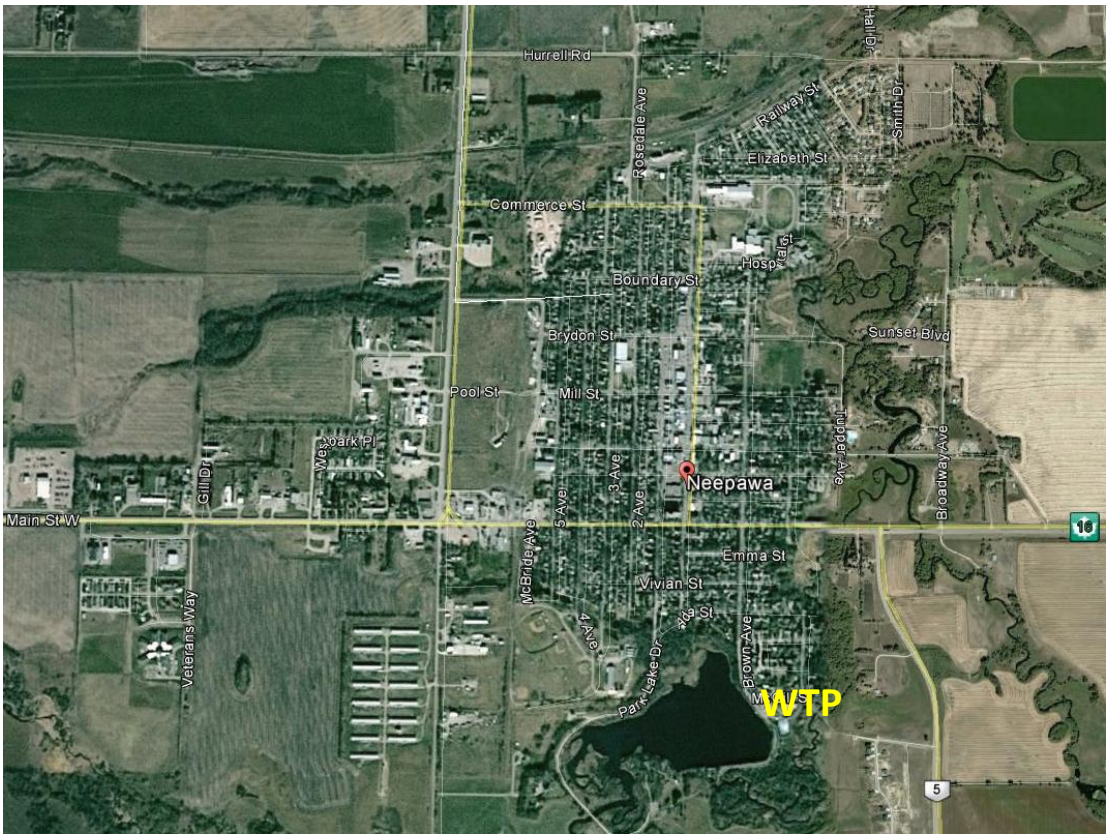

FIGURE 2.1 - LOCATION OF TOWN OF NEEPAWA WTP

2.1.1 Operation and Maintenance

The RM of Rosedale will be responsible for the operation and maintenance of the system distribution lines. An operator is required to periodically inspect flushouts, air releases, water meters, booster station, etc. to ensure system performance is maintained. In addition, an operator will submit bi-weekly water samples for bacteriological testing in accordance with the Manitoba *Drinking Water Quality*

Standards Regulation. An operator will also be required to read water meters on a quarterly basis and respond to maintenance issues related to the system.

2.2 Certificate of Title

It is proposed that the location of the rural water pipeline will be within municipal and provincial road right of ways. If necessary, private easements will be obtained to accommodate the pipeline installation.

2.3 Existing and Adjacent Land Use

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

2.4 Land Use Designation and Zoning

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

2.5 Project Schedule

The project is scheduled to commence in the 2017 construction season depending on funding and the receipt of all approvals.

2.6 Project Funding

The RM of Rosedale may seek cost sharing with the MWSB for the appropriate portion of the project subject to all approvals and availability of funding. Federal Funding may also be available for this project.

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 Sustainable Development
Manitoba Infrastructure and Transportation
Office of Drinking Water

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

2.8 Public Consultation

A public consultation will be held in the near future to discuss the proposed rural water distribution system with the citizens of the RM of Rosedale. It is not expected that there will be major concerns forwarded to the Municipality regarding the proposed expansion.

2.9 Storage of Petroleum Products and Other Chemicals

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

3.0 Physical Environment

3.1 Physiographic Setting and Climate

The RM of Rosedale is situated in the Westman Region of the province of Manitoba approximately 75 km northeast of the City of Brandon and covers an area of 865 km^2. Within the RM, the Community of Eden is located 18.5 km directly north of the Town of Neepawa along PTH 5.

The topography of the area decreases from an elevation of 675 m above sea level (asl) in the Riding Mountain Upland to 306 m asl on the Dauphin Lake Plain.

Climatic conditions throughout most of the RM are described using data collected from Neepawa. The mean annual temperature for the area is 2.4 degrees Celsius with below zero average daily temperatures from November through March. The mean annual precipitation is approximately 413 mm (Environment Canada).

3.2 Hydrogeology

The RM of Rosedale is located within the Western Canada Sedimentary Basin hydrogeological region of Canada. The bedrock in this region consist of Paleozoic, Mesozoic and Cenozoic rocks so include carbonates, shales, limestone and some sandstones.

The key groundwater source for this project is the Assiniboine Delta Aquifer which is an unconfined sand and gravel aquifer lying below a 3885 km^2 area centered around Carberry, Manitoba. The average thickness of the sand and gravel deposits is approximately 10 m. The estimated annual recharge capacity of the aquifer is 60,378 dam^3. Investigations of this aquifer have identified the transmissivity to be 0.0007 to 0.03 m^2/s.

3.3 Hydrology

The hydrology for the project area shown in Figure 3.1 is located in the Upper Whitemud Watershed zone within the Whitemud Watershed. The Upper Whitemud zone, which includes both Eden and Neepawa, originates on the south edge of Riding Mountain and flows south east towards Gladstone. It covers an area of about 1315 square kilometres and experiences a total elevation drop of approximately 460 m (Whitemud Watershed Conservation District).

The proposed pipeline project will cross several drains, streams and creeks. Of these crossings the largest second and third order waterways include Eden Creek, Law Creek, Millar Creek and Spring Creek which flow into the Whitemud River. The Whitemud River eventually empties into Lake Manitoba.

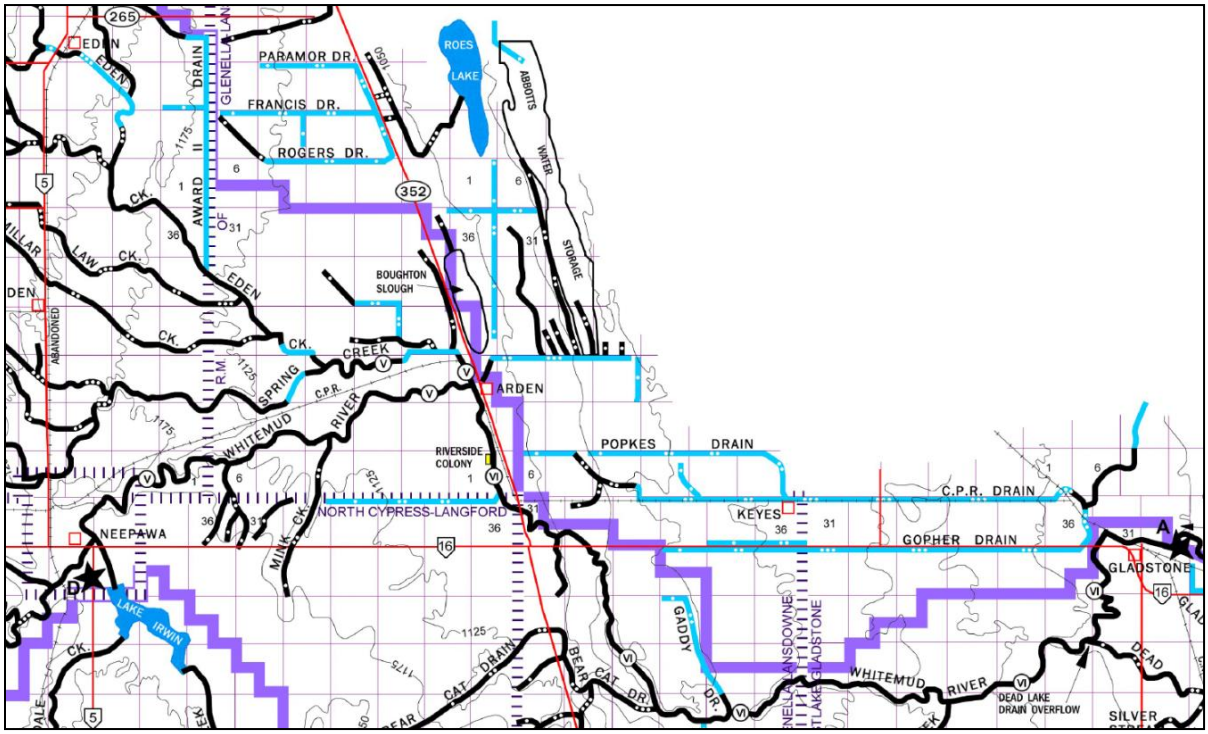

FIGURE 3.1- HYDROLOGY FOR PROJECT AREA IN THE RM OF ROSEDALE

3.4 Fish and Fish Habitat

Potential fish habitat in the project area includes Eden Creek, Law Creek, Spring Creek and Millar Creek which flow into the Whitemud River. Information provided by the Fisheries Science and Fish Culture Section of the Wildlife and Fisheries Branch indicate the following fish species shown in Table 3.1 are found in these water bodies (Janusz, L. and B. Bruederlin, July 18, 2016).

TABLE 3.1 FISH SPECIES FOUND WITHIN PROPOSED PROJECT AREA

Location	Fish Species
Eden Creek	Blacknose Dace, Finescale Dace, Brook Stickleback, White Sucker, Northern Pike
Law Creek	Brook Stickleback, Creek Chub, Fathead Minnow
Spring Creek	Central Mudminnow, Brook Stickleback, Finescale Dace, White Sucker, Fathead Minnow
Millar Creek	No information
Whitemud River	Walleye, Northern Pike, White Sucker, Freshwater Drum and numerous small bodied fish

3.5 Wildlife Habitat and Vegetation

The RM of Rosedale is located within the Lake Manitoba Plain Ecoregion of the Prairies Ecozone (Agriculture and Agri-Food Canada). It experiences a continental climate, subhumid to semiarid with short hot summers and long cold winters and low levels of precipitation. This ecoregion is associated with trembling aspen, balsam poplar, intermittent grasslands and Black Chernozemic soils. Willow and sedge grow in poorly drained areas. Natural grassland vegetation is dominated by spear, wheat and blue grama grass with an abundance of Sagebrush. The length of the growing season, available heat and precipitation permit the production of corn, wheat and other cereal grains (Agriculture and Agri-Food Canada). Characteristic mammals include mule deer, white-tailed deer, elk and coyote along with smaller animals such as badger, white-tailed jack rabbit, Richardson's ground squirrel and northern pocket gopher. Bird species include ferruginous hawk, Swainson's hawk, American avocet and burrowing owl. Other birds include great blue heron, black-billed magpie, northern oriole, veery and brown thrasher (National Ecological Framework Report).

CLI classification for the project area is 4, 5, 6 and 7 which indicates there is a moderate to severe limitation on the production of waterfowl within the RM (Agriculture and Agri-Food Canada). Subclasses indicate that production is restricted due to adverse topography, poor water-holding capacity of the soils and poor interspersion of marshes.

3.6 Socioeconomic

The project area is located within the RM of Rosedale which has an area of approximately 865 km^2 and a population of 1627 (Statistics Canada). There are seven communities within the RM including Eden, Kelwood, Birnie, Riding Mountain, Mountain Road, Polonia and Franklin. The main economic base is agriculture with other industries including machine shops, home-building and furniture manufacturing.

The Community of Eden has a population of approximately 85 people with 35 homes. The J.M. Young School is located in Eden teaching grades 1 – 8 as well as the Rosedale Fire Department and the Eden Community Hall. The Eden Rink and Rosedale Farm Trail provide recreation for the area.

3.7 Heritage Resources

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

4.0 Potential Environmental Effects

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

4.1 Air Quality

During construction, dust, 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

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

4.4 Groundwater Quality

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

4.5 Groundwater Levels

Ground water withdrawal will not exceed the allotment of water for the Neepawa PWS as stated in their Water Rights Licences. Impact to groundwater levels will be minimal as a result of this project.

4.6 Vegetation

Construction will occur primarily within municipal right-of-ways or easements that are previously disturbed, regularly managed and comprised primarily of grasses. During operation, monitoring and maintenance activities will be restricted to designated and previously disturbed areas. Potential effects to vegetation are considered to be negligible.

4.7 Wildlife Habitat and Vegetation

The construction and operation activities associated with this project will be limited to areas already developed for roadways or urban or agricultural 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 existed in the project area at the time the request for information for this EAP was made (Friesen, Chris. July 2016).

4.9 Noise and Vibration

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

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

4.10 Employment/Economy

Socio-economic implications are not expected as a result of environmental impacts as impacts are considered minor and short-term. Economic implications may exist for the Municipality due to the costs of developing the water system. However, the Municipality will gain a sustainable potable water supply to meet future demands. There may be some local economic benefit

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

4.11 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 considered to be minor effects will occur during construction. During operation, there will be a minor increase in vehicular traffic associated with monitoring and maintenance activities. The potential effects are considered minor.

The project will result in the distribution of treated water to meet current water quality standards. The effects of this on human health and well being are considered positive.

4.12 Climate Change

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

5.0 Environmental Management Measures

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

5.1 Air Quality

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

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

5.2 Soils

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

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

5.3 Surface Water

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

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

A 100 m setback to watercourses will be maintained for fuelling activities. Horizontal directional drilling will be implemented at watercourse crossings. Manitoba Water Services Board guidelines for watercourse crossings are found in Appendix C.

Vehicles will avoid entering the riparian zones. Re-establishment of vegetation will occur as soon as possible on areas of disturbed soil.

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

5.4 Groundwater

Mitigation of potential groundwater impacts from petroleum products can be mitigated as described in Section 5.3.

5.5 Vegetation and Wildlife

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

5.6 Fisheries

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

5.7 Noise and Vibration

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

5.8 Water Conservation

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

5.9 Socio-Economic Implications

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

6.0 References

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Burton, D.L., and M.C. Ryan. *Environmental Fate of Nitrate In The Assiniboine Delta Aquifer*. 2000

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< http://www12.statcan.gc.ca/census-recensement/index-eng.cfm>

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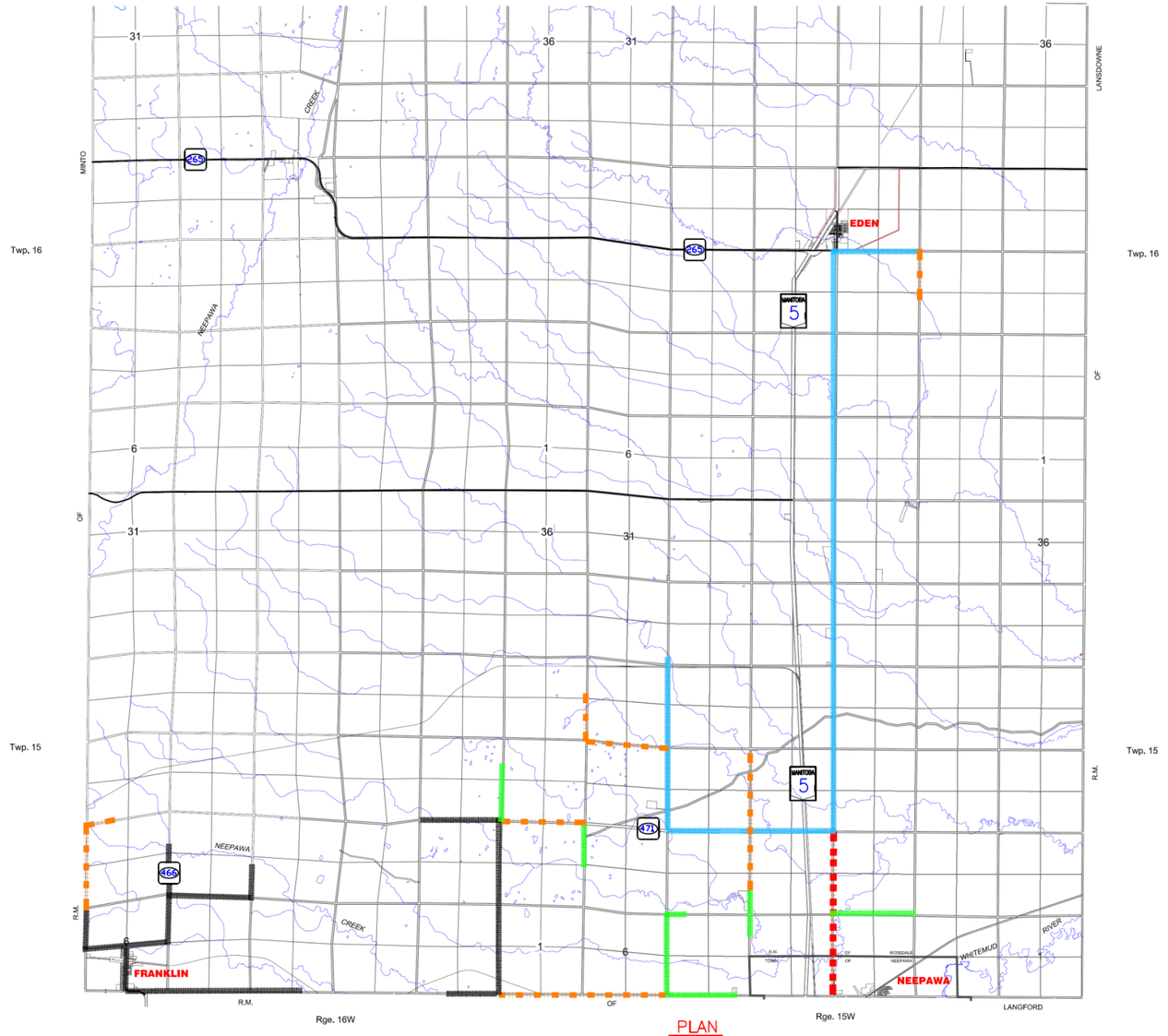
<http://www.whitemudwatershed.ca/39-upper-whitemud>

Appendix A

Preliminary Pipeline Route



PLAN
NTS

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

NO.	DESCRIPTION	BY	DATE

PROVINCE OF MANITOBA
D.M. GENAILLE
REGISTERED PROFESSIONAL ENGINEER

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

PROVINCE OF MANITOBA
THE MANITOBA WATER SERVICES BOARD
MANITOBA MUNICIPAL GOVERNMENT

SUBMITTED	APPROVED
CHIEF ENGINEER DATE	GENERAL MANAGER DATE

R.M. OF ROSEDALE

COST ESTIMATE – 2015

SCALE	DATE	PROJECT NUMBER	REVISION	SHEET
NTS	15-05-22			1 OF 1

Appendix B

Water Rights Licence

MG-14854 (English)

Licence to Use Water for Municipal Purposes

Manitoba
Sustainable Development
200 Saulteaux Cresc.
Winnipeg, Manitoba
R3J 3W3

Project: Oberon

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

Licence No.: **2016-027**
(Previous Lic. No.: 2011-044)
U.T.M.: Zone 14 465895 E
5545820 N

Subject to the terms and conditions contained in this Licence, the Minister of Conservation and Water Stewardship authorizes:

Town of Neepawa

of the **Town of Neepawa** in the Province of Manitoba (the "LICENSEE") to construct, operate, establish and maintain a project consisting of water well(s), pump(s), transmittal pipeline(s) and other works specific to the type of use (the "WORKS") and divert water from a **sand and gravel** aquifer located on the following land:

lying within the municipal road allowance West and South of the Southwest Quarter of Section 4, in Township 13 and Range 15, West of the Principal Meridian of Manitoba

as more particularly located and shown on the attached Exhibit "A" for **municipal** purposes on the following lands:

the Town of Neepawa and the Municipality of North Cypress-Langford

This licence is issued upon the express condition that it shall be subject to the provisions of The Water Rights Act and Regulation 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 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 **0.045 cubic metres per second (1.6 cubic feet per second)** .

   b) The total quantity of water diverted in any one year shall not exceed **1200 cubic decametres (972.85 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 water for **municipal** purposes.
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 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 Manitoba Conservation and Water Stewardship for cancellation on behalf of the Minister.
7. 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.
8. 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 339, Neepawa, MB, R0J 1H0, Canada** and thereafter this Licence shall be determined to be at an end.
9. 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.
10. The term of this Licence shall be **five (5) years** and this Licence shall become effective only on the date of execution hereof by a person so authorized in Manitoba Conservation and 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.
11. 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.
12. The LICENSEE shall keep records of daily and annual water use and shall provide a copy of such records to Manitoba Conservation and Water Stewardship not later than February 1st of the following year.
13. A flow meter must be installed, positioned to accurately measure instantaneous pumping rate and accumulative withdrawals from the water source.

Page 1 of 2

14. The LICENSEE does hereby agree to correct, to the satisfaction of the Minister, any water supply problems to wells or other forms of supply, which were constructed and operating prior to the date of the original application for the project and which are partly or wholly attributable, in the opinion of the Minister, to the diversion of water as authorized by this Licence.

15. The LICENSEE shall hold and maintain all other regulatory approvals that may be required and shall comply with all other regulatory requirements for the construction, operation, or maintenance of the WORKS or to divert or use water as provided by this Licence.

In witness whereof I the undersigned hereby agree to accept the aforesaid Licence on the terms and conditions set forth therein

and hereby set my hand and seal this _____ day of _____ 20___ .

SIGNED, SEALED AND DELIVERED

in the presence of:

X _____ } X _____ (Seal)
Witness Licensee

_____ } _____
Witness (Print name) Licensee (Print name)

FOR OFFICE USE ONLY

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

_____
The Honourable the Minister of Sustainable Development (or her/his designate)

Licence No.2016-027 Page 2 of 2

MG-14854 (English)

Licence to Use Water for Municipal Purposes

Manitoba
Sustainable Development
200 Saulteaux Cresc.
Winnipeg, Manitoba
R3J 3W3

Project: Hummerston

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

Licence No.: **2016-021**
(Previous Lic. No.: 2011-043)
U.T.M.: Zone 14 477333 E
5551563 N

Subject to the terms and conditions contained in this Licence, the Minister of Conservation and Water Stewardship authorizes:

Town of Neepawa

of the **Municipality of North Cypress-Langford** in the Province of Manitoba (the "LICENSEE") to construct, operate, establish and maintain a project consisting of water well(s), pump(s), transmittal pipeline(s) and other works specific to the type of use (the "WORKS") and divert water from a **sand and gravel** aquifer located on the following land:

NW and SW 22-13-14-WPM

as more particularly located and shown on the attached Exhibit "A" for **municipal** purposes on the following lands:

Town of Neepawa and the Municipality of North Cypress-Langford

This licence is issued upon the express condition that it shall be subject to the provisions of The Water Rights Act and Regulation 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 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 **0.030 cubic metres per second (1.1 cubic feet per second)** .

   b) The total quantity of water diverted in any one year shall not exceed **617 cubic decametres (500.21 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 water for **municipal** purposes.
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 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 Manitoba Conservation and Water Stewardship for cancellation on behalf of the Minister.
7. 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.
8. 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 339, Neepawa, MB, R0J 1H0, Canada** and thereafter this Licence shall be determined to be at an end.
9. 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.
10. The term of this Licence shall be **ten (10) years** and this Licence shall become effective only on the date of execution hereof by a person so authorized in Manitoba Conservation and 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.
11. 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.
12. The LICENSEE shall keep records of daily and annual water use and shall provide a copy of such records to Manitoba Conservation and Water Stewardship not later than February 1st of the following year.
13. A flow meter must be installed, positioned to accurately measure instantaneous pumping rate and accumulative withdrawals from the water source.

Page 1 of 2

14. The LICENSEE does hereby agree to correct, to the satisfaction of the Minister, any water supply problems to wells or other forms of supply, which were constructed and operating prior to the date of the original application for the project and which are partly or wholly attributable, in the opinion of the Minister, to the diversion of water as authorized by this Licence.

15. The LICENSEE shall hold and maintain all other regulatory approvals that may be required and shall comply with all other regulatory requirements for the construction, operation, or maintenance of the WORKS or to divert or use water as provided by this Licence.

In witness whereof I the undersigned hereby agree to accept the aforesaid Licence on the terms and conditions set forth therein

and hereby set my hand and seal this _____ day of _____ 20___ .

SIGNED, SEALED AND DELIVERED

in the presence of:

X _____ } X _____ (Seal)
Witness Licensee

_____ } _____
Witness (Print name) Licensee (Print name)

FOR OFFICE USE ONLY

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

_____
The Honourable the Minister of Sustainable Development (or her/his designate)

Licence No.2016-021 Page 2 of 2

Appendix C

MWSB Guidelines for Watercourse Crossings

WATERCOURSE CROSSINGS

Mitigation Measure

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

Reclamation

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

Pressure Loss/Fluid Loss Response

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

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

Loss of Fluid and Frac-out Response Plan

1. If an abnormal loss of fluid, drop in pressure or visible plume is observed indicating a frac-out or possible frac-out, drilling is to stop immediately.
2. The contractor will notify the MWSB/PFRA construction field supervisor of the frac-out condition or potential condition and decide on the appropriate action as follows:
   a) Assign a person to visually monitor for the presence of muddy plume.
   b) Make adjustments to the mud mixture; add lost circulation material (LCM) to the drilling fluid in an attempt to prevent further loss of fluid to the ground formation and/or watercourse.

c) Where conditions warrant and permit (i.e., shallow depth, clear water, low water velocity, potentially sensitive habitat) and where a frac-out has been visually detected, attempt to isolate the fluid release using a large diameter short piece of culvert.

d) Under circumstances where a frac-out has occurred, and where conditions do not permit containment and the prevention of drilling fluids release to the watercourse, attempts to plug the fracture by pumping LCM are not to continue for more than 10 minutes of pumping time.

e) If the frac-out is not contained within this time, MWSB/PFRA construction supervisor will halt any further attempts until a course of action (either abandon directional drilling or further consultation with MWSB engineers) is decided upon.

Appendix D

Water Quality Results

Town of Neepawa - Water Plant
ATTN: HOWARD BUFFI
Neepawa - PWS
Box 339
Neepawa MB R0J 1H0

Date Received: 14-MAY-14
Report Date: 27-MAY-14 14:31 (MT)
Version: FINAL

Client Phone: 204-841-1350

Certificate of Analysis

Lab Work Order #: L1455342
Project P.O. #: NOT SUBMITTED
Job Reference: NEEPAWA - PWS 149.00
C of C Numbers:
Legal Site Desc: 16802

Chantal Bouchard
Account Manager

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS Environmental

ANALYTICAL REPORT

Physical Tests (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1455342-1 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 1 - RAW	ALS ID: L1455342-2 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 2 - TREATED
Colour, True	CU	15	-	<5.0	<5.0
Conductivity	umhos/cm	-	-	543	307
Hardness (as CaCO3)	mg/L	-	-	255	105
Langelier Index (4 C)	No Unit	-	-	0.090	0.26
Langelier Index (60 C)	No Unit	-	-	0.86	1.0
pH	pH units	6.5-8.5	-	7.52	8.28
Total Dissolved Solids	mg/L	500	-	314	174
Transmittance, UV (254 nm)	% T	-	-	94.5	98.2
Turbidity	NTU	-	-	0.53	0.12

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	Guide Limit #1	Guide Limit #2	ALS ID: L1455342-1 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 1 - RAW	ALS ID: L1455342-2 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 2 - TREATED
Alkalinity, Total (as CaCO3)	mg/L	-	-	263	147
Ammonia, Total (as N)	mg/L	-	-	0.089	<0.010
Bicarbonate (HCO3)	mg/L	-	-	321	180
Bromide (Br)	mg/L	-	-	<0.10	<0.10
Carbonate (CO3)	mg/L	-	-	<12	<12
Chloride	mg/L	250	-	2.53	2.28
Fluoride	mg/L	-	1.5	0.16	0.69
Hydroxide (OH)	mg/L	-	-	<6.8	<6.8
Nitrate-N	mg/L	-	10	0.160	0.0635
Nitrite-N	mg/L	-	1	0.0015	<0.0010
Sulfate	mg/L	500	-	23.0	6.91

Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)
#1: GCDWQ - Aesthetic Objective
#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Organic / Inorganic Carbon (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1455342-1 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 1 - RAW	ALS ID: L1455342-2 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 2 - TREATED
Carbon,Dissolved Inorganic	mg/L	-	-	36.8	38.7
Dissolved Organic Carbon	mg/L	-	-	11.4	11.4
Total Carbon	mg/L	-	-	51.0	50.2
Total Inorganic Carbon	mg/L	-	-	37.2	38.8
Total Organic Carbon	mg/L	-	-	13.8	11.5

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.

ALS Environmental

ANALYTICAL REPORT

Total Metals (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1455342-1 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 1 - RAW	ALS ID: L1455342-2 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 2 - TREATED
Aluminum (Al)-Total	mg/L	0.1	-	<0.0050	<0.0050
Antimony (Sb)-Total	mg/L	-	0.006	<0.00020	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	0.00508	0.00144
Barium (Ba)-Total	mg/L	-	1	0.248	0.105
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	5	0.049	0.045
Cadmium (Cd)-Total	mg/L	-	0.005	<0.000010	<0.000010
Calcium (Ca)-Total	mg/L	-	-	67.8	27.3
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	-	0.00042	0.00610
Iron (Fe)-Total	mg/L	0.3	-	<0.10	<0.10
Lead (Pb)-Total	mg/L	-	0.01	<0.000090	<0.000090
Lithium (Li)-Total	mg/L	-	-	0.0191	0.0110
Magnesium (Mg)-Total	mg/L	-	-	20.9	9.08
Manganese (Mn)-Total	mg/L	0.05	-	0.453	0.0277
Molybdenum (Mo)-Total	mg/L	-	-	0.00285	0.00093
Nickel (Ni)-Total	mg/L	-	-	<0.0020	<0.0020
Phosphorus (P)-Total	mg/L	-	-	<0.10	0.92
Potassium (K)-Total	mg/L	-	-	2.87	1.71
Rubidium (Rb)-Total	mg/L	-	-	0.00125	0.00071
Selenium (Se)-Total	mg/L	-	0.01	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	11.3	6.15
Silver (Ag)-Total	mg/L	-	-	<0.00010	<0.00010
Sodium (Na)-Total	mg/L	200	-	6.62	20.5
Strontium (Sr)-Total	mg/L	-	-	0.265	0.103
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	-	-	<0.00050	<0.00050

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.

ALS Environmental

ANALYTICAL REPORT

Total Metals (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1455342-1 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 1 - RAW	ALS ID: L1455342-2 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 2 - TREATED
Tungsten (W)-Total	mg/L	-	-	<0.00010	<0.00010
Uranium (U)-Total	mg/L	-	0.02	0.00291	0.00094
Vanadium (V)-Total	mg/L	-	-	<0.00020	<0.00020
Zinc (Zn)-Total	mg/L	5	-	0.0024	<0.0020
Zirconium (Zr)-Total	mg/L	-	-	<0.00040	<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	Guide Limit #1	Guide Limit #2	ALS ID: L1455342-1 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 1 - RAW	ALS ID: L1455342-2 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 2 - TREATED
Total Dissolved Carbon	mg/L	-	-	48.1	50.0

Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)
#1: GCDWQ - Aesthetic Objective
#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Volatile Organic Compounds (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1455342-1 Sampled Date: 13-MAY-14 Sampled Time: 14:30 Sample ID: NEEPAWA 1 - RAW
Benzene	mg/L	-	0.005	<0.00050
1,1-dichloroethene	mg/L	-	0.014	<0.00050
Dichloromethane	mg/L	-	0.05	<0.00050
Ethylbenzene	mg/L	0.0016	0.14	<0.00050
MTBE	mg/L	0.015	-	<0.00050
Tetrachloroethene	mg/L	-	0.03	<0.00050
Toluene	mg/L	0.024	0.06	<0.00050
Trichloroethene	mg/L	-	0.005	<0.00050
o-Xylene	mg/L	-	-	<0.00050
M+P-Xylenes	mg/L	-	-	<0.00050
Xylenes (Total)	mg/L	0.02	0.09	<0.0015
Surrogate: 4-Bromofluorobenzene (SS)	%	-	-	97.1
Surrogate: 1,4-Difluorobenzene (SS)	%	-	-	100.8

Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)
#1: GCDWQ - Aesthetic Objective
#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

Office of Drinking Water
ATTN: DANICA WOTTON
1129 Queens Avenue
Brandon MB R7A 1I9

Date Received: 13-DEC-12
Report Date: 28-DEC-12 15:09 (MT)
Version: FINAL

Client Phone: 204-726-7005

Certificate of Analysis

Lab Work Order #: L1248980
Project P.O. #: 16635
Job Reference: EDEN - PWS 60.00
C of C Numbers:
Legal Site Desc:

Gail Hill
Account Manager

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS Environmental

ANALYTICAL REPORT

Physical Tests (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1248980-1 Sampled Date: 12-DEC-12 Sampled Time: 11:15 Sample ID: EDEN 1 - RAW	ALS ID: L1248980-2 Sampled Date: 12-DEC-12 Sampled Time: 11:00 Sample ID: EDEN 2 - TREATED
Colour, True	CU	15	-	6.2	6.3
Conductivity	umhos/cm	-	-	1740	1750
Hardness (as CaCO3)	mg/L	-	-	53.8	53.3
Langelier Index (4 C)	No Unit	-	-	0.44	0.47
Langelier Index (60 C)	No Unit	-	-	1.2	1.2
pH	pH units	6.5-8.5	-	8.45	8.48
Total Dissolved Solids	mg/L	500	-	1030	1080
Transmittance, UV (254 nm)	% T	-	-	84.7	84.1
Turbidity	NTU	-	-	0.40	0.93

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	Guide Limit #1	Guide Limit #2	ALS ID: L1248980-1 Sampled Date: 12-DEC-12 Sampled Time: 11:15 Sample ID: EDEN 1 - RAW	ALS ID: L1248980-2 Sampled Date: 12-DEC-12 Sampled Time: 11:00 Sample ID: EDEN 2 - TREATED
Alkalinity, Total (as CaCO3)	mg/L	-	-	439	439
Ammonia, Total (as N)	mg/L	-	-	1.53 DLA	1.49 DLA
Bicarbonate (HCO3)	mg/L	-	-	519	518
Bromide (Br)	mg/L	-	-	<0.50 DLM	<0.50 DLM
Carbonate (CO3)	mg/L	-	-	<12	<12
Chloride	mg/L	250	-	227	230
Fluoride	mg/L	-	1.5	0.64	0.66
Hydroxide (OH)	mg/L	-	-	<6.8	<6.8
Iodide (I)	mg/L	-	-	<2.0	<2.0
Nitrate and Nitrite as N	mg/L	-	10	<0.025	<0.025
Nitrate-N	mg/L	-	10	<0.025 DLM	<0.025 DLM
Nitrite-N	mg/L	-	1	<0.0050 DLM	<0.0050 DLM
Total Kjeldahl Nitrogen	mg/L	-	-	1.54	1.57
Total Nitrogen	mg/L	-	-	1.54	1.57
Sulfate	mg/L	500	-	115	116
Anion Sum	me/L	-	-	17.3	17.4
Cation Sum	me/L	-	-	19.0	19.2
Cation - Anion Balance	%	-	-	4.4	4.8

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

ANALYTICAL REPORT

Organic / Inorganic Carbon (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1248980-1 Sampled Date: 12-DEC-12 Sampled Time: 11:15 Sample ID: EDEN 1 - RAW	ALS ID: L1248980-2 Sampled Date: 12-DEC-12 Sampled Time: 11:00 Sample ID: EDEN 2 - TREATED
Dissolved Organic Carbon	mg/L	-	-	<1.0	<1.0
Total Inorganic Carbon	mg/L	-	-	109	110
Total Organic Carbon	mg/L	-	-	<1.0	<1.0

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 Limit #1	Guide Limit #2	ALS ID: L1248980-1 Sampled Date: 12-DEC-12 Sampled Time: 11:15 Sample ID: EDEN 1 - RAW	ALS ID: L1248980-2 Sampled Date: 12-DEC-12 Sampled Time: 11:00 Sample ID: EDEN 2 - TREATED	ALS ID: L1248980-3 Sampled Date: 12-DEC-12 Sampled Time: 12:10 Sample ID: EDEN 3 - DISTRIBUTION
Escherichia Coli	MPN/100mL	-	0	0	0	0
Total Coliforms	MPN/100mL	-	0	16	0	0

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ALS Environmental

ANALYTICAL REPORT

Total Metals (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID Sampled Date Sampled Time Sample ID L1248980-1 12-DEC-12 11:15 EDEN 1 - RAW	L1248980-2 12-DEC-12 11:00 EDEN 2 - TREATED
Aluminum (Al)-Total	mg/L	0.1	-	<0.0050	<0.0050
Antimony (Sb)-Total	mg/L	-	0.006	<0.00020	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	0.0334	0.0341
Barium (Ba)-Total	mg/L	-	1	0.0274	0.0280
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	5	1.7 DLA	1.8 DLA
Cadmium (Cd)-Total	mg/L	-	0.005	0.000258	0.000263
Calcium (Ca)-Total	mg/L	-	-	13.2	13.1
Cesium (Cs)-Total	mg/L	-	-	<0.00010	<0.00010
Chromium (Cr)-Total	mg/L	-	0.05	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	-	-	<0.00020	<0.00020
Copper (Cu)-Total	mg/L	1	-	<0.00020	0.00553
Iron (Fe)-Total	mg/L	0.3	-	0.11	0.12
Lead (Pb)-Total	mg/L	-	0.01	0.000162	0.000244
Lithium (Li)-Total	mg/L	-	-	0.144	0.144
Magnesium (Mg)-Total	mg/L	-	-	5.05	4.98
Manganese (Mn)-Total	mg/L	0.05	-	0.0550	0.0542
Molybdenum (Mo)-Total	mg/L	-	-	0.0932	0.0960
Nickel (Ni)-Total	mg/L	-	-	<0.0020	<0.0020
Phosphorus (P)-Total	mg/L	-	-	0.24	0.23
Potassium (K)-Total	mg/L	-	-	9.43	9.34
Rubidium (Rb)-Total	mg/L	-	-	0.00474	0.00467
Selenium (Se)-Total	mg/L	-	0.01	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	14.4	14.3
Silver (Ag)-Total	mg/L	-	-	<0.00010	<0.00010
Sodium (Na)-Total	mg/L	200	-	402 DLA	409 DLA
Strontium (Sr)-Total	mg/L	-	-	0.211	0.213
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	-	-	0.00271	0.00253

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ALS Environmental

ANALYTICAL REPORT

Total Metals (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1248980-1 Sampled Date: 12-DEC-12 Sampled Time: 11:15 Sample ID: EDEN 1 - RAW	ALS ID: L1248980-2 Sampled Date: 12-DEC-12 Sampled Time: 11:00 Sample ID: EDEN 2 - TREATED
Tungsten (W)-Total	mg/L	-	-	<0.00010	<0.00010
Uranium (U)-Total	mg/L	-	0.02	0.00211	0.00227
Vanadium (V)-Total	mg/L	-	-	<0.00020	<0.00020
Zinc (Zn)-Total	mg/L	5	-	0.103	<0.0020
Zirconium (Zr)-Total	mg/L	-	-	<0.00040	<0.00040

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

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1248980-1 Sampled Date: 12-DEC-12 Sampled Time: 11:15 Sample ID: EDEN 1 - RAW	ALS ID: L1248980-2 Sampled Date: 12-DEC-12 Sampled Time: 11:00 Sample ID: EDEN 2 - TREATED
Aluminum (Al)-Dissolved	mg/L	0.1	-	<0.0020	<0.0020

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

ANALYTICAL REPORT

Volatile Organic Compounds (WATER)

				ALS ID	L1248980-1
				Sampled Date	12-DEC-12
				Sampled Time	11:15
				Sample ID	**EDEN 1 - RAW**
Analyte	Unit	Guide Limit #1	Guide Limit #2		
Benzene	ug/L	-	5		<0.50
1,1-Dichloroethylene	ug/L	-	14		<0.50
Dichloromethane	ug/L	-	50		<0.50
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
Surrogate: 4-Bromofluorobenzene	%	-	-		105.3
Surrogate: 1,2-Dichloroethane d4	%	-	-		82.8
Surrogate: Toluene-d8	%	-	-		92.0

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