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August 9, 2016

Director
Environmental Approvals Branch
Department of Sustainable Development
Suite 160, 123 Main Street
Winnipeg, MB R3C 1A5

Attention: Tracey Braun, M.Sc.
Director

Dear Ms. Braun:

**Re: Environment Act Proposal: Class 1 Development License:
RM of Yellowhead – Community of Shoal Lake WTP Concentrate Discharge**

On behalf of the RM of Yellowhead, please find enclosed an Environment Act Proposal for a Class 1 Development License. Enclosed is a cheque payable to the Minister of Finance in the amount of \$1,000.00.

Please find enclosed 4 hard copies and 1 electronic copy (CD); each includes a completed application form, EAP report, and drawings.

If you have any questions, please contact the undersigned at (204) 726-6083.


Yours truly,

AUG. 9, 2016

Cory Vitt, M.Eng. P.Eng.
Project Engineer
enc.

Environment Act Proposal Form



Name of the development: RM of Yellowhead, Shoal Lake, WTP Wastewater Discharge	
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): Class 1 Development: Water Treatment Plant (Concentrate Discharge)	
Legal name of the applicant: Rural Municipality of Yellowhead	
Mailing address of the applicant: Box 278, 306 Elm Street, Shoal Lake, MB	
Contact Person: CAO: Nadine Gapka; ngapka@yhgov.net	
City: Shoal Lake	Province: MB Postal Code: R0J 1Z0
Phone Number: 204-759-2565	Fax: 204-759-2740 email:
Location of the development: Town of Shoal Lake	
Contact Person: CAO: Nadine Gapka; ngapka@yhgov.net	
Street Address: various locations within Town	
Legal Description: various locations within Town	
City/Town: Shoal Lake	Province: MB Postal Code: R0J 1Z0
Phone Number: 204-759-2565	Fax: 204-759-2740 email:
Name of proponent contact person for purposes of the environmental assessment: Cory Vitt, M.Eng. P.Eng.	
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Email address: cory.vitt@gov.mb.ca	
Webpage address:	
Date: August 9, 2016	Signature of proponent, or corporate principal of corporate proponent:  Printed name: CORY VITT
	AUG 9, 2016

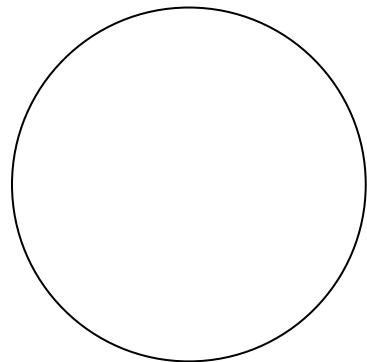
**ENVIRONMENT ACT PROPOSAL
RURAL MUNICIPALITY OF
YELLOWHEAD
SHOAL LAKE WATER TREATMENT PLANT
CONCENTRATE DISCHARGE**

August 2016

Prepared by:



Unit #1A - 2010 Currie Blvd.,
Brandon MB R7B 4E7



EXECUTIVE SUMMARY

The Rural Municipality of Yellowhead (RM) requested the Manitoba Water Services Board (MWSB) to submit an Environment Act Proposal (EAP) for a Class 1 Development License under Manitoba Environment Act for the construction of a new water treatment plant for the Community of Shoal Lake with membrane concentrate discharge to Shoal Lake. The proposed work includes:

1. Increasing raw water well capacity for new water treatment plant in Shoal Lake.
2. Construction of a new membrane water plant.
3. Construction of a membrane concentrate pipeline from the new Shoal Lake WTP to Shoal Lake approximately 1 km due west of the new WTP.

The proposed upgrades will allow the Rural Municipality to provide treated water that meets regulatory requirements. This project is funded under Clean Water and Wastewater Fund (CWWF) and is to be completed by March 31, 2018.

The Rural Municipality of Yellowhead was incorporated January 1, 2015 with the amalgamation of the Municipalities of Shoal Lake and Strathclair. The Rural Municipality of Yellowhead has an operating license to supply potable water to residents in the Community of Shoal Lake (population of 714 from the 2011 census) with future expansion to the surrounding RM (population of 515 from the 2011 census).

Currently the Community of Shoal Lake does not have a full scale water plant. The community operates a public water distribution system with only chlorine disinfection. Chlorine is injected at the well pumphouse and utilizes the distribution system for disinfection contact time. The well pump pressurizes the distribution system and fills an online reservoir/pumphouse located in the north section of the community. Raw water ammonia concentrations are in the range of 2 to 3 mg/l and residents near the pumphouse complain about the high chlorine dosing required to achieve disinfection break point.

This proposal includes the construction of a new 16.7 L/s WTP using existing groundwater wells as a water source. The proposed treatment process will consist of an integrated reverse membrane system and a manganese greensand by-pass filter with concentrate disposal to Shoal Lake. The proposed water plant will increase treatment capacity to 16.7 L/s from current 6.8 L/s peak day chlorine treatment only. The 16.7 L/s raw water flow include 75% product water (12.5 L/s) and 25% concentrate flow (4.2 L/s). These peak day values assume no by-pass through the greensand filter; however, it is anticipated that the by-pass rate could be as high as 10% depending on operating problems encountered with achieving disinfection break point.

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0.0 List of Acronyms

AO	Aesthetic Objective
CIP	Clean-In-Place
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
OS	Operational Statements
PR	Public Road
RM	Rural Municipality
RO	Reverse Osmosis
TDS	Total Dissolved Solids
THM	Trihalomethane
TOC	Total Organic Carbon
UV	Ultraviolet
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

1.0 Introduction and Background

1.1 Introduction

The Rural Municipality of Yellowhead requested the Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal (EAP) for a Class 1 Development License to construct a water treatment plant with concentrate discharge to Shoal Lake. This document was developed in accordance with Department of Sustainable Development "Environment Act Proposal Report Guidelines" and "Supplementary Guidelines for Municipal Water Supply Systems".

1.2 Background Information

The Rural Municipality of Yellowhead was incorporated January 1, 2015 after the amalgamation of the Municipalities of Shoal Lake and Strathclair. The Rural Municipality of Yellowhead is responsible to supply potable water to residents in the Community of Shoal Lake (population of 714 from the 2011 census) and proposed future pipeline to a rural population of 515 people in 2011.

1.2.1 Previous Studies

Previous reports have been reviewed in preparation of this Environment Act Proposal. These include:
MWSB document titled "Hamiota - Shoal Lake Regional Water Supply Feasibility Study", March 2014, written by Nathan Wittmeier.¹

1.2.2 Population

Based on 2011 Census data, the Community of Shoal Lake has a population of 714 people, an increase from 680 in 2006. The future design population for Shoal Lake is calculated to be 900 people assuming the same growth rate experienced since 2006.¹

Based on 2011 Census data, the rural area has a population of 515 people, a decrease from 555 in 2006. Although the population in the rural area has shown negative growth, an assumed growth rate of 1.0% will be used to allow for future population growth which anticipates new development generated by a proposed rural water system. Assuming a 1.0% growth rate and a 75% connection rate, the population of the RM serviced by the rural distribution system in 20 years would be approximately 486.¹

1.2.3 Raw Water Source

Two groundwater production wells provide water to Shoal Lake and are located near an existing pumphouse in the southeast corner of the Community. Well 1 was constructed in 1961, has limited capacity and is used as a backup well. The second well is a 200 mm diameter production well with screen setting at 36.6 m deep. Well 2 was constructed in 1979 and is the primary water source for the Shoal Lake Public Water System (PWS). Well 2 withdraws water from a suspected GUDI sand and gravel aquifer influenced by Shoal Lake. No instances of total coliform (TC) or Escherichia coli (EC) were recorded in raw water bacteria sampling, however TOC in range of 4.0 to 5.0 mg/L is present in the raw water supply. The well is suspected to be under the influence of Shoal Lake due to the proximity to the lake and the overlying soil stratigraphy consisting of porous stony till, sands and gravels. The raw water is of poor quality and contains high levels of ammonia, manganese, sulphate, sodium, and iron. The well has an estimated yield potential of 15.9 L/s and will require extensive treatment due to the high mineral concentration and ammonia levels. The aquifer yield potential will be assessed by a hydrologist prior to the construction of the water treatment plant and required Water Rights documentation will be filed for a new license.¹

1.2.4 Existing Water Treatment Process

Shoal Lake public water system treatment is chlorination only. Chlorine is injected at the well pumphouse and with limited treated water storage onsite the system is unable to comply with the 20 minute contact time regulation under the Water Safety Act. The well pump pressurizes the distribution system and fills an online reservoir/pumphouse in the north portion of the community. DWSA regulations require water from GUDI wells to be disinfected with ultraviolet disinfection to control viruses and parasites (Giardia lamblia cysts & Cryptosporidium oocysts). The existing raw water pumphouse building is in poor condition and requires significant upgrading. The RM of Yellowhead has received Build Canada funding to construct a new water treatment plant in Shoal Lake.¹

1.2.5 Water Storage and Distribution Pumping System

Treated water storage in Shoal Lake consists of a 682 m³ underground concrete reservoir in the north end of the community and a 142 m³ underground concrete reservoir at the well site for a total reservoir capacity of 824 m³. Treated water is pumped from the production well directly into the town distribution system by a 20 HP vertical turbine pump. During times of high flows, water is pumped from the town reservoirs by a 20 HP and 5 HP VFD distribution pumps.¹

1.2.6 Fire Protection

The new water treatment plant will have sufficient reservoir capacity to meet disinfection requirements and fire flows. The 20-year projected population for Shoal Lake requires Class 3 fire protection (population between 800 and 1200) according to the MWSB classes for fire protection. The recommended fire flow for a Class 3 community is 60 L/s sustained flow for a minimum duration of two hours. The required storage volume for the 20 year projected population is 764 m³.¹

The existing 682 m³ reservoir in the north end and proposed reservoir at the water plant will satisfy the 20 year projected demands and fire storage requirements for Shoal Lake.¹

1.2.7 Current and Projected Water Use

A WTP is designed based on peak day demand over a 20 hour operating day with 4 hours allocated for maintenance. Typical average daily water usage ranges from 250 L/person/day to 300 L/person/day with peak day usage typically 1.5 to 2.0 times greater than average day consumption. Water consumption of 300 L/person/day and a peak day factor of 2.0 were used to estimate projected treated water demands which are summarized in Table 1.1.

The Shoal Lake projected water demand includes Shoal Lake, rural residents, and an estimated allowance for livestock. The total projected treated water demand for Shoal Lake is 12.42 L/s. Membrane treatment systems typically have a projected 25% reject rate which will require a raw water pumping rate of 16.2 L/s based on a peak day demand.¹

Table 1.1 - Community of Shoal Lake Projected Treated Water Demands¹

Parameter	Units	Shoal Lake	Shoal Lake	Total
20 Year Population	Pop.	898	486	1,344
Average Demand				
Consumption Rate	L/c/day	x300	x250	
Average Day Residential	L/day	269,400	121,500	390,900
Livestock Consumption	L/day		112,700	112,700
Total Average Day Demand	L/day	269,400	234,200	503,600
Peak Day Demand				
Peak Day Factor		x1.8	x1.5	
Peak Day Residential	L/day	484,920	182,250	667,170
Livestock Consumption	L/day		112,700	112,700
Total Peak Day Demand	L/day	484,920	294,950	779,870
Average Day Flow (20 hour day)	L/s	3.74	3.25	6.99
Peak Day Flow (20 hour day)	L/s	6.74	4.10	10.84

1.2.8 Water Rights Act

A groundwater assessment for the new water plant will be conducted, including a new WRL application based on the results of the investigation. The yield potential of the aquifer is unknown at this time and the assessment will determine if a new supply well will be required to meet projected water demands. Shoal Lake has a valid Water Rights License No. 2009-020 (previous License No. 83-57).

Wells are located on the following described lands:

- East Half of Section 9, in Township 17 and Range 23, west of the Principal Meridian in Manitoba, more particularly described on Certificate of Title Nos. 1649843 and 114383 NLTO.

This license allows a maximum instantaneous withdrawal rate of 16 L/s and a maximum annual usage of 154.18 cubic decameters.

Table 1.2 - Projected Total Water Demand for the Rural Municipality of Yellowhead - Shoal Lake WTP

Demand	Unit
16.7	L/s
526,700,000	L/yr
526,700	cubic meters/yr
526.7	cubic decameters/yr

Based on Table 1.2, the proposed WTP will require a new Water Rights License for the new water treatment plant based on projected water demands.

1.2.9 Water Quality

The Office of Drinking Water (ODW) currently conducts annual audits of all public water systems which includes sampling and chemistry analysis every three years for secure groundwater sources and once per year for surface water and GUDI supply systems. In addition, the operator tests chlorine residuals daily on the treated water.

Raw and treated water quality parameters exceeding the GCDWQ include manganese, sodium, sulfate, and total dissolved solids (TDS). The existing treatment system, which only provides chlorine disinfection, does not reduce the above noted parameters below the Aesthetic Objective (AO) or the Maximum Acceptable Concentration (MAC). To meet current regulations a new water plant with a membrane treatment process will meet Guidelines for Canadian Drinking Water Quality (GCDWQ) and Water Safety Act regulations.

Ammonia does not have an AO or MAC; however, high ammonia values in the raw water supply which is in the range of approximately 3 mg/L, presents challenges for the treatment process. Operators have difficulty of achieving disinfection break point due to varying chlorine demand to ionize ammonia. It is proposed to incorporate a manganese greensand filter as a by-pass to enhance taste and assist with stabilization of membrane treated water. Should ammonia levels with by-pass water affect the disinfection process the by-pass will be discontinued.

Table 1.3 - Water Quality Results

Parameter	Unit	GCDWQ		Sampled: September 27, 2010	Sampled: September 27, 2010	Sampled: June 1, 2016	Sampled: June 1, 2016
		AO/OG	MAC	Shoal Lake 1 Raw	Shoal Lake 2 Treated	Shoal Lake 1 Raw	Shoal Lake 2 Treated
Alkalinity (Total) CaCO ₃	mg/L			617	618	572	569
Ammonia (Total) Nitrogen	mg/L			2.84		2.77	2.39
Arsenic	mg/L		0.01	0.00535	0.00533	0.00342	0.00361
Boron	mg/L			2.22	2.23	2.1	2.1
Calcium	mg/L			65.9	66.6	75.0	74.6
Chloride (Dissolved)	mg/L	250		94.2	99.5	101	107
Colour (True)	CU	15		10.0	5.0	<5.0	<5.0
Conductivity	umhos/cm			2810	2820	2760	2760
Fluoride (Dissolved)	mg/L		1.5	0.34	0.32	0.20	0.21
Hardness (Total) CaCO ₃	mg/L			241	242	271	268
Iron	mg/L	0.3		0.152	0.152	0.160	0.181
Langelier Saturation Index (4 C)	NA			0.46	0.65	0.39	0.50
Langelier Saturation Index (60 C)	NA			1.2	1.4	1.1	1.2
Lead	mg/L		0.01	0.000177	0.000227	<0.000090	0.000258
Magnesium	mg/L			18.5	18.5	20.3	19.9
Manganese	mg/L	0.05		0.706	0.694	0.753	0.738
Nitrate and Nitrite as N	mg/L		10	<0.050	<0.050	<0.025	0.069
Nitrate as N	mg/L		10	~~~	~~~	<0.025	0.040
Nitrite as N	mg/L		1	~~~	~~~	0.0076	0.0292
pH	pH	6.5 to 8.5		7.71	7.91	7.63	7.74
Potassium	mg/L			10.8	10.9	11.5	11.9
Sodium	mg/L	200		594	592	628	614
Sulphate/ Sulfate (Dissolved)	mg/L	500		693	850	757	759
Total Dissolved Solids	mg/L	500		1910	1980	1940	1950
Total Organic Carbon	mg/L			6.1	6.4	4.66	5.07
Turbidity	NTU			0.54	0.31	1.60	0.36
Uranium	mg/L		0.02	0.00051	0.00051	0.00059	0.00060
Zinc	mg/L	5		0.0059	0.0120	0.0021	0.0060

^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.

* Turbidity is a physical property that must be measured on site. It is anticipated that on site testing would demonstrate that the high turbidity recorded is a result of the high iron content oxidizing and precipitating in the raw water during transit.

^{DLA} Detected Limit Adjusted for required dilution.

1.2.10 Compliance Plan

A compliance plan for the existing system is available and is already on record with ODW. The document title with ODW is "CP-12-03-01 Shoal Lake Compliance Plan". The document is dated from February 29, 2012 and was signed by Mayor Don Yanick and CAO Nadine Gapka. This compliance plan was submitted to address the lack of a primary disinfectant, and highlights recommendations from the 2010 Engineering Assessment, and proposed actions from the Town of Shoal Lake including the proposed construction of a new WTP, and preliminary budgets (now out-of-date), and the stated goal of applying/receiving infrastructure funding.

2.0 Description of Proposed Development

2.1 Project Description

The proposed development includes:

1. Installation of one raw water supply well in Shoal Lake.
2. Construction of a water plant at the location of the existing well site building.
3. Construction of a membrane concentrate pipeline from the new Shoal Lake WTP to Shoal Lake approximately 1 km due west of the new WTP.

The existing well site building with chlorine disinfection equipment will be decommissioned when the new water treatment plant is commissioned. All pipelines will be installed in municipal road allowances.

This development requires approval to discharge concentrate from the membrane plant to Shoal Lake.

Refer to the Drawing in the Appendix, which shows the locations of the infrastructure.

2.1.1 Water Source

The raw water source was discussed in previous sections.

2.1.2 Proposed Water Treatment Plant

The proposed Rural Municipality of Yellowhead, Shoal Lake water plant will be classified as a Class 3 Water Treatment Facility. The existing chlorination treatment system will be replaced with a 16.7 L/s raw Reverse Osmosis (RO) membrane unit treatment system. The proposed system will have a manganese greensand filter by-pass in conjunction with the RO unit. The proposed membrane filtration is effective in protecting against viruses and cysts such as *Cryptosporidium* oocysts and *Giardia lamblia* cysts as well as removing sodium, sulfate, TDS, and softening the water to acceptable concentrations. The high ammonia values for Shoal Lake will limit the amount of water that can be run through the greensand filter bypass. The new treatment system will have capacity to meet project 20-year population demands in Shoal Lake and rural residents meeting current regulations.

Membrane concentrate is projected to be in the range of 20 to 30% of the total raw water flow. This rejection rate depends on raw water quality and membranes selected to achieve desired treated water quality.

For Shoal Lake a reject rate of 25% was selected from experience in operating similar Board plants. The proposed raw water pumping rate for an average day is 9.3 L/s with 2.3 L/s as concentrate flow. For peak day demands, raw water pumping rate is estimated to be 16.7 L/s with a concentrate flow of 4.2 L/s.

It is proposed that a pumping system and pipeline system be constructed to Shoal Lake to discharge concentrate water from the membrane water treatment plant.

The detailed design of the proposed WTP will be finalized and submitted to Office of Drinking Water for a construction permit when all approvals are received.

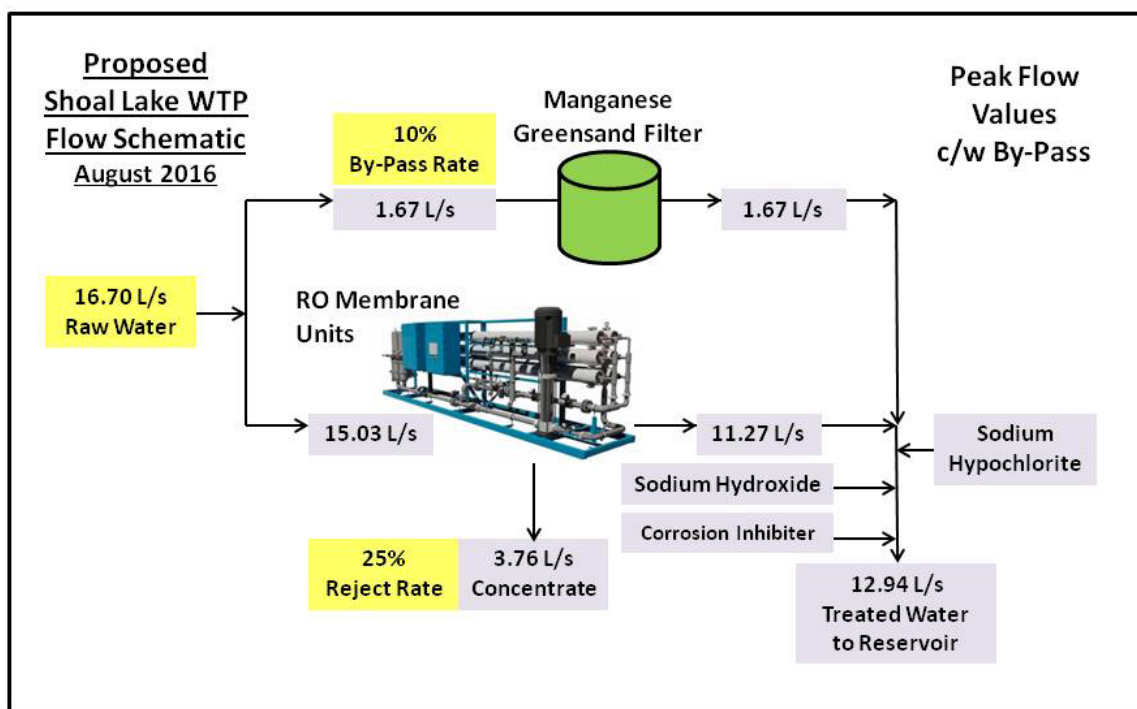


Figure 2.1 - Membrane Flow Analysis

The membrane system will be designed to produce water quality which meets CDWQ guidelines and Water Safety Act. Membrane systems remove a significant portion of the dissolved minerals and permeate produced is corrosive. In order to achieve an aesthetically acceptable level of hardness, it is proposed that approximately 10% percent of the raw water flow will be treated using a manganese filter for blending with membrane permeate. Membrane permeate is generally chemically unstable and filtered by-pass water with addition of caustic soda will balance pH to achieve a chemically stable water within the water distribution system.

2.1.3 Backwash and Concentrate Disposal

Membrane systems typically generate a mineralized concentrate stream. Concentrate streams vary between 10% to 30% of the total flow for membrane systems, depending on the arrangement and type of membranes selected. The proposed membrane system was modeled with 75% recovery rate with 25% concentrate rate of the flow through the membrane unit.

It is proposed that membrane concentrate be discharged to Shoal Lake through a 150 mm diameter pipeline.

Shoal Lake, the lake itself, is approximately 1 km due west of the existing Shoal Lake well site building. The new WTP is proposed to be constructed at the existing well site. It is proposed to install the concentrate pipeline straight east-west along "1st Avenue" from the new WTP to Shoal Lake. For reference purposes, 1st Avenue is located just southeast on the outskirts of the Town of Shoal Lake.

This is the only concentrate water disposal option considered in this EAP. Shoal Lake is the largest water body in the area. Other water bodies in the area are smaller with longer pumping distances being impractical from an operational and cost perspective. Concentrate discharge from membrane plants is highly mineralized (relatively) and tends to form deposits within pipelines; the greater the length of pipeline the greater the probability of pipeline encrustation and clogging.

2.1.4 Operation and Maintenance

The Rural Municipality is responsible for operation and maintenance of the public water system which includes the well site, raw water pipeline, and proposed WTP. Staff will be required to periodically inspect flushouts, air

releases, etc. to ensure the system performance is maintained. In addition, an operator will be required to submit bi-weekly water samples for bacteriological testing in accordance with the Manitoba Drinking Water Quality Standards Regulation. Staff will read water meters on a quarterly basis and respond to maintenance issues related to the system.

The operators will be required to operate the facility in a safe and efficient manner in accordance with relevant operation manuals and DWSA. Operation requirements will include measurements, monitoring, sampling, testing, record-keeping, and reporting. Operators will be required to perform proper maintenance and inspection. The operators will receive training operation and maintenance training for the new water plant during the commissioning phase.

Typical system operating costs include: chemicals, staff salaries, electrical costs, allowance for membrane replacement every 5 years, general repairs, bacteriological testing, staff certification and training, and a reserve fund for future replacement or expansion. Operating and maintenance costs are recovered through the sale of water in the distribution system. All retail water rates are subject to Public Utilities Board approval.

2.2 Certificate of Title

The wells are located on municipal owned land. The proposed new WTP will be on municipal owned land.

It is anticipated that easements may be required to facilitate the construction of the concentrate pipeline. Alternative routes will be investigated to avoid easements and/or land purchase agreements.

2.3 Mineral Rights

All mineral rights associated with lands for the existing and proposed new facilities belong to the Crown.

2.4 Existing and Adjacent Land Use

The proposed land for the development will be on municipal and provincially owned land in highway and roadway Right-of-Ways (ROWs). Within the RM, adjacent land is agriculture. Within the Town, adjacent land is industrial, commercial, and residential. Existing and adjacent land use will not change as a result of this development.

2.5 Land Use Designation and Zoning

Refer to Section 2.4.

2.6 Agricultural and Livestock Water Use

The Public Water System (PWS) for the Rural Municipality of Yellowhead was designed for the Community of Shoal Lake. The assumption was that a portion of the rural residents of the RM will be serviced by the new WTP while the remainder are serviced by individual wells. In addition, the projected treated water demands for the new WTP include a portion for livestock use. Refer to Table 1.1.

2.7 Water Conservation Report

Water conservation measures will include metering and sustainable water rates to cover operating and establish reserves. Water conservation information in water bill mailings can be implemented. Leak detection will consist of comparing the volume of water pumped and charged to ratepayers on a quarterly basis. Since all service connections are metered, abnormalities can be identified and rectified.

2.8 Project Schedule

The development of this water project is anticipated to occur as a one-phase process with strict deadlines. Funding has been approved and construction must be completed by March 31, 2018. Therefore, this project must be designed, engineered, permitted, constructed, and commissioned before the end of March 31, 2018.

2.9 Project Funding

This project has been approved for cost sharing between the Governments of Canada, Manitoba, and the Rural Municipality, subject to all approvals.

2.10 Regulatory Approvals

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

- Department of Sustainable Development - Environmental Approvals
- Department of Sustainable Development - Office of Drinking Water (ODW)
- Department of Manitoba Infrastructure (MI)

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

2.11 Public Consultation

A public consultation will be held in the future to discuss the proposed new WTP project with Shoal Lake residents as part of the borrowing by-law process. It is not expected that there will be major concerns regarding the proposed project which will produce pristine water meeting current regulations.

3.0 Description of Existing Environment in the Project Area

3.1 Physiography

The Rural Municipality of Yellowhead is located in western Manitoba, approximately 30 km south of Riding Mountain National Park (RMNP) and approximately 80 km north of Brandon.

The area slopes southwest from Riding Mountain to the Assiniboine River Valley. The land surface varies from relatively flat upland areas with numerous sloughs and potholes to the steep slopes and incised gullies on the flanks of the Assiniboine River Valley. The ground elevation at the Town of Shoal Lake is on the order of 550m to 550m. The base of the Assiniboine River Valley is at an elevation on the order of 410m. Surface water drainage is towards the Assiniboine River Valley.

3.2 Climate

There are several Government of Canada weather stations located near the Town of Shoal Lake.

In general, the western portion of Manitoba, north of Brandon and south of Riding Mountain National Park (RMNP), has weather patterns which are a mixture between Brandon and Dauphin. The western portion of Manitoba is also influenced by weather patterns blown eastbound from Saskatchewan. Historical average normal temperatures for the month of July are plus 25 degrees Celsius ranging to minus 25 degrees Celsius (without wind-chill) for the month of January. There is approximately 500 mm of precipitation (rain and snow) per year in this region.

3.3 Hydrogeology

According to a soil survey map of the Rossburn area in Manitoba from a Manitoba/ Canada joint venture for the Departments of Agriculture, the soil geography surrounding the Town of Shoal Lake is "Nc" which is Newdale Clay Loam (Calcareous and Salinized associates) which is a blackearth soil developed on moderately calcareous till.

3.4 Hydrology

There are numerous smaller "pothole" lakes surrounding the Town of Shoal Lake. Locally, the largest water body is Shoal Lake, which the name of the Town was derived. In this greater region, the Assiniboine River runs north-south, over 50 km west of Shoal Lake; the Manitoba-Saskatchewan border is over 60 km west.

The relevant water body for this EAP is Shoal Lake. From Google Earth, it is estimated that the surface area of Shoal Lake is approximately 15 quarter-mile sections or 3.75 square miles or 9.7 square kilometers. This does not include the surface area of the greater watershed.

There is no Government of Canada, Environment Canada (EC), hydrometric station located near Shoal Lake.

3.5 Fish and Fish Habitat

From the official website for the Rural Municipality of Yellowhead:

Fishing:²

Shoal Lake:²

Fishermen enjoy the abundant supply of walleye, northern pike and perch which are kept healthy year round thanks to two aeration systems supplied in part by the Lions Club. There have been a number of master angler/trophy fish proudly pulled out of Shoal Lake. Fish, golf, and camp close to downtown. Ice fishing shacks are also a common site on the lake throughout the winter months.²

Thus, Shoal Lake is a managed lake with stocked fish and aeration systems.

3.6 Habitat, Vegetation and Wildlife

Depending on the information source and nomenclature, the terrestrial environment (ecozone) of western Manitoba south of Riding Mountain National Park (RMNP) is called either "Prairies" or "Aspen Parkland". RMNP is part of an area of land called "Boreal Plains" or "Boreal Forest" and occasionally "Western Uplands". We will consider the

Rural Municipality of Yellowhead as "Aspen Parkland".

From the website for the "World Wildlife Federation" (.org), there is abundant information regarding this ecozone "Canadian Aspen Forests and Parklands".³ This source contains information on habitat, vegetation and wildlife. Further details will not be provided here for the sake of brevity.

The entire proposed project will occur within previously developed and disturbed land within the Community of Shoal Lake or just outside the community limits. Thus, it is not expected that there will be any Species-At-Risk (SAR), with regards to flora and fauna.

An information request was made to the Manitoba Conservation Data Centre (CDC), a branch of the Government of Manitoba, regarding any records of Species-At-Risk (SAR). On August 2, 2016, CDC sent an email with the following search results:
"There are no records of species at risk (plant or animal) along the proposed routes."

No biological surveys are planned along the pipeline routes because it was determined through field inspections that the proposed routes are entirely composed of previously disturbed areas, most of which are ditches within highway/roadway Right-of-Ways (ROWs), with some RM/ Town/ private property, and/or farmer's fields (if necessary).

There are no naturally vegetated (previously undisturbed) areas along any of the proposed routes.

Tree clearing is not anticipated as a requirement for the project. If tree clearing or grubbing is required, it will be inside ditches within highway/roadway Right-of-Ways (ROWs), and it will be minimal and selective. It was determined through field inspections that the proposed routes do not contain old-growth/ legacy forestry resources.

3.7 Socioeconomic

The Rural Municipality of Yellowhead is a mixture of rural living (Town, Village, and country), agricultural, and tourism including recreational fishing and hunting.

This Environment Act Proposal (EAP) is to upgrade and modernize the Public Water System (PWS) specifically through the construction of a new membrane WTP. This work will ensure the long-term supply of potable water which is necessary to ensure the continued socio-economic sustainability and growth of rural communities. There are no public safety and human health risks associated with this project. In fact, this project mitigates risks through the provision of quality water.

3.8 Parks

The nearest provincial and federal parks are located outside the environmental impact area of this project. The nearest federal park is Riding Mountain National Park (RMNP) which is approximately 30 km due north. The nearest provincial parks are Aseissippi Provincial Park (80+ km away) and Rivers Provincial Park (50+ km away).

3.9 Heritage Resources

No heritage resources will be disturbed since the various components of this project will occur on previously disturbed land such as municipal property, highway/roadway allowances or easements, etc.

3.10 Aboriginal Communities

Regarding First Nation (FN) communities in the area: Keeseekoowenin FN is 25 km away, Waywayseecappo FN is 35 km away, Birdtail Sioux FN is 45 km away. Keesee, Wayway, and Birdtail all are located in Treaty # 2 land. Manitoba has a large Metis population. Metis are considered aboriginal under Section 35 of the Constitution Act of Canada (1982) along with Indian and Inuit. There are no recognized Metis communities in western Manitoba, according to the Department of Indigenous and Municipal Relations for the Province of Manitoba.

Due to the distance from aboriginal communities, consultation is not a requirement because of the geographic location of the proposed Shoal Lake water plant and no environmental impact on aboriginal communities.

4.0 Description of Environmental and Human Health Effects of the Proposed Development

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

4.1 Air Quality

During construction, dust will be raised by construction and transportation equipment and there will be gaseous and particulate emissions from the construction equipment. Any effects would be localized, temporary and insignificant. During the development, there will be no pollutants released to the air besides the ones discussed previously.

4.2 Soils

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

During operation, project activities are limited to regular monitoring and maintenance activities that have a negligible effect on soil disturbance and compaction because of low vehicle traffic volumes and the use of established routes to access the locations. Regular monitoring and maintenance activities will have a negligible effect on soil contamination since fuel trucks and other hazardous substances will not be brought on site on a regular basis. The potential adverse effect on soil quality is assessed to be minor.

4.3 Surface Water, Fish Habitat and Fisheries

Minor and short-term impacts on surface water may occur as a result of construction activity in highway and roadway allowances and 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. Horizontal directional drilling will be conducted to install pipelines at waterway crossings and discharge outlets. This will eliminate excavation within the riparian zone and minimize impacts. There is potential for some loss of drilling mud to the surface water. Impacts to fish habitat and fisheries are assessed to be minor.

Regarding Shoal Lake, surface water will not be affected since the discharge is carefully controlled through piping and a discharge point. Fisheries will not be affected in Shoal Lake since this is a human-altered and human-controlled lake as demonstrated by the stocking of fish and year-round aeration within the lake. Refer to Section 3.5: Fish and Fish Habitat.

Water quality samples and chemistries will be taken from Shoal Lake, the water body to be used for the concentrate discharge. The results were not available at the time of writing but will be made available upon future request. The results will be analyzed. It is fully expected the results will be:

"Impacts to fish habitat and fisheries are assessed to be negligible."

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 effects to water quality. Nevertheless, the potential still exists and monitoring of the raw water quality will be required to identify any such adverse effects and allow the appropriate adjustments in the operation to the system after construction.

4.5 Groundwater Levels

Refer to Section 1.2.8: Water Rights Act.

A new Water Rights License (WRL) will be applied for the Rural Municipality of Yellowhead. The available information indicates that the proposed withdrawal of groundwater is unlikely to result in adverse changes to groundwater levels. Nevertheless, the potential still exists and monitoring will be required.

4.6 Vegetation

Construction will occur primarily within Right-of-Ways (ROWs) or easements that are previously disturbed, regularly managed, and comprised primarily of grasses. As the areas are already disturbed, they are unlikely to contain rare plant species, and the amount of vegetation disturbance is expected to be minimal.

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

Forestry resources will not be impacted in short-term or long-term.

4.7 Wildlife Habitat

The construction and operation activities associated with this project will be limited to areas already developed for agriculture, industrial, commercial, or residential or hydro utilities. The potential adverse effects of wildlife habitat loss are assessed to be negligible to minor.

There will be negligible to minimal short-term impacts on wildlife and no long term impacts.

4.8 Noise and Vibration

During construction, there will be several sources of sound emissions including construction equipment and vehicles. The types of noises heard due to construction are dominated by engines. However, miscellaneous short-term noises (i.e. dump truck gates, back hoe buckets, etc.) are often heard. The noise will be in addition to the regular community and highway activities. The effects are assessed to be minor.

4.9 Heritage Resources

No heritage resources will be disturbed since the various components of this project will occur on previously disturbed land such as municipal property, highway/roadway allowances or easements, etc.

4.10 Employment/Economy

Socio-economic implications are not expected as a result of the environmental impacts as the impacts are considered minor and short-term. Some economic implications may exist for the Town and RM due to the financial costs of development. However, the Town and RM will have a sustainable potable water supply to meet future demands. The proposed project will address limited treatment capacity and water quality issues at Shoal Lake. There will be some local economic benefit during construction. The potential effects of the project on employment and the economy are assessed to be positive.

There are no expected negative socio-economic implications resulting from this proposed project. In fact, there will be positive socio-economic implications since this project is necessary to ensure the continued socio-economic sustainability and growth of the communities.

4.11 Human Health and Well-being

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

The project will result in the construction of a new WTP and pipelines designed and operated to produce a treated water supply to meet current water quality standards. This will produce a higher standard of living. The effects on human health and well-being are considered positive.

There is no public safety and human health risks associated with this project. In fact, this project mitigates risks through the provision of quality water.

4.12 Climate Change

It is predicted there will be no impacts to the climate as a result of these project activities.

Climate change implications due to this project can be classified as negligible.

5.0 Mitigation Measures and Residual Environment Effects

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

The construction and installation of water supply pipelines and concentrate discharge pipelines will be in accordance with standard industry practices and the General and Special Conditions from the Manitoba Water Services Board (MWSB), which have been specifically designed to mitigate the risks involved with these activities. The pipelines will be constructed by open-trenching, directional drilling, or a combination of both techniques depending on the location.

The work shall be designed by a Professional Engineer registered in Manitoba and shall be in general conformance to the Ten State Standards, Canadian Standards Association (CSA), American Water Works Association (AWWA), and provincial regulatory standards and guidelines.

The protection of the environment and human health will remain a key priority throughout all phases of this project.

5.1 Air Quality

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

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

Water spraying is an important, common and practical procedure that would be applied as required to alleviate potential dust problems.

Burning of shrubs etc. will only occur on days and times where wind conditions are favorable. Burning could be limited to days permitted for burning according to the Manitoba Crop Residual Burning Program.

5.2 Soils

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

In the event of a reportable spill, the Department of Sustainable Development will be notified through the emergency response line and appropriate measures will be taken according to the Department of Sustainable Development requirements.

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

5.3 Surface Water, Fish Habitat and Fisheries

Mitigation of surface water issues may be achieved by limiting open cut trenching to 30m from sensitive areas and providing erosion control practices as required.

The same procedures for petroleum products (fuel or lubricants) will be applied to water as with soil.

Fisheries impacts will be minimized by implementing practices to reduce soil and contaminate runoff. The proponent will work with provincial officials should any concerns arise.

Regarding Shoal Lake, the proponent will conduct long-term monitoring of Shoal Lake to verify impacts on water quality.

5.4 Groundwater Quality

Groundwater is primarily protected by the natural hydrogeology in the area. Mitigation of potential groundwater impacts from petroleum products was described in earlier sections. Groundwater monitoring will be performed as required to address potential issues associated with groundwater quality.

The recommended water quality sampling program consists of quarterly sampling of groundwater for the first year of operation. Following this initial year of sampling, the recommended frequency is at minimum annually. The laboratory analyses should include hardness, alkalinity, Total Dissolved Solids (TDS), electrical conductivity, major cations and anions (calcium, sodium, magnesium, hydrogen carbonate, sulfate, chloride), dissolved metals (including arsenic), and iron and manganese. The samples should be collected at a designated location on the raw water side of the water treatment system using sample bottles and methods in accordance with the laboratory instructions. This sampling is separate from any routine sampling program required as part of the operation from the WTP.

5.5 Groundwater Levels

The availability of groundwater usage for this proposal and potential future users will be assessed through the Water Rights Act licensing process. Groundwater monitoring will be performed as required to address potential issues associated with groundwater levels.

The recommended groundwater level monitoring program would include the use of several monitoring wells at locations owned by the RM or the Province. The monitoring well should be equipped with a continuous groundwater level monitoring device such as a digital pressure transducer capable of recording groundwater levels on at least a daily basis. The information would be downloaded on a regular basis (typically quarterly) and input into a suitable database capable of generating charts of water level trends over time.

5.6 Vegetation

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

5.7 Wildlife Habitat

Impacts to wildlife habitat can be limited by minimizing the area of construction, vegetation and soil disturbance.

5.8 Noise and Vibration

Noise disturbance will be limited by use of mufflers on equipment and vehicles, limiting idling, and minimizing the construction area.

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.

5.9 Heritage Resources

If by chance, heritage resources are found in an unexpected area, work will be stopped to assess the situation and the relevant authorities will be contacted.

5.10 Employment/Economy

MWSB works closely with the local community in the development of projects; as such, this should mitigate any unwanted socio-economic effects.

5.11 Human Health and Well-being

All Federal, Provincial, and Municipal acts and regulations and guidelines will be followed.

5.12 Climate Change

Mitigation for climate change is encapsulated within the other mitigation measures.

6.0 Follow-up Plans including Monitoring and Reporting

In the future, there will have to be a "Permit to Construct or Alter a Public Water System" under the Drinking Water Safety Act (DWSA), submitted to the Office of Drinking Water (ODW), which is part of the Department of Sustainable Development. Also, there will have to be an Operating License for the new system including the new Water Treatment Plant (WTP) in Shoal Lake.

7.0 Conclusions

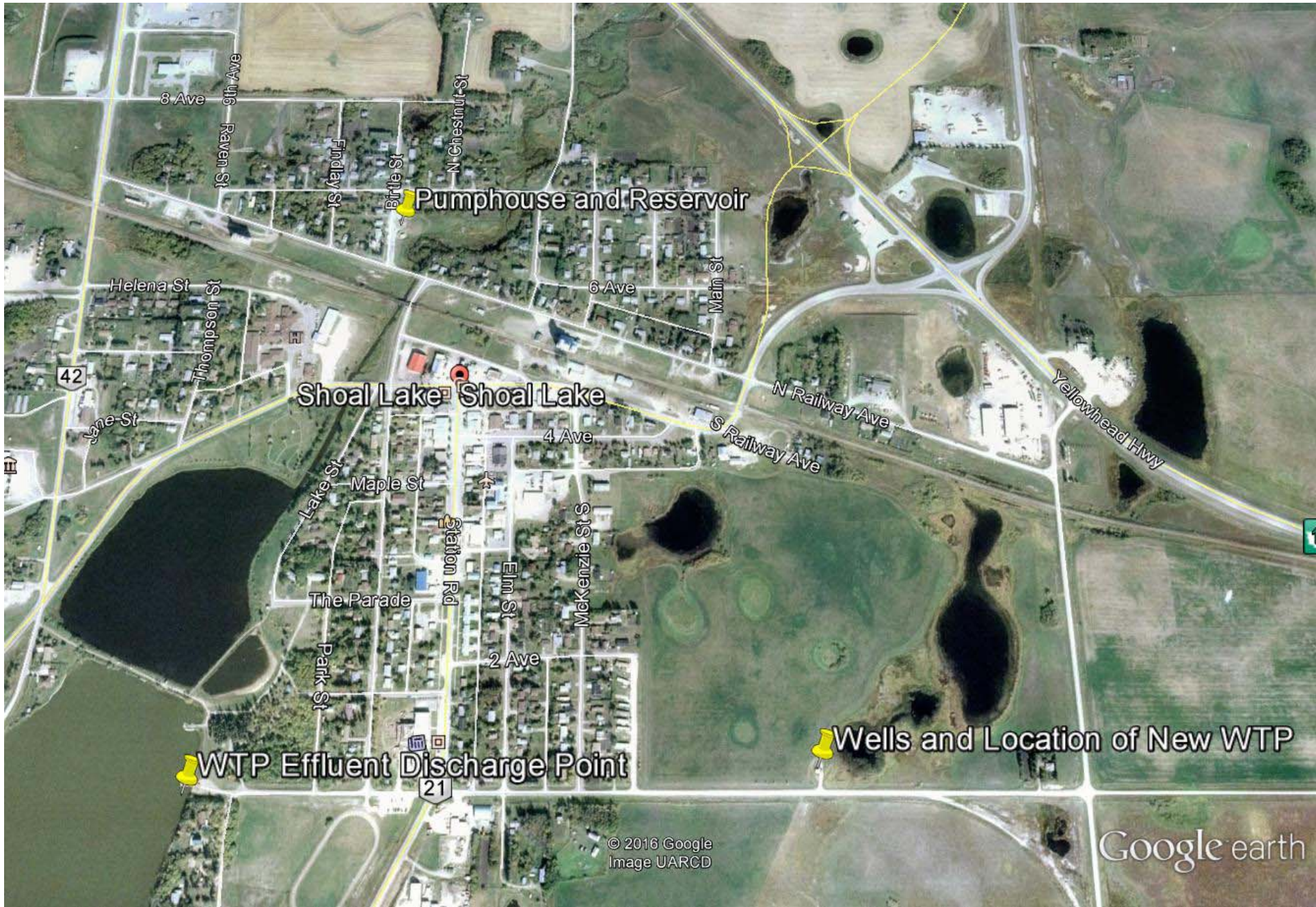
In conclusion, this Environment Act Proposal (EAP) for a Class 1 Development License under the Manitoba Environment Act for the construction of a new Shoal Lake water treatment plant with concentrate discharge to Shoal Lake has demonstrated that this proposed work meets or exceeds regulatory requirements and is environmentally responsible.

8.0 References

1. MWSB, Nathan Wittmeier, March 2014, Hamiota - Shoal Lake Regional Water Supply Feasibility Study.
2. Rural Municipality of Yellowhead official website: (July 29, 2016)
<http://yellowheadmunicipality.ca/default.aspx>
3. WWF (org), World Wildlife Fund or World Wide Fund for Nature (WWF), Ecoregion: Canadian Aspen Forests and Parklands: (July 29, 2016)
<http://www.worldwildlife.org/ecoregions/na0802>

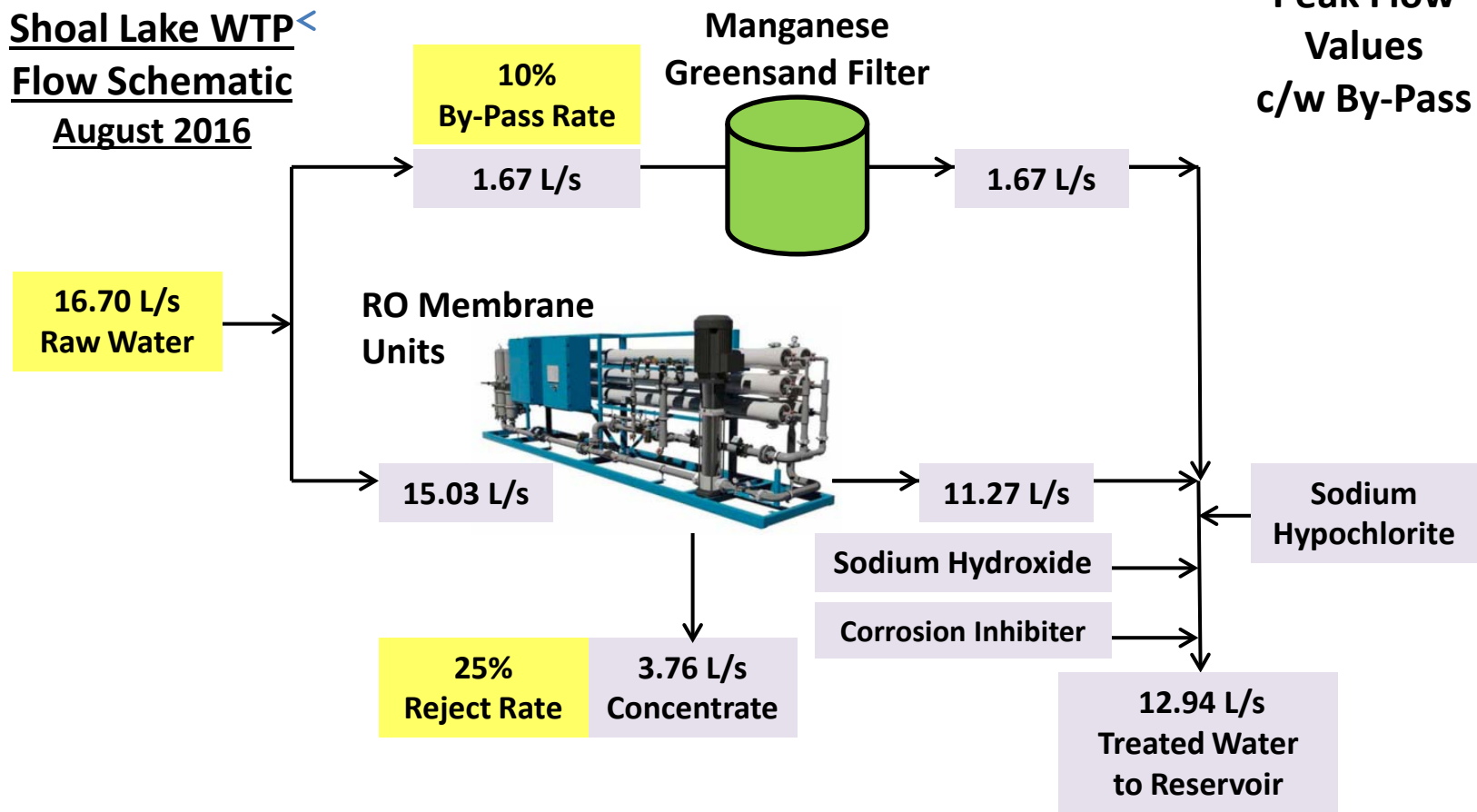
9.0 Appendix

9.1 Appendix A - Shoal Lake Route Drawing



9.2 Appendix B - Membrane Flow Analysis

**Proposed
Shoal Lake WTP <
Flow Schematic
August 2016**



**Peak Flow
Values
c/w By-Pass**

9.3 Appendix C - Existing Operating License (PWS-12-517-A)



Conservation and Water Stewardship

Office of Drinking Water

1007 Century Street, Winnipeg, Manitoba R3H 0W4

**OPERATING LICENCE FOR
A PUBLIC WATER SYSTEM**

LICENCE NUMBER: PWS-12-517 A

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

WATER SYSTEM CODE: 197.00
OPERATION ID: 16844
EFFECTIVE DATE: JANUARY 1, 2015
EXPIRY DATE: MAY 31, 2017

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

RURAL MUNICIPALITY OF YELLOWHEAD: "THE LICENSEE"

FOR THE OPERATION OF THE **SHOAL LAKE PUBLIC WATER SYSTEM**, WHICH INCLUDES SECURE 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: December 12, 2014

Kim Philip, P.Eng.
Director

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 Licensee shall provide written notice to the Office of Drinking Water of any changes in the operational status of the water system, such as a permanent cessation of service, or changing the length of service from year-round to seasonal or the opposite.
- 1.8. 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.
- 1.9. The Licensee shall post the ceremonial framed Licence at the water treatment facility.
- 1.10. The Licensee shall keep a copy of this Licence in its entirety at a location established by the Drinking Water Officer and ensure all operators are familiar with its terms and conditions.
- 1.11. The Licensee shall apply for renewal of this Licence at least 60 days prior to its expiry.

2. OPERATION - GENERAL

- 2.1. The Licensee shall operate all water system facilities, control systems and equipment as efficiently as possible, inspect them on a regular basis, maintain them in good working order, and ensure that the water system is protected from the risks associated with cross-contamination.
- 2.2. The Licensee shall ensure that all chemicals and components that may come into contact with potable water are certified safe for potable water use through AWWA Standards, ANSI/NSF Standard 60 or 61, Health Canada, or other standards acceptable to the Director.
- 2.3. No alternate water source shall be brought into service without the consent of the Drinking Water Officer and the maintenance of adequate cross connection control between the alternate source and the primary source.
- 2.4. The Licensee shall have a re-assessment of the water system infrastructure and water supply sources completed and submitted by a qualified professional engineer, who is not an employee of the water system, in a form satisfactory to the Director by March 1, 2017 and every five years thereafter.
- 2.5. The Licensee shall update and re-submit the compliance plan in a form and timeframe satisfactory to the Director if the contents and schedule of the plan have changed significantly and a revised plan has become necessary. The revised compliance plan is to address the following standards:
 - a) 20 minute chlorine contact time, or a method or combination of methods approved by the Director

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 but not limited to 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/TREATMENT STANDARDS

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

Table 1: Water Quality/Treatment Standards

Parameter	Quality Standard
Total coliform	Less than one total coliform bacteria detectable per 100 mL in all treated and distributed water
<i>E. coli</i>	Less than one <i>E. coli</i> bacteria detectable per 100 mL in all treated and distributed water
Monochloramine	A monochloramine residual of at least 1.0 mg/L at the treated water sampling location established by the Drinking Water Officer A monochloramine residual of at least 0.3 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
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 exceedances as directed by the regional Drinking Water Officer, a Corrective Actions Form must be completed and submitted to the regional Drinking Water Officer.

5. WATER QUALITY MONITORING

- 5.1. The Licensee shall ensure monitoring is completed as set out in Table 2.

Table 2. Monitoring Schedule

Parameter	Monitoring Requirement
Bacteriological (total coliform and <i>E. coli</i>)	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
Heterotrophic plate count (HPC) (distribution system)	One sample taken on a quarterly basis during February, May, August, and November, each year at a dead end sampling location in the distribution system

Parameter	Monitoring Requirement
Monochloramine (treated water)	One sample per day at the treated water sampling location established by the Drinking water Officer
Monochloramine (distribution system)	At the same times and location(s) as bacteriological distribution system sampling One sample on a bi-weekly basis, at a dead end sampling location in the distribution system
Total chlorine (treated water)	One sample per week at the treated water sampling location established by the Drinking water Officer
Total chlorine (distribution system)	At the same times and location(s) as bacteriological distribution system sampling One sample on a bi-weekly basis, at a dead end sampling location in the distribution system
Free ammonia (treated water)	One sample per week at the treated water sampling location established by the Drinking water Officer
Free ammonia (distribution system)	At the same time and location(s) as bacteriological distribution system sampling One sample on a bi-weekly basis, at a dead end sampling location in the distribution system
Nitrite and nitrate (treated water)	One sample taken on a quarterly basis during February , May, August, and November, each year
Nitrite and nitrate (distribution system)	One sample taken on a quarterly basis during February , May, August, and November, each year at a dead end sampling location in the distribution system
General chemistry (parameter list provided by Office of Drinking Water)	One raw and one treated water sample once every three years
Lead	As per the instructions of the Drinking Water Officer

5.2. The Licensee shall ensure that an accredited laboratory, as specified in section 35 of Manitoba Regulation 40/2007 the *Drinking Water Safety Regulation*, undertake the following analysis required in Table 2:

- a) bacteriological (total coliform and *E. coli*)
- b) heterotrophic plate count
- c) nitrite and nitrate
- d) general chemistry
- e) any other parameter required by the Drinking Water Officer

and that all samples are collected, handled, and submitted in a manner that is satisfactory to the accredited laboratory.

5.3. The Licensee shall ensure that parameters listed in Table 2 but not specified in clause 5.2 are measured utilizing water quality monitoring equipment and methods approved by the U.S. Environmental Protection Agency (EPA).

5.4. The Licensee shall ensure that raw water samples are taken on an alternating basis in instances where more than one water supply source is used.

- 5.5. The Licensee shall ensure that all water quality monitoring equipment is properly maintained and calibrated by a qualified person according to manufacturer recommendations and that records are maintained to that effect.
- 5.6. The Licensee shall ensure that sampling within the distribution system takes place at varied locations acceptable to the Drinking Water Officer.

6. RECORD-KEEPING AND REPORTING

- 6.1. The Licensee shall maintain in a secure location all construction drawings for the life of the water system components.
- 6.2. The Licensee shall retain in chronological order for a minimum of 24 months all information specified in subsection 34(2) of *Manitoba Regulation 40/2007, Drinking Water Safety Regulation*.
- 6.3. The Licensee shall ensure the information identified in clause 6.2 is available for inspection by any member of the public during normal business hours at the office of the water supplier or at a location convenient to the users of the system.
- 6.4. The Licensee shall record disinfectant residual measurements on the monthly disinfection report or other forms satisfactory to the Director.
- 6.5. The Licensee shall record other measurements as specified in *Table 2: Monitoring Schedule* on the monthly report forms or other forms satisfactory to the Director.
- 6.6. The Licensee shall keep one copy of all monthly report forms required in Clauses 6.4 and 6.5, and forward the original copy to the Drinking Water Officer within seven days after the end of each calendar month.
- 6.7. The Licensee shall record all distribution system measurements specified in *Table 2: Monitoring Schedule* on the chain of custody form (laboratory submission form) which accompanies the bacteriological sample bottles to the laboratory.
- 6.8. The Licensee shall ensure that water metering devices at the water treatment plant or storage reservoir 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.
- 6.9. The Licensee shall record corrective actions for minor exceedances as discussed in clause 4.4 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 report forms.

9.4 Appendix D - Existing Water Rights License (#2009-020)

Licence to Use Water for Municipal Purposes



Conservation and Water Stewardship

200 Saulteaux Cresc.
Winnipeg, Manitoba
R3J 3W3

Project: Shoal Lake

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

Licence No.: **2009-020**
(Original Lic. No.: 83-57)
U.T.M.: Zone 14 387606 E
5587915 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 **The Town of Shoal Lake** in the Province of Manitoba (hereinafter called "the LICENSEE") to divert water from a **sand and gravel** aquifer by means of two water wells, pumps, pipeline(s) and other appurtenances (hereinafter called "the WORKS"), located on the following described lands:

the East Half of Section 9, in Township 17 and Range 23, West of the Principal Meridian in Manitoba, more particularly described on Certificate of Title Nos. 1649843 and 114383 NLTO,

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:

in Section 9, in Township 17 and Range 23, West of the Principal Meridian in Manitoba.

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

1. The water shall be used solely for **municipal** purposes.
2. The 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 **0.016 cubic metres per second (0.6 cubic feet per second)**.
b) The total quantity of water diverted in any one year shall not exceed **154.18 cubic decametres (125.00 acre feet)**.
4. Water shall not be diverted during any period when the water level in the aquifer as measured at:
 - a) Well No. 1 is more than 48.0 metres (157.4 feet) beneath the surface of the ground.
 - b) Well No. 2 is more than 28.3 metres (92.9 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 342, Shoal Lake, MB, R0J 1Z0, 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 wells or other forms of supply, which were constructed and operating prior to the date of application for the original Licence (No. 83-57), and 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 _____ day of _____ A.D. 20_____ .

SIGNED, SEALED AND DELIVERED
in the presence of

_____ } _____ (Seal)
Witness Licensee

Canada, PROVINCE OF MANITOBA To Wit:

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

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

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

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

My Commission expires _____

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

The Honourable the Minister of Conservation and Water Stewardship

9.5 Appendix E - Shoal Lake Water Chemistry - Raw & Treated



Office of Drinking Water
ATTN: CHRISTINE GERARDY
1129 Queens Avenue
Brandon MB R7A 1L9

Date Received: 02-JUN-16
Report Date: 20-JUN-16 15:22 (MT)
Version: FINAL

Client Phone: 204-570-1405

Certificate of Analysis

Lab Work Order #: L1777314
Project P.O. #: 16844
Job Reference: SHOAL LAKE - PWS 197.00
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory 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
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ANALYTICAL REPORT

Physical Tests (WATER)

		ALS ID		L1777314-1	L1777314-2
		Sampled Date		01-JUN-16	01-JUN-16
		Sampled Time		12:30	11:00
		Sample ID		SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED
Analyte	Unit	Guide Limit #1	Guide Limit #2		
Colour, True	CU	15	-	<5.0	<5.0
Conductivity	umhos/cm	-	-	2760	2760
Hardness (as CaCO3)	mg/L	-	-	271	268
Langelier Index (4 C)	No Unit	-	-	0.39	0.50
Langelier Index (60 C)	No Unit	-	-	1.1	1.2
pH	pH units	6.5-8.5	-	7.63	7.74
Total Dissolved Solids	mg/L	500	-	1940	1950
Transmittance, UV (254 nm)	%T/cm	-	-	83.8	80.7
Turbidity	NTU	-	-	1.60	0.36

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Anions and Nutrients (WATER)

		ALS ID		L1777314-1	L1777314-2	L1777314-3
		Sampled Date		01-JUN-16	01-JUN-16	01-JUN-16
		Sampled Time		12:30	11:00	12:45
		Sample ID		SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED	SHOAL LAKE 3 - DIST
Analyte	Unit	Guide Limit #1	Guide Limit #2			
Alkalinity, Total (as CaCO3)	mg/L	-	-	572	569	
Ammonia, Total (as N)	mg/L	-	-	2.77	2.39	
Bicarbonate (HCO3)	mg/L	-	-	698	694	
Bromide (Br)	mg/L	-	-	<0.50 ^{DLM}	<0.50 ^{DLM}	
Carbonate (CO3)	mg/L	-	-	<0.60	<0.60	
Chloride (Cl)	mg/L	250	-	101	107	
Fluoride (F)	mg/L	-	1.5	0.20 ^{DLM}	0.21 ^{DLM}	
Hydroxide (OH)	mg/L	-	-	<0.34	<0.34	
Iodide (I)	mg/L	-	-	<2.0	<2.0	
Nitrate and Nitrite as N	mg/L	-	10	<0.025	0.069	<0.11
Nitrate (as N)	mg/L	-	10	<0.025 ^{DLM}	0.040 ^{DLM}	<0.10 ^{DLM}
Nitrite (as N)	mg/L	-	1	0.0076 ^{DLM}	0.0292	<0.050 ^{DLM}
Total Kjeldahl Nitrogen	mg/L	-	-	3.05	2.70	
Total Nitrogen	mg/L	-	-	3.05	2.77	
Sulfate (SO4)	mg/L	500	-	757	759	
Anion Sum	me/L	-	-	30.1	30.2	
Cation Sum	me/L	-	-	33.2	32.5	
Cation - Anion Balance	%	-	-	5.0	3.7	

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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

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

ANALYTICAL REPORT

Organic / Inorganic Carbon (WATER)

		ALS ID		L1777314-1	L1777314-2
		Sampled Date		01-JUN-16	01-JUN-16
		Sampled Time		12:30	11:00
		Sample ID		SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED
Analyte	Unit	Guide Limit #1	Guide Limit #2		
Dissolved Organic Carbon	mg/L	-	-	4.46	5.13
Total Inorganic Carbon	mg/L	-	-	139	139
Total Organic Carbon	mg/L	-	-	4.66	5.07

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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

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

ANALYTICAL REPORT

Total Metals (WATER)

		ALS ID		L1777314-1	L1777314-2	L1777314-3
		Sampled Date		01-JUN-16	01-JUN-16	01-JUN-16
		Sampled Time		12:30	11:00	12:45
		Sample ID		SHOAL LAKE 1 -	SHOAL LAKE 2 -	SHOAL LAKE 3 -
Analyte	Unit	Guide Limit #1	Guide Limit #2	RAW	TREATED	DIST
Aluminum (Al)-Total	mg/L	0.1	-	0.0024	0.0027	0.0014
Antimony (Sb)-Total	mg/L	-	0.006	<0.00020	<0.00020	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	0.00342	0.00361	0.00356
Barium (Ba)-Total	mg/L	-	1	0.00982	0.00970	0.00997
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	5	2.1	2.1	2.1
Cadmium (Cd)-Total	mg/L	-	0.005	<0.000010	<0.000010	<0.000010
Calcium (Ca)-Total	mg/L	-	-	75.0	74.6	72.3
Cesium (Cs)-Total	mg/L	-	-	<0.00010	<0.00010	<0.00010
Chromium (Cr)-Total	mg/L	-	0.05	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Total	mg/L	-	-	0.00174	0.00171	0.00166
Copper (Cu)-Total	mg/L	1	-	0.00218	0.0108	0.690
Iron (Fe)-Total	mg/L	0.3	-	0.160	0.181	0.212
Lead (Pb)-Total	mg/L	-	0.01	<0.000090	0.000258	0.000212
Lithium (Li)-Total	mg/L	-	-	0.419	0.416	0.427
Magnesium (Mg)-Total	mg/L	-	-	20.3	19.9	20.5
Manganese (Mn)-Total	mg/L	0.05	-	0.753	0.738	0.736
Molybdenum (Mo)-Total	mg/L	-	-	0.00630	0.00602	0.00601
Nickel (Ni)-Total	mg/L	-	-	0.00306	0.00285	0.00287
Phosphorus (P)-Total	mg/L	-	-	0.273	0.265	0.266
Potassium (K)-Total	mg/L	-	-	11.5	11.9	11.8
Rubidium (Rb)-Total	mg/L	-	-	0.00553	0.00541	0.00542
Selenium (Se)-Total	mg/L	-	0.05	<0.00010	<0.00010	<0.00010
Silicon (Si)-Total	mg/L	-	-	13.8	14.2	13.9
Silver (Ag)-Total	mg/L	-	-	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	200	-	628	614	634
Strontium (Sr)-Total	mg/L	-	-	0.798	0.776	0.766
Tellurium (Te)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	-	-	<0.00010	<0.00010	<0.00010
Thorium (Th)-Total	mg/L	-	-	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Titanium (Ti)-Total	mg/L	-	-	<0.00050	<0.00050	<0.00050

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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

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

ANALYTICAL REPORT

Total Metals (WATER)

		ALS ID		L1777314-1	L1777314-2	L1777314-3
		Sampled Date		01-JUN-16	01-JUN-16	01-JUN-16
		Sampled Time		12:30	11:00	12:45
		Sample ID		SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED	SHOAL LAKE 3 - DIST
Analyte	Unit	Guide Limit #1	Guide Limit #2			
Tungsten (W)-Total	mg/L	-	-	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	mg/L	-	0.02	0.00059	0.00060	0.00057
Vanadium (V)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Zinc (Zn)-Total	mg/L	5	-	0.0021	0.0060	0.0064
Zirconium (Zr)-Total	mg/L	-	-	<0.00040	<0.00040	<0.00040

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Dissolved Metals (WATER)

		ALS ID		L1777314-1	L1777314-2
		Sampled Date		01-JUN-16	01-JUN-16
		Sampled Time		12:30	11:00
		Sample ID		SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED
Analyte	Unit	Guide Limit #1	Guide Limit #2		
Aluminum (Al)-Dissolved	mg/L	0.1	-	<0.0020	<0.0020

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Volatile Organic Compounds (WATER)

		ALS ID		L1777314-1
		Sampled Date		01-JUN-16
		Sampled Time		12:30
		Sample ID		SHOAL LAKE 1 - RAW
Analyte	Unit	Guide Limit #1	Guide Limit #2	
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
1,1,1,2-Tetrachloroethane	mg/L	-	-	<0.00050
1,1,2,2-Tetrachloroethane	mg/L	-	-	<0.00050
Tetrachloroethene	mg/L	-	0.01	<0.00050
Toluene	mg/L	0.024	0.06	<0.00050
1,1,1-Trichloroethane	mg/L	-	-	<0.00050
1,1,2-Trichloroethane	mg/L	-	-	<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

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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

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

9.6 Appendix F - Shoal Lake Water Chemistry - Lake (Not Available)

9.7 Appendix G - Species-At-Risk (SAR)

From: [Friesen, Chris \(SD\)](#)
To: [Vitt, Cory \(MMG\)](#)
Subject: R.M. of Yellowhead – Shoal Lake; New Water Treatment Plant (EAP)
Date: August-02-16 4:01:24 PM

Cory

Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's rare species database and found no occurrences at this time for your area of interest.

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre at the time of the request. These data are dependent on the research and observations of CDC staff and others who have shared their data, and reflect our current state of knowledge. An absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present; in many areas, comprehensive surveys have never been completed. Therefore, this information should be regarded neither as a final statement on the occurrence of any species of concern, nor as a substitute for on-site surveys for species as part of environmental assessments.

Because the Manitoba CDC's Biotics database is continually updated and because information requests are evaluated by type of action, any given response is only appropriate for its respective request. Please contact the Manitoba CDC for an update on this natural heritage information if more than six months pass before it is utilized.

Third party requests for products wholly or partially derived from Biotics must be approved by the Manitoba CDC before information is released. Once approved, the primary user will identify the Manitoba CDC as data contributors on any map or publication using Biotics data, as follows as: Data developed by the Manitoba Conservation Data Centre; Wildlife & Fisheries Branch, Manitoba Sustainable Development.

This letter is for information purposes only - it does not constitute consent or approval of the proposed project or activity, nor does it negate the need for any permits or approvals required by the Province of Manitoba.

We would be interested in receiving a copy of the results of any field surveys that you may undertake, to update our database with the most current knowledge of the area.

If you have any questions or require further information please contact me directly at (204) 945-7747.

Chris Friesen
Coordinator
Manitoba Conservation Data Centre
204-945-7747
chris.friesen@gov.mb.ca
<http://www.manitoba.ca/conservation/cdc/>

-----Original Message-----

From:
Sent: July-29-16 10:17 AM
To: Friesen, Chris (SD)
Subject: WWW Form Submission

Below is the result of your feedback form. It was submitted by WWW Information Request () on Friday, July 29, 2016 at 10:16:53

DocumentID: Manitoba_Conservation

Project Title: R.M. of Yellowhead – Shoal Lake; New Water Treatment Plant (EAP)

Date Needed: 2016/08/19

Name: Cory Vitt

Company/Organization: MWSB for Manitoba Government

Address: Unit #1A - 2010 Currie Blvd.

City: Brandon

Province/State: Manitoba

Phone: 1-204-726-6083

Fax: 1-204-726-7196

Email: cory.vitt@gov.mb.ca

Project Description: Canada and Manitoba approved 27 community infrastructure projects today under two new federal infrastructure programs introduced as part of Phase 1 of the 10-year Investing in Canada plan.

R.M. of Yellowhead – Shoal Lake; New Water Treatment Plant (EAP)

Construction of new water treatment plant.

GOAL:

Need to write an EAP for this project which was approved for funding for construction for the 2017-2018 fiscal year.

Information Requested: Species At Risk (SAR); flora and fauna; within the Town of Shoal Lake and the surrounding Municipality (RM Shoal Lake/ RM Strathclair).

REQUEST:

records of species at risk (plant or animal) along the proposed routes.

Format Requested: VIA:

email:

cory.vitt@gov.mb.ca

FORMAT:

typical written statement/ sentences/ paragraphs with disclaimers.

Location: Town of Shoal Lake

R.M. of Yellowhead,

focusing on Shoal Lake.

action: Submit

9.8 Appendix H - MWSB Watercourse Crossing Guidelines

MWSB WATERCOURSE CROSSING GUIDELINES

Mitigation Measure:

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

Reclamation:

- Restore all disturbed areas to original contours.
- 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:
 - A record of drilling progress will be maintained to always know the location of the drill head relative to the point of entry.
 - A record of drilling component usage (type and quantity) will be maintained throughout each drilling operation.
 - 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 construction field supervisor.
 - 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:

- 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.
- The contractor will notify the MWSB construction field supervisor of the frac-out condition or potential condition and decide on the appropriate action as follows:
- Assign a person to visually monitor for the presence of muddy plume.
- 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.
- 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.
- 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.
- If the frac-out is not contained within this time, MWSB 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.

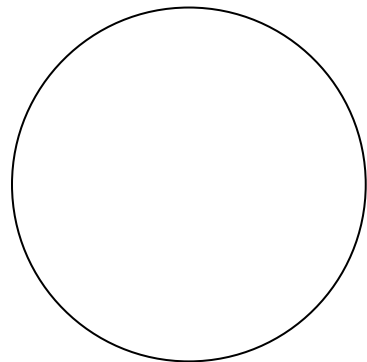
ENVIRONMENT ACT PROPOSAL RURAL MUNICIPALITY OF YELLOWHEAD SHOAL LAKE WATER TREATMENT PLANT CONCENTRATE DISCHARGE

August 2016

Prepared by:



Unit #1A - 2010 Currie Blvd.,
Brandon MB R7B 4E7



EXECUTIVE SUMMARY

The Rural Municipality of Yellowhead (RM) requested the Manitoba Water Services Board (MWSB) to submit an Environment Act Proposal (EAP) for a Class 1 Development License under Manitoba Environment Act for the construction of a new water treatment plant for the Community of Shoal Lake with membrane concentrate discharge to Shoal Lake. The proposed work includes:

1. Increasing raw water well capacity for new water treatment plant in Shoal Lake.
2. Construction of a new membrane water plant.
3. Construction of a membrane concentrate pipeline from the new Shoal Lake WTP to Shoal Lake approximately 1 km due west of the new WTP.

The proposed upgrades will allow the Rural Municipality to provide treated water that meets regulatory requirements. This project is funded under Clean Water and Wastewater Fund (CWWF) and is to be completed by March 31, 2018.

The Rural Municipality of Yellowhead was incorporated January 1, 2015 with the amalgamation of the Municipalities of Shoal Lake and Strathclair. The Rural Municipality of Yellowhead has an operating license to supply potable water to residents in the Community of Shoal Lake (population of 714 from the 2011 census) with future expansion to the surrounding RM (population of 515 from the 2011 census).

Currently the Community of Shoal Lake does not have a full scale water plant. The community operates a public water distribution system with only chlorine disinfection. Chlorine is injected at the well pumphouse and utilizes the distribution system for disinfection contact time. The well pump pressurizes the distribution system and fills an online reservoir/pumphouse located in the north section of the community. Raw water ammonia concentrations are in the range of 2 to 3 mg/l and residents near the pumphouse complain about the high chlorine dosing required to achieve disinfection break point.

This proposal includes the construction of a new 16.7 L/s WTP using existing groundwater wells as a water source. The proposed treatment process will consist of an integrated reverse membrane system and a manganese greensand by-pass filter with concentrate disposal to Shoal Lake. The proposed water plant will increase treatment capacity to 16.7 L/s from current 6.8 L/s peak day chlorine treatment only. The 16.7 L/s raw water flow include 75% product water (12.5 L/s) and 25% concentrate flow (4.2 L/s). These peak day values assume no by-pass through the greensand filter; however, it is anticipated that the by-pass rate could be as high as 10% depending on operating problems encountered with achieving disinfection break point.

Table of Contents

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0.0 List of Acronyms

AO	Aesthetic Objective
CIP	Clean-In-Place
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
OS	Operational Statements
PR	Public Road
RM	Rural Municipality
RO	Reverse Osmosis
TDS	Total Dissolved Solids
THM	Trihalomethane
TOC	Total Organic Carbon
UV	Ultraviolet
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

1.0 Introduction and Background

1.1 Introduction

The Rural Municipality of Yellowhead requested the Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal (EAP) for a Class 1 Development License to construct a water treatment plant with concentrate discharge to Shoal Lake. This document was developed in accordance with Department of Sustainable Development "Environment Act Proposal Report Guidelines" and "Supplementary Guidelines for Municipal Water Supply Systems".

1.2 Background Information

The Rural Municipality of Yellowhead was incorporated January 1, 2015 after the amalgamation of the Municipalities of Shoal Lake and Strathclair. The Rural Municipality of Yellowhead is responsible to supply potable water to residents in the Community of Shoal Lake (population of 714 from the 2011 census) and proposed future pipeline to a rural population of 515 people in 2011.

1.2.1 Previous Studies

Previous reports have been reviewed in preparation of this Environment Act Proposal. These include:
MWSB document titled "Hamiota - Shoal Lake Regional Water Supply Feasibility Study", March 2014, written by Nathan Wittmeier.¹

1.2.2 Population

Based on 2011 Census data, the Community of Shoal Lake has a population of 714 people, an increase from 680 in 2006. The future design population for Shoal Lake is calculated to be 900 people assuming the same growth rate experienced since 2006.¹

Based on 2011 Census data, the rural area has a population of 515 people, a decrease from 555 in 2006. Although the population in the rural area has shown negative growth, an assumed growth rate of 1.0% will be used to allow for future population growth which anticipates new development generated by a proposed rural water system. Assuming a 1.0% growth rate and a 75% connection rate, the population of the RM serviced by the rural distribution system in 20 years would be approximately 486.¹

1.2.3 Raw Water Source

Two groundwater production wells provide water to Shoal Lake and are located near an existing pumphouse in the southeast corner of the Community. Well 1 was constructed in 1961, has limited capacity and is used as a backup well. The second well is a 200 mm diameter production well with screen setting at 36.6 m deep. Well 2 was constructed in 1979 and is the primary water source for the Shoal Lake Public Water System (PWS). Well 2 withdraws water from a suspected GUDI sand and gravel aquifer influenced by Shoal Lake. No instances of total coliform (TC) or Escherichia coli (EC) were recorded in raw water bacteria sampling, however TOC in range of 4.0 to 5.0 mg/L is present in the raw water supply. The well is suspected to be under the influence of Shoal Lake due to the proximity to the lake and the overlying soil stratigraphy consisting of porous stony till, sands and gravels. The raw water is of poor quality and contains high levels of ammonia, manganese, sulphate, sodium, and iron. The well has an estimated yield potential of 15.9 L/s and will require extensive treatment due to the high mineral concentration and ammonia levels. The aquifer yield potential will be assessed by a hydrologist prior to the construction of the water treatment plant and required Water Rights documentation will be filed for a new license.¹

1.2.4 Existing Water Treatment Process

Shoal Lake public water system treatment is chlorination only. Chlorine is injected at the well pumphouse and with limited treated water storage onsite the system is unable to comply with the 20 minute contact time regulation under the Water Safety Act. The well pump pressurizes the distribution system and fills an online reservoir/pumphouse in the north portion of the community. DWSA regulations require water from GUDI wells to be disinfected with ultraviolet disinfection to control viruses and parasites (Giardia lamblia cysts & Cryptosporidium oocysts). The existing raw water pumphouse building is in poor condition and requires significant upgrading. The RM of Yellowhead has received Build Canada funding to construct a new water treatment plant in Shoal Lake.¹

1.2.5 Water Storage and Distribution Pumping System

Treated water storage in Shoal Lake consists of a 682 m³ underground concrete reservoir in the north end of the community and a 142 m³ underground concrete reservoir at the well site for a total reservoir capacity of 824 m³. Treated water is pumped from the production well directly into the town distribution system by a 20 HP vertical turbine pump. During times of high flows, water is pumped from the town reservoirs by a 20 HP and 5 HP VFD distribution pumps.¹

1.2.6 Fire Protection

The new water treatment plant will have sufficient reservoir capacity to meet disinfection requirements and fire flows. The 20-year projected population for Shoal Lake requires Class 3 fire protection (population between 800 and 1200) according to the MWSB classes for fire protection. The recommended fire flow for a Class 3 community is 60 L/s sustained flow for a minimum duration of two hours. The required storage volume for the 20 year projected population is 764 m³.¹

The existing 682 m³ reservoir in the north end and proposed reservoir at the water plant will satisfy the 20 year projected demands and fire storage requirements for Shoal Lake.¹

1.2.7 Current and Projected Water Use

A WTP is designed based on peak day demand over a 20 hour operating day with 4 hours allocated for maintenance. Typical average daily water usage ranges from 250 L/person/day to 300 L/person/day with peak day usage typically 1.5 to 2.0 times greater than average day consumption. Water consumption of 300 L/person/day and a peak day factor of 2.0 were used to estimate projected treated water demands which are summarized in Table 1.1.

The Shoal Lake projected water demand includes Shoal Lake, rural residents, and an estimated allowance for livestock. The total projected treated water demand for Shoal Lake is 12.42 L/s. Membrane treatment systems typically have a projected 25% reject rate which will require a raw water pumping rate of 16.2 L/s based on a peak day demand.¹

Table 1.1 - Community of Shoal Lake Projected Treated Water Demands¹

Parameter	Units	Shoal Lake	Shoal Lake	Total
20 Year Population	Pop.	898	486	1,344
Average Demand				
Consumption Rate	L/c/day	x300	x250	
Average Day Residential	L/day	269,400	121,500	390,900
Livestock Consumption	L/day		112,700	112,700
Total Average Day Demand	L/day	269,400	234,200	503,600
Peak Day Demand				
Peak Day Factor		x1.8	x1.5	
Peak Day Residential	L/day	484,920	182,250	667,170
Livestock Consumption	L/day		112,700	112,700
Total Peak Day Demand	L/day	484,920	294,950	779,870
Average Day Flow (20 hour day)	L/s	3.74	3.25	6.99
Peak Day Flow (20 hour day)	L/s	6.74	4.10	10.84

1.2.8 Water Rights Act

A groundwater assessment for the new water plant will be conducted, including a new WRL application based on the results of the investigation. The yield potential of the aquifer is unknown at this time and the assessment will determine if a new supply well will be required to meet projected water demands. Shoal Lake has a valid Water Rights License No. 2009-020 (previous License No. 83-57).

Wells are located on the following described lands:

- East Half of Section 9, in Township 17 and Range 23, west of the Principal Meridian in Manitoba, more particularly described on Certificate of Title Nos. 1649843 and 114383 NLTO.

This license allows a maximum instantaneous withdrawal rate of 16 L/s and a maximum annual usage of 154.18 cubic decameters.

Table 1.2 - Projected Total Water Demand for the Rural Municipality of Yellowhead - Shoal Lake WTP

Demand	Unit
16.7	L/s
526,700,000	L/yr
526,700	cubic meters/yr
526.7	cubic decameters/yr

Based on Table 1.2, the proposed WTP will require a new Water Rights License for the new water treatment plant based on projected water demands.

1.2.9 Water Quality

The Office of Drinking Water (ODW) currently conducts annual audits of all public water systems which includes sampling and chemistry analysis every three years for secure groundwater sources and once per year for surface water and GUDI supply systems. In addition, the operator tests chlorine residuals daily on the treated water.

Raw and treated water quality parameters exceeding the GCDWQ include manganese, sodium, sulfate, and total dissolved solids (TDS). The existing treatment system, which only provides chlorine disinfection, does not reduce the above noted parameters below the Aesthetic Objective (AO) or the Maximum Acceptable Concentration (MAC). To meet current regulations a new water plant with a membrane treatment process will meet Guidelines for Canadian Drinking Water Quality (GCDWQ) and Water Safety Act regulations.

Ammonia does not have an AO or MAC; however, high ammonia values in the raw water supply which is in the range of approximately 3 mg/L, presents challenges for the treatment process. Operators have difficulty of achieving disinfection break point due to varying chlorine demand to ionize ammonia. It is proposed to incorporate a manganese greensand filter as a by-pass to enhance taste and assist with stabilization of membrane treated water. Should ammonia levels with by-pass water affect the disinfection process the by-pass will be discontinued.

Table 1.3 - Water Quality Results

Parameter	Unit	GCDWQ		Sampled: September 27, 2010	Sampled: September 27, 2010	Sampled: June 1, 2016	Sampled: June 1, 2016
		AO/OG	MAC	Shoal Lake 1 Raw	Shoal Lake 2 Treated	Shoal Lake 1 Raw	Shoal Lake 2 Treated
Alkalinity (Total) CaCO ₃	mg/L			617	618	572	569
Ammonia (Total) Nitrogen	mg/L			2.84		2.77	2.39
Arsenic	mg/L		0.01	0.00535	0.00533	0.00342	0.00361
Boron	mg/L			2.22	2.23	2.1	2.1
Calcium	mg/L			65.9	66.6	75.0	74.6
Chloride (Dissolved)	mg/L	250		94.2	99.5	101	107
Colour (True)	CU	15		10.0	5.0	<5.0	<5.0
Conductivity	umhos/cm			2810	2820	2760	2760
Fluoride (Dissolved)	mg/L		1.5	0.34	0.32	0.20	0.21
Hardness (Total) CaCO ₃	mg/L			241	242	271	268
Iron	mg/L	0.3		0.152	0.152	0.160	0.181
Langelier Saturation Index (4 C)	NA			0.46	0.65	0.39	0.50
Langelier Saturation Index (60 C)	NA			1.2	1.4	1.1	1.2
Lead	mg/L		0.01	0.000177	0.000227	<0.000090	0.000258
Magnesium	mg/L			18.5	18.5	20.3	19.9
Manganese	mg/L	0.05		0.706	0.694	0.753	0.738
Nitrate and Nitrite as N	mg/L		10	<0.050	<0.050	<0.025	0.069
Nitrate as N	mg/L		10	~~~	~~~	<0.025	0.040
Nitrite as N	mg/L		1	~~~	~~~	0.0076	0.0292
pH	pH	6.5 to 8.5		7.71	7.91	7.63	7.74
Potassium	mg/L			10.8	10.9	11.5	11.9
Sodium	mg/L	200		594	592	628	614
Sulphate/ Sulfate (Dissolved)	mg/L	500		693	850	757	759
Total Dissolved Solids	mg/L	500		1910	1980	1940	1950
Total Organic Carbon	mg/L			6.1	6.4	4.66	5.07
Turbidity	NTU			0.54	0.31	1.60	0.36
Uranium	mg/L		0.02	0.00051	0.00051	0.00059	0.00060
Zinc	mg/L	5		0.0059	0.0120	0.0021	0.0060

^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.

* Turbidity is a physical property that must be measured on site. It is anticipated that on site testing would demonstrate that the high turbidity recorded is a result of the high iron content oxidizing and precipitating in the raw water during transit.

^{DLA} Detected Limit Adjusted for required dilution.

1.2.10 Compliance Plan

A compliance plan for the existing system is available and is already on record with ODW. The document title with ODW is "CP-12-03-01 Shoal Lake Compliance Plan". The document is dated from February 29, 2012 and was signed by Mayor Don Yanick and CAO Nadine Gapka. This compliance plan was submitted to address the lack of a primary disinfectant, and highlights recommendations from the 2010 Engineering Assessment, and proposed actions from the Town of Shoal Lake including the proposed construction of a new WTP, and preliminary budgets (now out-of-date), and the stated goal of applying/receiving infrastructure funding.

2.0 Description of Proposed Development

2.1 Project Description

The proposed development includes:

1. Installation of one raw water supply well in Shoal Lake.
2. Construction of a water plant at the location of the existing well site building.
3. Construction of a membrane concentrate pipeline from the new Shoal Lake WTP to Shoal Lake approximately 1 km due west of the new WTP.

The existing well site building with chlorine disinfection equipment will be decommissioned when the new water treatment plant is commissioned. All pipelines will be installed in municipal road allowances.

This development requires approval to discharge concentrate from the membrane plant to Shoal Lake.

Refer to the Drawing in the Appendix, which shows the locations of the infrastructure.

2.1.1 Water Source

The raw water source was discussed in previous sections.

2.1.2 Proposed Water Treatment Plant

The proposed Rural Municipality of Yellowhead, Shoal Lake water plant will be classified as a Class 3 Water Treatment Facility. The existing chlorination treatment system will be replaced with a 16.7 L/s raw Reverse Osmosis (RO) membrane unit treatment system. The proposed system will have a manganese greensand filter by-pass in conjunction with the RO unit. The proposed membrane filtration is effective in protecting against viruses and cysts such as *Cryptosporidium* oocysts and *Giardia lamblia* cysts as well as removing sodium, sulfate, TDS, and softening the water to acceptable concentrations. The high ammonia values for Shoal Lake will limit the amount of water that can be run through the greensand filter bypass. The new treatment system will have capacity to meet project 20-year population demands in Shoal Lake and rural residents meeting current regulations.

Membrane concentrate is projected to be in the range of 20 to 30% of the total raw water flow. This rejection rate depends on raw water quality and membranes selected to achieve desired treated water quality.

For Shoal Lake a reject rate of 25% was selected from experience in operating similar Board plants. The proposed raw water pumping rate for an average day is 9.3 L/s with 2.3 L/s as concentrate flow. For peak day demands, raw water pumping rate is estimated to be 16.7 L/s with a concentrate flow of 4.2 L/s.

It is proposed that a pumping system and pipeline system be constructed to Shoal Lake to discharge concentrate water from the membrane water treatment plant.

The detailed design of the proposed WTP will be finalized and submitted to Office of Drinking Water for a construction permit when all approvals are received.

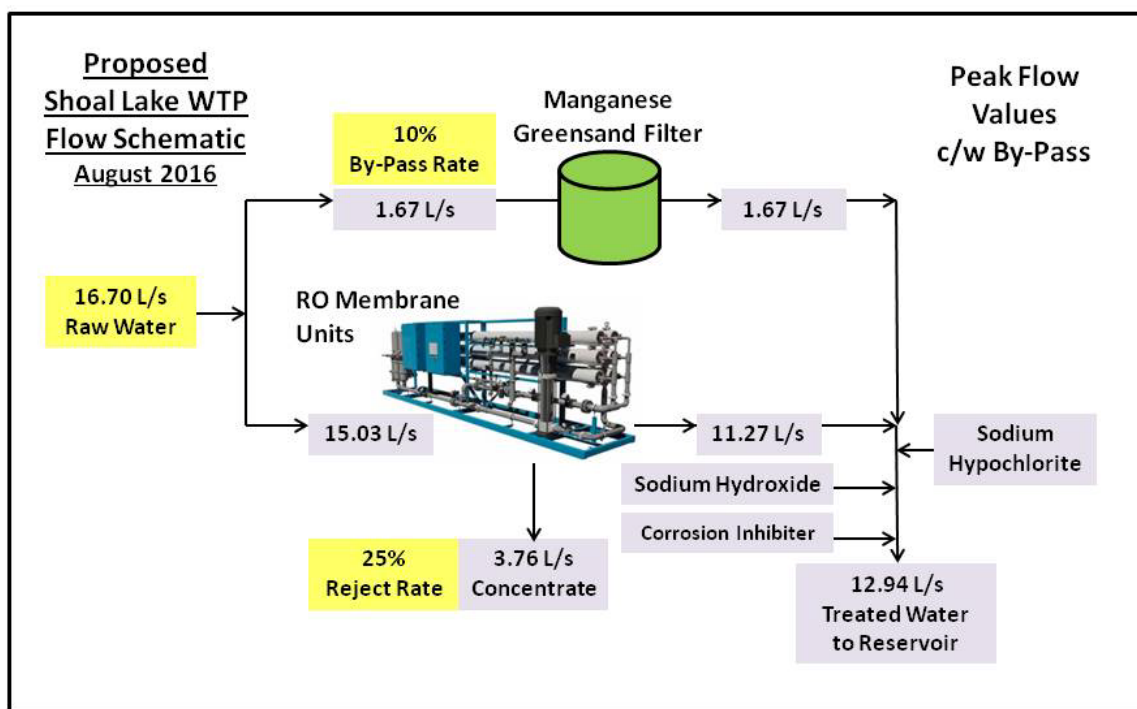


Figure 2.1 - Membrane Flow Analysis

The membrane system will be designed to produce water quality which meets CDWQ guidelines and Water Safety Act. Membrane systems remove a significant portion of the dissolved minerals and permeate produced is corrosive. In order to achieve an aesthetically acceptable level of hardness, it is proposed that approximately 10% percent of the raw water flow will be treated using a manganese filter for blending with membrane permeate. Membrane permeate is generally chemically unstable and filtered by-pass water with addition of caustic soda will balance pH to achieve a chemically stable water within the water distribution system.

2.1.3 Backwash and Concentrate Disposal

Membrane systems typically generate a mineralized concentrate stream. Concentrate streams vary between 10% to 30% of the total flow for membrane systems, depending on the arrangement and type of membranes selected. The proposed membrane system was modeled with 75% recovery rate with 25% concentrate rate of the flow through the membrane unit.

It is proposed that membrane concentrate be discharged to Shoal Lake through a 150 mm diameter pipeline.

Shoal Lake, the lake itself, is approximately 1 km due west of the existing Shoal Lake well site building. The new WTP is proposed to be constructed at the existing well site. It is proposed to install the concentrate pipeline straight east-west along "1st Avenue" from the new WTP to Shoal Lake. For reference purposes, 1st Avenue is located just southeast on the outskirts of the Town of Shoal Lake.

This is the only concentrate water disposal option considered in this EAP. Shoal Lake is the largest water body in the area. Other water bodies in the area are smaller with longer pumping distances being impractical from an operational and cost perspective. Concentrate discharge from membrane plants is highly mineralized (relatively) and tends to form deposits within pipelines; the greater the length of pipeline the greater the probability of pipeline encrustation and clogging.

2.1.4 Operation and Maintenance

The Rural Municipality is responsible for operation and maintenance of the public water system which includes the well site, raw water pipeline, and proposed WTP. Staff will be required to periodically inspect flushouts, air

releases, etc. to ensure the system performance is maintained. In addition, an operator will be required to submit bi-weekly water samples for bacteriological testing in accordance with the Manitoba Drinking Water Quality Standards Regulation. Staff will read water meters on a quarterly basis and respond to maintenance issues related to the system.

The operators will be required to operate the facility in a safe and efficient manner in accordance with relevant operation manuals and DWSA. Operation requirements will include measurements, monitoring, sampling, testing, record-keeping, and reporting. Operators will be required to perform proper maintenance and inspection. The operators will receive training operation and maintenance training for the new water plant during the commissioning phase.

Typical system operating costs include: chemicals, staff salaries, electrical costs, allowance for membrane replacement every 5 years, general repairs, bacteriological testing, staff certification and training, and a reserve fund for future replacement or expansion. Operating and maintenance costs are recovered through the sale of water in the distribution system. All retail water rates are subject to Public Utilities Board approval.

2.2 Certificate of Title

The wells are located on municipal owned land. The proposed new WTP will be on municipal owned land.

It is anticipated that easements may be required to facilitate the construction of the concentrate pipeline. Alternative routes will be investigated to avoid easements and/or land purchase agreements.

2.3 Mineral Rights

All mineral rights associated with lands for the existing and proposed new facilities belong to the Crown.

2.4 Existing and Adjacent Land Use

The proposed land for the development will be on municipal and provincially owned land in highway and roadway Right-of-Ways (ROWs). Within the RM, adjacent land is agriculture. Within the Town, adjacent land is industrial, commercial, and residential. Existing and adjacent land use will not change as a result of this development.

2.5 Land Use Designation and Zoning

Refer to Section 2.4.

2.6 Agricultural and Livestock Water Use

The Public Water System (PWS) for the Rural Municipality of Yellowhead was designed for the Community of Shoal Lake. The assumption was that a portion of the rural residents of the RM will be serviced by the new WTP while the remainder are serviced by individual wells. In addition, the projected treated water demands for the new WTP include a portion for livestock use. Refer to Table 1.1.

2.7 Water Conservation Report

Water conservation measures will include metering and sustainable water rates to cover operating and establish reserves. Water conservation information in water bill mailings can be implemented. Leak detection will consist of comparing the volume of water pumped and charged to ratepayers on a quarterly basis. Since all service connections are metered, abnormalities can be identified and rectified.

2.8 Project Schedule

The development of this water project is anticipated to occur as a one-phase process with strict deadlines. Funding has been approved and construction must be completed by March 31, 2018. Therefore, this project must be designed, engineered, permitted, constructed, and commissioned before the end of March 31, 2018.

2.9 Project Funding

This project has been approved for cost sharing between the Governments of Canada, Manitoba, and the Rural Municipality, subject to all approvals.

2.10 Regulatory Approvals

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

- Department of Sustainable Development - Environmental Approvals
- Department of Sustainable Development - Office of Drinking Water (ODW)
- Department of Manitoba Infrastructure (MI)

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

2.11 Public Consultation

A public consultation will be held in the future to discuss the proposed new WTP project with Shoal Lake residents as part of the borrowing by-law process. It is not expected that there will be major concerns regarding the proposed project which will produce pristine water meeting current regulations.

3.0 Description of Existing Environment in the Project Area

3.1 Physiography

The Rural Municipality of Yellowhead is located in western Manitoba, approximately 30 km south of Riding Mountain National Park (RMNP) and approximately 80 km north of Brandon.

The area slopes southwest from Riding Mountain to the Assiniboine River Valley. The land surface varies from relatively flat upland areas with numerous sloughs and potholes to the steep slopes and incised gullies on the flanks of the Assiniboine River Valley. The ground elevation at the Town of Shoal Lake is on the order of 550m to 550m. The base of the Assiniboine River Valley is at an elevation on the order of 410m. Surface water drainage is towards the Assiniboine River Valley.

3.2 Climate

There are several Government of Canada weather stations located near the Town of Shoal Lake.

In general, the western portion of Manitoba, north of Brandon and south of Riding Mountain National Park (RMNP), has weather patterns which are a mixture between Brandon and Dauphin. The western portion of Manitoba is also influenced by weather patterns blown eastbound from Saskatchewan. Historical average normal temperatures for the month of July are plus 25 degrees Celsius ranging to minus 25 degrees Celsius (without wind-chill) for the month of January. There is approximately 500 mm of precipitation (rain and snow) per year in this region.

3.3 Hydrogeology

According to a soil survey map of the Rossburn area in Manitoba from a Manitoba/ Canada joint venture for the Departments of Agriculture, the soil geography surrounding the Town of Shoal Lake is "Nc" which is Newdale Clay Loam (Calcareous and Salinized associates) which is a blackearth soil developed on moderately calcareous till.

3.4 Hydrology

There are numerous smaller "pothole" lakes surrounding the Town of Shoal Lake. Locally, the largest water body is Shoal Lake, which the name of the Town was derived. In this greater region, the Assiniboine River runs north-south, over 50 km west of Shoal Lake; the Manitoba-Saskatchewan border is over 60 km west.

The relevant water body for this EAP is Shoal Lake. From Google Earth, it is estimated that the surface area of Shoal Lake is approximately 15 quarter-mile sections or 3.75 square miles or 9.7 square kilometers. This does not include the surface area of the greater watershed.

There is no Government of Canada, Environment Canada (EC), hydrometric station located near Shoal Lake.

3.5 Fish and Fish Habitat

From the official website for the Rural Municipality of Yellowhead:

Fishing:²

Shoal Lake:²

Fishermen enjoy the abundant supply of walleye, northern pike and perch which are kept healthy year round thanks to two aeration systems supplied in part by the Lions Club. There have been a number of master angler/trophy fish proudly pulled out of Shoal Lake. Fish, golf, and camp close to downtown. Ice fishing shacks are also a common site on the lake throughout the winter months.²

Thus, Shoal Lake is a managed lake with stocked fish and aeration systems.

3.6 Habitat, Vegetation and Wildlife

Depending on the information source and nomenclature, the terrestrial environment (ecozone) of western Manitoba south of Riding Mountain National Park (RMNP) is called either "Prairies" or "Aspen Parkland". RMNP is part of an area of land called "Boreal Plains" or "Boreal Forest" and occasionally "Western Uplands". We will consider the

Rural Municipality of Yellowhead as "Aspen Parkland".

From the website for the "World Wildlife Federation" (.org), there is abundant information regarding this ecozone "Canadian Aspen Forests and Parklands".³ This source contains information on habitat, vegetation and wildlife. Further details will not be provided here for the sake of brevity.

The entire proposed project will occur within previously developed and disturbed land within the Community of Shoal Lake or just outside the community limits. Thus, it is not expected that there will be any Species-At-Risk (SAR), with regards to flora and fauna.

An information request was made to the Manitoba Conservation Data Centre (CDC), a branch of the Government of Manitoba, regarding any records of Species-At-Risk (SAR). On August 2, 2016, CDC sent an email with the following search results:
"There are no records of species at risk (plant or animal) along the proposed routes."

No biological surveys are planned along the pipeline routes because it was determined through field inspections that the proposed routes are entirely composed of previously disturbed areas, most of which are ditches within highway/roadway Right-of-Ways (ROWs), with some RM/ Town/ private property, and/or farmer's fields (if necessary).

There are no naturally vegetated (previously undisturbed) areas along any of the proposed routes.

Tree clearing is not anticipated as a requirement for the project. If tree clearing or grubbing is required, it will be inside ditches within highway/roadway Right-of-Ways (ROWs), and it will be minimal and selective. It was determined through field inspections that the proposed routes do not contain old-growth/ legacy forestry resources.

3.7 Socioeconomic

The Rural Municipality of Yellowhead is a mixture of rural living (Town, Village, and country), agricultural, and tourism including recreational fishing and hunting.

This Environment Act Proposal (EAP) is to upgrade and modernize the Public Water System (PWS) specifically through the construction of a new membrane WTP. This work will ensure the long-term supply of potable water which is necessary to ensure the continued socio-economic sustainability and growth of rural communities. There are no public safety and human health risks associated with this project. In fact, this project mitigates risks through the provision of quality water.

3.8 Parks

The nearest provincial and federal parks are located outside the environmental impact area of this project. The nearest federal park is Riding Mountain National Park (RMNP) which is approximately 30 km due north. The nearest provincial parks are Aseissippi Provincial Park (80+ km away) and Rivers Provincial Park (50+ km away).

3.9 Heritage Resources

No heritage resources will be disturbed since the various components of this project will occur on previously disturbed land such as municipal property, highway/roadway allowances or easements, etc.

3.10 Aboriginal Communities

Regarding First Nation (FN) communities in the area: Keeseekoowenin FN is 25 km away, Waywayseecappo FN is 35 km away, Birdtail Sioux FN is 45 km away. Keesee, Wayway, and Birdtail all are located in Treaty # 2 land. Manitoba has a large Metis population. Metis are considered aboriginal under Section 35 of the Constitution Act of Canada (1982) along with Indian and Inuit. There are no recognized Metis communities in western Manitoba, according to the Department of Indigenous and Municipal Relations for the Province of Manitoba.

Due to the distance from aboriginal communities, consultation is not a requirement because of the geographic location of the proposed Shoal Lake water plant and no environmental impact on aboriginal communities.

4.0 Description of Environmental and Human Health Effects of the Proposed Development

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

4.1 Air Quality

During construction, dust will be raised by construction and transportation equipment and there will be gaseous and particulate emissions from the construction equipment. Any effects would be localized, temporary and insignificant. During the development, there will be no pollutants released to the air besides the ones discussed previously.

4.2 Soils

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

During operation, project activities are limited to regular monitoring and maintenance activities that have a negligible effect on soil disturbance and compaction because of low vehicle traffic volumes and the use of established routes to access the locations. Regular monitoring and maintenance activities will have a negligible effect on soil contamination since fuel trucks and other hazardous substances will not be brought on site on a regular basis. The potential adverse effect on soil quality is assessed to be minor.

4.3 Surface Water, Fish Habitat and Fisheries

Minor and short-term impacts on surface water may occur as a result of construction activity in highway and roadway allowances and 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. Horizontal directional drilling will be conducted to install pipelines at waterway crossings and discharge outlets. This will eliminate excavation within the riparian zone and minimize impacts. There is potential for some loss of drilling mud to the surface water. Impacts to fish habitat and fisheries are assessed to be minor.

Regarding Shoal Lake, surface water will not be affected since the discharge is carefully controlled through piping and a discharge point. Fisheries will not be affected in Shoal Lake since this is a human-altered and human-controlled lake as demonstrated by the stocking of fish and year-round aeration within the lake. Refer to Section 3.5: Fish and Fish Habitat.

Water quality samples and chemistries will be taken from Shoal Lake, the water body to be used for the concentrate discharge. The results were not available at the time of writing but will be made available upon future request. The results will be analyzed. It is fully expected the results will be:

"Impacts to fish habitat and fisheries are assessed to be negligible."

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 effects to water quality. Nevertheless, the potential still exists and monitoring of the raw water quality will be required to identify any such adverse effects and allow the appropriate adjustments in the operation to the system after construction.

4.5 Groundwater Levels

Refer to Section 1.2.8: Water Rights Act.

A new Water Rights License (WRL) will be applied for the Rural Municipality of Yellowhead. The available information indicates that the proposed withdrawal of groundwater is unlikely to result in adverse changes to groundwater levels. Nevertheless, the potential still exists and monitoring will be required.

4.6 Vegetation

Construction will occur primarily within Right-of-Ways (ROWs) or easements that are previously disturbed, regularly managed, and comprised primarily of grasses. As the areas are already disturbed, they are unlikely to contain rare plant species, and the amount of vegetation disturbance is expected to be minimal.

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

Forestry resources will not be impacted in short-term or long-term.

4.7 Wildlife Habitat

The construction and operation activities associated with this project will be limited to areas already developed for agriculture, industrial, commercial, or residential or hydro utilities. The potential adverse effects of wildlife habitat loss are assessed to be negligible to minor.

There will be negligible to minimal short-term impacts on wildlife and no long term impacts.

4.8 Noise and Vibration

During construction, there will be several sources of sound emissions including construction equipment and vehicles. The types of noises heard due to construction are dominated by engines. However, miscellaneous short-term noises (i.e. dump truck gates, back hoe buckets, etc.) are often heard. The noise will be in addition to the regular community and highway activities. The effects are assessed to be minor.

4.9 Heritage Resources

No heritage resources will be disturbed since the various components of this project will occur on previously disturbed land such as municipal property, highway/roadway allowances or easements, etc.

4.10 Employment/Economy

Socio-economic implications are not expected as a result of the environmental impacts as the impacts are considered minor and short-term. Some economic implications may exist for the Town and RM due to the financial costs of development. However, the Town and RM will have a sustainable potable water supply to meet future demands. The proposed project will address limited treatment capacity and water quality issues at Shoal Lake. There will be some local economic benefit during construction. The potential effects of the project on employment and the economy are assessed to be positive.

There are no expected negative socio-economic implications resulting from this proposed project. In fact, there will be positive socio-economic implications since this project is necessary to ensure the continued socio-economic sustainability and growth of the communities.

4.11 Human Health and Well-being

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

The project will result in the construction of a new WTP and pipelines designed and operated to produce a treated water supply to meet current water quality standards. This will produce a higher standard of living. The effects on human health and well-being are considered positive.

There is no public safety and human health risks associated with this project. In fact, this project mitigates risks through the provision of quality water.

4.12 Climate Change

It is predicted there will be no impacts to the climate as a result of these project activities.

Climate change implications due to this project can be classified as negligible.

5.0 Mitigation Measures and Residual Environment Effects

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

The construction and installation of water supply pipelines and concentrate discharge pipelines will be in accordance with standard industry practices and the General and Special Conditions from the Manitoba Water Services Board (MWSB), which have been specifically designed to mitigate the risks involved with these activities. The pipelines will be constructed by open-trenching, directional drilling, or a combination of both techniques depending on the location.

The work shall be designed by a Professional Engineer registered in Manitoba and shall be in general conformance to the Ten State Standards, Canadian Standards Association (CSA), American Water Works Association (AWWA), and provincial regulatory standards and guidelines.

The protection of the environment and human health will remain a key priority throughout all phases of this project.

5.1 Air Quality

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

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

Water spraying is an important, common and practical procedure that would be applied as required to alleviate potential dust problems.

Burning of shrubs etc. will only occur on days and times where wind conditions are favorable. Burning could be limited to days permitted for burning according to the Manitoba Crop Residual Burning Program.

5.2 Soils

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

In the event of a reportable spill, the Department of Sustainable Development will be notified through the emergency response line and appropriate measures will be taken according to the Department of Sustainable Development requirements.

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

5.3 Surface Water, Fish Habitat and Fisheries

Mitigation of surface water issues may be achieved by limiting open cut trenching to 30m from sensitive areas and providing erosion control practices as required.

The same procedures for petroleum products (fuel or lubricants) will be applied to water as with soil.

Fisheries impacts will be minimized by implementing practices to reduce soil and contaminate runoff. The proponent will work with provincial officials should any concerns arise.

Regarding Shoal Lake, the proponent will conduct long-term monitoring of Shoal Lake to verify impacts on water quality.

5.4 Groundwater Quality

Groundwater is primarily protected by the natural hydrogeology in the area. Mitigation of potential groundwater impacts from petroleum products was described in earlier sections. Groundwater monitoring will be performed as required to address potential issues associated with groundwater quality.

The recommended water quality sampling program consists of quarterly sampling of groundwater for the first year of operation. Following this initial year of sampling, the recommended frequency is at minimum annually. The laboratory analyses should include hardness, alkalinity, Total Dissolved Solids (TDS), electrical conductivity, major cations and anions (calcium, sodium, magnesium, hydrogen carbonate, sulfate, chloride), dissolved metals (including arsenic), and iron and manganese. The samples should be collected at a designated location on the raw water side of the water treatment system using sample bottles and methods in accordance with the laboratory instructions. This sampling is separate from any routine sampling program required as part of the operation from the WTP.

5.5 Groundwater Levels

The availability of groundwater usage for this proposal and potential future users will be assessed through the Water Rights Act licensing process. Groundwater monitoring will be performed as required to address potential issues associated with groundwater levels.

The recommended groundwater level monitoring program would include the use of several monitoring wells at locations owned by the RM or the Province. The monitoring well should be equipped with a continuous groundwater level monitoring device such as a digital pressure transducer capable of recording groundwater levels on at least a daily basis. The information would be downloaded on a regular basis (typically quarterly) and input into a suitable database capable of generating charts of water level trends over time.

5.6 Vegetation

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

5.7 Wildlife Habitat

Impacts to wildlife habitat can be limited by minimizing the area of construction, vegetation and soil disturbance.

5.8 Noise and Vibration

Noise disturbance will be limited by use of mufflers on equipment and vehicles, limiting idling, and minimizing the construction area.

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.

5.9 Heritage Resources

If by chance, heritage resources are found in an unexpected area, work will be stopped to assess the situation and the relevant authorities will be contacted.

5.10 Employment/Economy

MWSB works closely with the local community in the development of projects; as such, this should mitigate any unwanted socio-economic effects.

5.11 Human Health and Well-being

All Federal, Provincial, and Municipal acts and regulations and guidelines will be followed.

5.12 Climate Change

Mitigation for climate change is encapsulated within the other mitigation measures.

6.0 Follow-up Plans including Monitoring and Reporting

In the future, there will have to be a "Permit to Construct or Alter a Public Water System" under the Drinking Water Safety Act (DWSA), submitted to the Office of Drinking Water (ODW), which is part of the Department of Sustainable Development. Also, there will have to be an Operating License for the new system including the new Water Treatment Plant (WTP) in Shoal Lake.

7.0 Conclusions

In conclusion, this Environment Act Proposal (EAP) for a Class 1 Development License under the Manitoba Environment Act for the construction of a new Shoal Lake water treatment plant with concentrate discharge to Shoal Lake has demonstrated that this proposed work meets or exceeds regulatory requirements and is environmentally responsible.

8.0 References

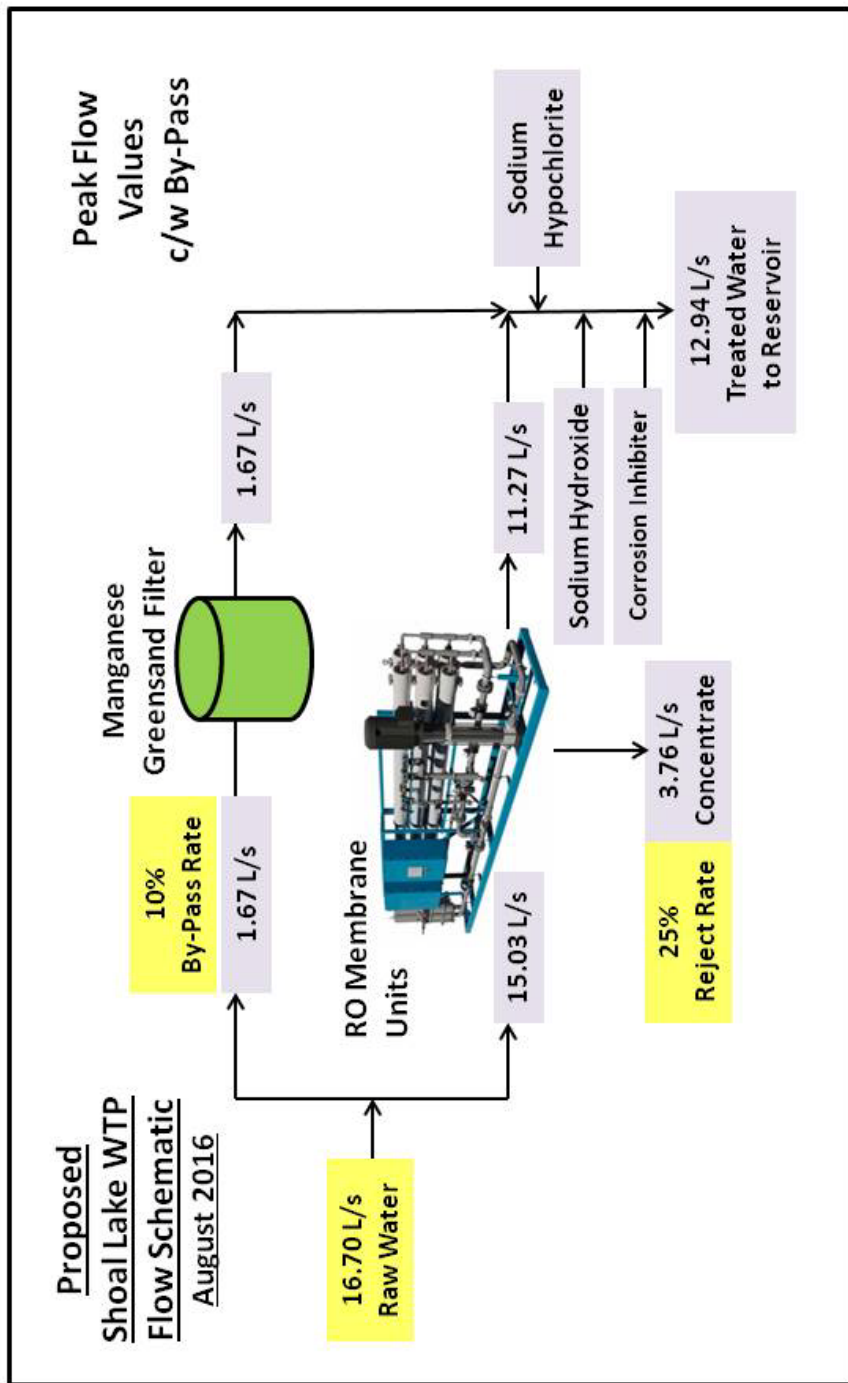
1. MWSB, Nathan Wittmeier, March 2014, Hamiota - Shoal Lake Regional Water Supply Feasibility Study.
2. Rural Municipality of Yellowhead official website: (July 29, 2016)
<http://yellowheadmunicipality.ca/default.aspx>
3. WWF (org), World Wildlife Fund or World Wide Fund for Nature (WWF), Ecoregion: Canadian Aspen Forests and Parklands: (July 29, 2016)
<http://www.worldwildlife.org/ecoregions/na0802>

9.0 Appendix

9.1 Appendix A - Shoal Lake Route Drawing



9.2 Appendix B - Membrane Flow Analysis



9.3 Appendix C - Existing Operating License (PWS-12-517-A)



**OPERATING LICENCE FOR
A PUBLIC WATER SYSTEM**

LICENCE NUMBER: PWS-12-517 A

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

WATER SYSTEM CODE: 197.00
OPERATION ID: 16844
EFFECTIVE DATE: JANUARY 1, 2015
EXPIRY DATE: MAY 31, 2017

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

RURAL MUNICIPALITY OF YELLOWHEAD: "THE LICENSEE"

FOR THE OPERATION OF THE **SHOAL LAKE PUBLIC WATER SYSTEM**, WHICH INCLUDES SECURE 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: December 12, 2014

Kim Philip, P.Eng.
Director

Page 1 of 6

TERMS AND CONDITIONS

1. GENERAL

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

2. OPERATION - GENERAL

- 2.1. The Licensee shall operate all water system facilities, control systems and equipment as efficiently as possible, inspect them on a regular basis, maintain them in good working order, and ensure that the water system is protected from the risks associated with cross-contamination.
- 2.2. The Licensee shall ensure that all chemicals and components that may come into contact with potable water are certified safe for potable water use through AWWA Standards, ANSI/NSF Standard 60 or 61, Health Canada, or other standards acceptable to the Director.
- 2.3. No alternate water source shall be brought into service without the consent of the Drinking Water Officer and the maintenance of adequate cross connection control between the alternate source and the primary source.
- 2.4. The Licensee shall have a re-assessment of the water system infrastructure and water supply sources completed and submitted by a qualified professional engineer, who is not an employee of the water system, in a form satisfactory to the Director by March 1, 2017 and every five years thereafter.
- 2.5. The Licensee shall update and re-submit the compliance plan in a form and timeframe satisfactory to the Director if the contents and schedule of the plan have changed significantly and a revised plan has become necessary. The revised compliance plan is to address the following standards:
 - a) 20 minute chlorine contact time, or a method or combination of methods approved by the Director

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 but not limited to 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/TREATMENT STANDARDS

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

Table 1: Water Quality/Treatment Standards

Parameter	Quality Standard
Total coliform	Less than one total coliform bacteria detectable per 100 mL in all treated and distributed water
<i>E. coli</i>	Less than one <i>E. coli</i> bacteria detectable per 100 mL in all treated and distributed water
Monochloramine	A monochloramine residual of at least 1.0 mg/L at the treated water sampling location established by the Drinking Water Officer A monochloramine residual of at least 0.3 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
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 exceedances as directed by the regional Drinking Water Officer, a Corrective Actions Form must be completed and submitted to the regional Drinking Water Officer.

5. WATER QUALITY MONITORING

5.1. The Licensee shall ensure monitoring is completed as set out in Table 2.

Table 2. Monitoring Schedule

Parameter	Monitoring Requirement
Bacteriological (total coliform and <i>E. coli</i>)	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
Heterotrophic plate count (HPC) (distribution system)	One sample taken on a quarterly basis during February, May, August, and November, each year at a dead end sampling location in the distribution system

Parameter	Monitoring Requirement
Monochloramine (treated water)	One sample per day at the treated water sampling location established by the Drinking water Officer
Monochloramine (distribution system)	At the same times and location(s) as bacteriological distribution system sampling One sample on a bi-weekly basis, at a dead end sampling location in the distribution system
Total chlorine (treated water)	One sample per week at the treated water sampling location established by the Drinking water Officer
Total chlorine (distribution system)	At the same times and location(s) as bacteriological distribution system sampling One sample on a bi-weekly basis, at a dead end sampling location in the distribution system
Free ammonia (treated water)	One sample per week at the treated water sampling location established by the Drinking water Officer
Free ammonia (distribution system)	At the same time and location(s) as bacteriological distribution system sampling One sample on a bi-weekly basis, at a dead end sampling location in the distribution system
Nitrite and nitrate (treated water)	One sample taken on a quarterly basis during February , May, August, and November, each year
Nitrite and nitrate (distribution system)	One sample taken on a quarterly basis during February , May, August, and November, each year at a dead end sampling location in the distribution system
General chemistry (parameter list provided by Office of Drinking Water)	One raw and one treated water sample once every three years
Lead	As per the instructions of the Drinking Water Officer

- 5.2. The Licensee shall ensure that an accredited laboratory, as specified in section 35 of Manitoba Regulation 40/2007 the *Drinking Water Safety Regulation*, undertake the following analysis required in Table 2:
- a) bacteriological (total coliform and *E. coli*)
 - b) heterotrophic plate count
 - c) nitrite and nitrate
 - d) general chemistry
 - e) any other parameter required by the Drinking Water Officer
- and that all samples are collected, handled, and submitted in a manner that is satisfactory to the accredited laboratory.
- 5.3. The Licensee shall ensure that parameters listed in Table 2 but not specified in clause 5.2 are measured utilizing water quality monitoring equipment and methods approved by the U.S. Environmental Protection Agency (EPA).
- 5.4. The Licensee shall ensure that raw water samples are taken on an alternating basis in instances where more than one water supply source is used.

- 5.5. The Licensee shall ensure that all water quality monitoring equipment is properly maintained and calibrated by a qualified person according to manufacturer recommendations and that records are maintained to that effect.
- 5.6. The Licensee shall ensure that sampling within the distribution system takes place at varied locations acceptable to the Drinking Water Officer.

6. RECORD-KEEPING AND REPORTING

- 6.1. The Licensee shall maintain in a secure location all construction drawings for the life of the water system components.
- 6.2. The Licensee shall retain in chronological order for a minimum of 24 months all information specified in subsection 34(2) of *Manitoba Regulation 40/2007, Drinking Water Safety Regulation*.
- 6.3. The Licensee shall ensure the information identified in clause 6.2 is available for inspection by any member of the public during normal business hours at the office of the water supplier or at a location convenient to the users of the system.
- 6.4. The Licensee shall record disinfectant residual measurements on the monthly disinfection report or other forms satisfactory to the Director.
- 6.5. The Licensee shall record other measurements as specified in *Table 2: Monitoring Schedule* on the monthly report forms or other forms satisfactory to the Director.
- 6.6. The Licensee shall keep one copy of all monthly report forms required in Clauses 6.4 and 6.5, and forward the original copy to the Drinking Water Officer within seven days after the end of each calendar month.
- 6.7. The Licensee shall record all distribution system measurements specified in *Table 2: Monitoring Schedule* on the chain of custody form (laboratory submission form) which accompanies the bacteriological sample bottles to the laboratory.
- 6.8. The Licensee shall ensure that water metering devices at the water treatment plant or storage reservoir 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.
- 6.9. The Licensee shall record corrective actions for minor exceedances as discussed in clause 4.4 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 report forms.

9.4 Appendix D - Existing Water Rights License (#2009-020)

1483-14854 (English)

**Licence to Use Water for
Municipal
Purposes**

Manitoba
Conservation and Water Stewardship
200 Saulteaux Cresc.
Winnipeg, Manitoba
R3J 3W3

Project: Shoal Lake

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

Licence No.: **2009-020**
(Original Lic. No.: 83-57)
U.T.M.: Zone 14 387606 E
5587915 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
The Town of Shoal Lake in the Province of Manitoba (hereinafter called "the LICENSEE") to divert water from a **sand and gravel** aquifer by means of two water wells, pumps, pipeline(s) and other appurtenances (hereinafter called "the WORKS"), located on the following described lands:

the East Half of Section 9, in Township 17 and Range 23, West of the Principal Meridian in Manitoba, more particularly described on Certificate of Title Nos. 1649843 and 114383 NLTO,
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:

in Section 9, in Township 17 and Range 23, West of the Principal Meridian in Manitoba.

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

1. The water shall be used solely for **municipal** purposes.
2. The 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 **0.016 cubic metres per second (0.6 cubic feet per second)**
b) The total quantity of water diverted in any one year shall not exceed **154.18 cubic decametres (125.00 acre feet)**
4. Water shall not be diverted during any period when the water level in the aquifer as measured at:
a) Well No. 1 is more than 48.0 metres (157.4 feet) beneath the surface of the ground.
b) Well No. 2 is more than 28.3 metres (92.9 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 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 342, Shoal Lake, MB, R0J 1Z0, 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.

Page 1 of 2

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 wells or other forms of supply, which were constructed and operating prior to the date of application for the original Licence (No. 83-57), and 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 _____ day of _____ A.D. 20_____.

SIGNED, SEALED AND DELIVERED
in the presence of

Witness } _____ (Seal)
Licensee

Canada, PROVINCE OF MANITOBA To Wit:

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

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

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

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

My Commission expires _____

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

The Honourable the Minister of Conservation and Water Stewardship

9.5 Appendix E - Shoal Lake Water Chemistry - Raw & Treated



Office of Drinking Water
ATTN: CHRISTINE GERARDY
1129 Queens Avenue
Brandon MB R7A 1L9

Date Received: 02-JUN-16
Report Date: 20-JUN-16 15:22 (MT)
Version: FINAL

Client Phone: 204-570-1405

Certificate of Analysis

Lab Work Order #: L1777314
Project P.O. #: 16844
Job Reference: SHOAL LAKE - PWS 197.00
C of C Numbers:
Legal Site Desc:

A handwritten signature in black ink, appearing to read 'Hua Wo', written over a horizontal line.

Hua Wo
Chemistry Laboratory 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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ANALYTICAL REPORT

L1777314 CONTD....
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Physical Tests (WATER)

Analyte	Unit	ALS ID		L1777314-1	L1777314-2
		Guide Limit #1	Guide Limit #2	SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED
Colour, True	CU	15	-	<5.0	<5.0
Conductivity	umhos/cm	-	-	2760	2760
Hardness (as CaCO3)	mg/L	-	-	271	268
Langelier Index (4 C)	No Unit	-	-	0.39	0.50
Langelier Index (60 C)	No Unit	-	-	1.1	1.2
pH	pH units	6.5-8.5	-	7.63	7.74
Total Dissolved Solids	mg/L	500	-	1940	1950
Transmittance, UV (254 nm)	%T/cm	-	-	83.8	80.7
Turbidity	NTU	-	-	1.60	0.36

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Anions and Nutrients (WATER)

Analyte	Unit	ALS ID		L1777314-1	L1777314-2	L1777314-3
		Guide Limit #1	Guide Limit #2	SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED	SHOAL LAKE 3 - DIST
Alkalinity, Total (as CaCO3)	mg/L	-	-	572	569	
Ammonia, Total (as N)	mg/L	-	-	2.77	2.39	
Bicarbonate (HCO3)	mg/L	-	-	698	694	
Bromide (Br)	mg/L	-	-	<0.50 DLM	<0.50 DLM	
Carbonate (CO3)	mg/L	-	-	<0.60	<0.60	
Chloride (Cl)	mg/L	250	-	101	107	
Fluoride (F)	mg/L	-	1.5	0.20 DLM	0.21 DLM	
Hydroxide (OH)	mg/L	-	-	<0.34	<0.34	
Iodide (I)	mg/L	-	-	<2.0	<2.0	
Nitrate and Nitrite as N	mg/L	-	10	<0.025	0.069	<0.11
Nitrate (as N)	mg/L	-	10	<0.025 DLM	0.040 DLM	<0.10 DLM
Nitrite (as N)	mg/L	-	1	0.0076 DLM	0.0292	<0.050 DLM
Total Kjeldahl Nitrogen	mg/L	-	-	3.05	2.70	
Total Nitrogen	mg/L	-	-	3.05	2.77	
Sulfate (SO4)	mg/L	500	-	757	759	
Anion Sum	me/L	-	-	30.1	30.2	
Cation Sum	me/L	-	-	33.2	32.5	
Cation - Anion Balance	%	-	-	5.0	3.7	

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)


#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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

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



ANALYTICAL REPORT

L1777314 CONTD....
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Organic / Inorganic Carbon (WATER)

Analyte	Unit	Guide Limit		ALS ID	L1777314-1	L1777314-2
		Limit #1	Limit #2	Sampled Date	Sampled Time	Sample ID
Dissolved Organic Carbon	mg/L	-	-	01-JUN-16	12:30	01-JUN-16 11:00
Total Inorganic Carbon	mg/L	-	-	SHOAL LAKE 1 - RAW		SHOAL LAKE 2 - TREATED
Total Organic Carbon	mg/L	-	-	4.66	139	5.13
				4.66	5.07	

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
 #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.

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ANALYTICAL REPORT

L1777314 CONTD....
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Total Metals (WATER)

Analyte	Unit	ALS ID		L1777314-1	L1777314-2	L1777314-3
		Guide Limit #1	Guide Limit #2	Sampled Date Sampled Time Sample ID	Sampled Date Sampled Time Sample ID	Sampled Date Sampled Time Sample ID
				01-JUN-16 12:30 SHOAL LAKE 1 - RAW	01-JUN-16 11:00 SHOAL LAKE 2 - TREATED	01-JUN-16 12:45 SHOAL LAKE 3 - DIST
Aluminum (Al)-Total	mg/L	0.1	-	0.0024	0.0027	0.0014
Antimony (Sb)-Total	mg/L	-	0.006	<0.00020	<0.00020	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	0.00342	0.00361	0.00356
Barium (Ba)-Total	mg/L	-	1	0.00982	0.00970	0.00997
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	5	2.1	2.1	2.1
Cadmium (Cd)-Total	mg/L	-	0.005	<0.000010	<0.000010	<0.000010
Calcium (Ca)-Total	mg/L	-	-	75.0	74.6	72.3
Cesium (Cs)-Total	mg/L	-	-	<0.00010	<0.00010	<0.00010
Chromium (Cr)-Total	mg/L	-	0.05	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Total	mg/L	-	-	0.00174	0.00171	0.00166
Copper (Cu)-Total	mg/L	1	-	0.00218	0.0108	0.690
Iron (Fe)-Total	mg/L	0.3	-	0.160	0.181	0.212
Lead (Pb)-Total	mg/L	-	0.01	<0.000090	0.000258	0.000212
Lithium (Li)-Total	mg/L	-	-	0.419	0.416	0.427
Magnesium (Mg)-Total	mg/L	-	-	20.3	19.9	20.5
Manganese (Mn)-Total	mg/L	0.05	-	0.753	0.738	0.736
Molybdenum (Mo)-Total	mg/L	-	-	0.00630	0.00602	0.00601
Nickel (Ni)-Total	mg/L	-	-	0.00306	0.00285	0.00287
Phosphorus (P)-Total	mg/L	-	-	0.273	0.265	0.266
Potassium (K)-Total	mg/L	-	-	11.5	11.9	11.8
Rubidium (Rb)-Total	mg/L	-	-	0.00553	0.00541	0.00542
Selenium (Se)-Total	mg/L	-	0.05	<0.00010	<0.00010	<0.00010
Silicon (Si)-Total	mg/L	-	-	13.8	14.2	13.9
Silver (Ag)-Total	mg/L	-	-	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total	mg/L	200	-	628	614	634
Strontium (Sr)-Total	mg/L	-	-	0.798	0.776	0.766
Tellurium (Te)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	-	-	<0.00010	<0.00010	<0.00010
Thorium (Th)-Total	mg/L	-	-	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Titanium (Ti)-Total	mg/L	-	-	<0.00050	<0.00050	<0.00050

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)


#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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ANALYTICAL REPORT

L1777314 CONTD....
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Total Metals (WATER)

		ALS ID		L1777314-1	L1777314-2	L1777314-3
		Sampled Date		01-JUN-16	01-JUN-16	01-JUN-16
		Sampled Time		12:30	11:00	12:45
		Sample ID		SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED	SHOAL LAKE 3 - DIST
Analyte	Unit	Guide Limit #1	Guide Limit #2			
Tungsten (W)-Total	mg/L	-	-	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	mg/L	-	0.02	0.00059	0.00060	0.00057
Vanadium (V)-Total	mg/L	-	-	<0.00020	<0.00020	<0.00020
Zinc (Zn)-Total	mg/L	5	-	0.0021	0.0060	0.0064
Zirconium (Zr)-Total	mg/L	-	-	<0.00040	<0.00040	<0.00040

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
 #1: GCDWQ - Aesthetic Objective
 #2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Dissolved Metals (WATER)

		ALS ID		L1777314-1	L1777314-2
		Sampled Date		01-JUN-16	01-JUN-16
		Sampled Time		12:30	11:00
		Sample ID		SHOAL LAKE 1 - RAW	SHOAL LAKE 2 - TREATED
Analyte	Unit	Guide Limit #1	Guide Limit #2		
Aluminum (Al)-Dissolved	mg/L	0.1	-	<0.0020	<0.0020

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
 #1: GCDWQ - Aesthetic Objective
 #2: GCDWQ - Maximum Acceptable Concentrations (MACs)

Volatile Organic Compounds (WATER)

		ALS ID		L1777314-1
		Sampled Date		01-JUN-16
		Sampled Time		12:30
		Sample ID		SHOAL LAKE 1 - RAW
Analyte	Unit	Guide Limit #1	Guide Limit #2	
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
1,1,1,2-Tetrachloroethane	mg/L	-	-	<0.00050
1,1,2,2-Tetrachloroethane	mg/L	-	-	<0.00050
Tetrachloroethene	mg/L	-	0.01	<0.00050
Toluene	mg/L	0.024	0.06	<0.00050
1,1,1-Trichloroethane	mg/L	-	-	<0.00050
1,1,2-Trichloroethane	mg/L	-	-	<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

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
 #1: GCDWQ - Aesthetic Objective
 #2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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

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

9.6 Appendix F - Shoal Lake Water Chemistry - Lake (Not Available)

9.7 Appendix G - Species-At-Risk (SAR)

From: [Friesen, Chris \(SD\)](#)
To: [Vitt, Cory \(MMG\)](#)
Subject: R.M. of Yellowhead – Shoal Lake; New Water Treatment Plant (EAP)
Date: August-02-16 4:01:24 PM

Cory

Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's rare species database and found no occurrences at this time for your area of interest.

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre at the time of the request. These data are dependent on the research and observations of CDC staff and others who have shared their data, and reflect our current state of knowledge. An absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present; in many areas, comprehensive surveys have never been completed. Therefore, this information should be regarded neither as a final statement on the occurrence of any species of concern, nor as a substitute for on-site surveys for species as part of environmental assessments.

Because the Manitoba CDC's Biotics database is continually updated and because information requests are evaluated by type of action, any given response is only appropriate for its respective request. Please contact the Manitoba CDC for an update on this natural heritage information if more than six months pass before it is utilized.

Third party requests for products wholly or partially derived from Biotics must be approved by the Manitoba CDC before information is released. Once approved, the primary user will identify the Manitoba CDC as data contributors on any map or publication using Biotics data, as follows as: Data developed by the Manitoba Conservation Data Centre; Wildlife & Fisheries Branch, Manitoba Sustainable Development.

This letter is for information purposes only - it does not constitute consent or approval of the proposed project or activity, nor does it negate the need for any permits or approvals required by the Province of Manitoba.

We would be interested in receiving a copy of the results of any field surveys that you may undertake, to update our database with the most current knowledge of the area.

If you have any questions or require further information please contact me directly at (204) 945-7747.

Chris Friesen
Coordinator
Manitoba Conservation Data Centre
204-945-7747
chris.friesen@gov.mb.ca
<http://www.manitoba.ca/conservation/cdc/>

-----Original Message-----

From:
Sent: July-29-16 10:17 AM
To: Friesen, Chris (SD)
Subject: WWW Form Submission

Below is the result of your feedback form. It was submitted by WWW Information Request () on Friday, July 29, 2016 at 10:16:53

DocumentID: Manitoba_Conservation

Project Title: R.M. of Yellowhead – Shoal Lake; New Water Treatment Plant (EAP)

Date Needed: 2016/08/19

Name: Cory Vitt

Company/Organization: MWSB for Manitoba Government

Address: Unit #1A - 2010 Currie Blvd.

City: Brandon

Province/State: Manitoba

Phone: 1-204-726-6083

Fax: 1-204-726-7196

Email: cory.vitt@gov.mb.ca

Project Description: Canada and Manitoba approved 27 community infrastructure projects today under two new federal infrastructure programs introduced as part of Phase 1 of the 10-year Investing in Canada plan.

R.M. of Yellowhead – Shoal Lake; New Water Treatment Plant (EAP)

Construction of new water treatment plant.

GOAL:

Need to write an EAP for this project which was approved for funding for construction for the 2017-2018 fiscal year.

Information Requested: Species At Risk (SAR); flora and fauna; within the Town of Shoal Lake and the surrounding Municipality (RM Shoal Lake/ RM Strathclair).

REQUEST:

records of species at risk (plant or animal) along the proposed routes.

Format Requested: VIA:

email:

cory.vitt@gov.mb.ca

FORMAT:

typical written statement/ sentences/ paragraphs with disclaimers.

Location: Town of Shoal Lake

R.M. of Yellowhead,
focusing on Shoal Lake.

action: Submit

9.8 Appendix H - MWSB Watercourse Crossing Guidelines

MWSB WATERCOURSE CROSSING GUIDELINES

Mitigation Measure:

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

Reclamation:

- Restore all disturbed areas to original contours.
- 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:
 - A record of drilling progress will be maintained to always know the location of the drill head relative to the point of entry.
 - A record of drilling component usage (type and quantity) will be maintained throughout each drilling operation.
 - 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 construction field supervisor.
 - 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:

- 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.
- The contractor will notify the MWSB construction field supervisor of the frac-out condition or potential condition and decide on the appropriate action as follows:
- Assign a person to visually monitor for the presence of muddy plume.
- 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.
- 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.
- 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.
- If the frac-out is not contained within this time, MWSB 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.

ENVIRONMENT ACT PROPOSAL RURAL MUNICIPALITY OF YELLOWHEAD SHOAL LAKE WATER TREATMENT PLANT CONCENTRATE DISCHARGE

August 2016

Prepared by:



Unit #1A - 2010 Currie Blvd.,
Brandon MB R7B 4E7

